

# Appendix A

[¶ 43] There is no need to address the constitutional issue raised by Nissan, namely that changes in South Dakota statutes which became effective after the Nissan–Krantz franchise agreement could not constitutionally be applied to Nissan.

[¶ 44] Now, therefore,

[¶ 45] IT IS ORDERED, as follows:

1) The motion (Doc. 60) of plaintiffs in CIV. 05–1015 for leave to respond to the summary judgment motion and required statement of material facts is denied.

2) The motion (Doc. 54) of Nissan for a summary judgment in CIV. 05–1015 is granted.

3) The motion (Doc. 23) of Krantz in CIV. 05–3018 “for hearing and for leave to file reply brief” is denied.

4) The Order entered by the hearing officer of the Office of Hearing Examiners as filed in CIV 05–3018 is affirmed and adopted; the appeal by Krantz is denied with prejudice.



**The NAVAJO NATION,  
et al., Plaintiffs,**

v.

**U.S. FOREST SERVICE,  
et al., Defendants.**

**Nos. CV 05–1824–PCT–PGR, CV 05–  
1914–PCT–EHC, CV 05–1949–PCT–  
NW, CV 05–1966–PCT–JAT.**

United States District Court,  
D. Arizona.

Jan. 11, 2006.

**Background:** Various Native American tribes, their members and environmental organization brought action challenging the Forest Service’s decision to authorize upgrades to facilities at an existing ski area in the Coconino National Forest. Par-

ties filed cross-motions for summary judgment on non-Religious Freedom Restoration Act (RFRA), and proceeded to trial on RFRA claims.

**Holdings:** The District Court, Rosenblatt, J., held that:

- (1) Forest Service fully discharged its National Environmental Policy Act (NEPA) responsibilities by preparing an environmental impact statement (EIS) with public involvement;
- (2) Forest Service complied with its obligations under the National Historic Preservation Act (NHPA);
- (3) by following all applicable statutes in authorizing upgrades to facilities at an existing ski area in national forest, the Forest Service satisfied its fiduciary duty to the local tribes; and
- (4) Forest Service’s decision did not violate RFRA.

Defendant’s motion granted; RFRA claims dismissed.

### 1. Environmental Law ⇐689

In reviewing a required environmental impact statement (EIS), court must determine whether the document contained a reasonably thorough discussion of the significant aspects of the probable environmental consequences; courts should employ a “rule of reason” standard to make that finding, and once the court is satisfied that a proposing agency has taken the requisite hard look at a decision’s environmental consequences, the review is at an end. National Environmental Policy Act of 1969, § 102, 42 U.S.C.A. § 4332.

### 2. Environmental Law ⇐604(2)

In authorizing upgrades to facilities at an existing ski area in national forest, the Forest Service fully discharged its National Environmental Policy Act (NEPA) responsibilities by preparing an

environmental impact statement (EIS) with public involvement; statement of purposes and needs for the ski area proposal permitted the Forest Service to evaluate a reasonable range of alternatives, Forest Service adequately considered the cumulative impacts and/or indirect effects of diverting 1.5 million gallons of reclaimed water a day from aquifer to the ski area for snowmaking, conducted a reasonable scientific analysis of the environmental impacts of the proposed snowmaking based on the best available scientific evidence, properly evaluated and disclosed all comments and reasonable opposing scientific viewpoints that were available during the NEPA process, and made decisional materials publicly available before its final decision was rendered. National Environmental Policy Act of 1969, § 102, 42 U.S.C.A. § 4332.

### 3. Environmental Law ¶601, 689

Under National Environmental Policy Act (NEPA), range of alternatives discussed in environmental impact statement (EIS) is reviewed under a rule of reason that requires an agency to set forth only those alternatives necessary to permit a reasoned choice; NEPA does not require a separate analysis of alternatives which are not significantly distinguishable from alternatives actually considered, or which have substantially similar consequences, but does require federal agencies to rigorously explore and objectively evaluate all reasonable alternatives. National Environmental Policy Act of 1969, § 102, 42 U.S.C.A. § 4332; 40 C.F.R. § 1502.14.

### 4. Environmental Law ¶600

With regard to its environmental impact statement (EIS), an agency is entitled to wide discretion in assessing the scientific evidence, so long as it takes a hard look at the issues and responds to reasonable opposing viewpoints. National Environmental Policy Act of 1969, § 102, 42 U.S.C.A. § 4332; 40 C.F.R. § 1500.1(b).

## 5. Environmental Law ¶84

### Woods and Forests ¶8

Forest Service complied with its obligations under the National Historic Preservation Act (NHPA) in authorizing upgrades to facilities at an existing ski area in national forest; memorandum of agreement (MOA) with affected Indian tribes, which required access before, during and after construction, protection and regeneration of plants of traditional importance, that the Forest Service work to ensure that current ceremonial activities continue uninterrupted, that the Forest Service protect shrines, that tribes be provided water-quality information, and that projects take advantage of previously-disturbed areas where practicable, adequately described the steps to mitigate the potential adverse effects of the proposed project. National Historic Preservation Act, § 106, 16 U.S.C.A. § 470f; 36 C.F.R. § 800.1.

## 6. Environmental Law ¶536

In authorizing upgrades to facilities at an existing ski area in national forest, Forest Service did not violate National Forest Management Act (NFMA) by inadequately addressing potential impacts on certain management indicator species (MIS); Forest Service plan did not require the Forest Service to evaluate the impacts of the proposal on MIS because there were no MIS assigned to the management area where the ski area was located. Forest and Rangeland Renewable Resources Planning Act of 1974, § 2 et seq., 16 U.S.C.A. § 1600 et seq.

## 7. Indians ¶12

### United States ¶57

Grand Canyon Enlargement Act (GCEA) did not impose any limitations on the government's uses of lands outside the Havasupai reservation and did not restrict activities on lands outside the Havasupai reservation. Grand Canyon National Park

Enlargement Act, § 10(a), 16 U.S.C.A. § 228i(a).

#### 8. Environmental Law ⇌659

Court was without the jurisdiction to consider Indian tribe's claim that Forest Service violated the Endangered Species Act (ESA) in its approval of the proposed project where tribe did not first provide written notice of the alleged violation to the Secretary of the Interior sixty days in advance of filing suit. Endangered Species Act, § 11(g)(2)(A)(i), 16 U.S.C.A. § 1540(g)(2)(A)(i).

#### 9. Indians ⇌4

By following all applicable statutes in authorizing upgrades to facilities at an existing ski area in national forest, the Forest Service satisfied its fiduciary duty to the local tribes.

#### 10. Civil Rights ⇌1032

Under Religious Freedom Restoration Act (RFRA), a law of general applicability that provides conduct that substantially burdens a person's exercise of religion is invalid unless the law is the least restrictive means of serving a compelling government interest. Religious Freedom Restoration Act of 1993, § 2(b), 42 U.S.C.A. § 2000bb-1(b).

#### 11. Civil Rights ⇌1406

To establish a prima facie case under Religious Freedom Restoration Act (RFRA), a plaintiff must show that the law substantially burdens his ability to freely exercise his religion; once a plaintiff has established a prima facie case, the burden shifts to the defendant to demonstrate that the law furthers a "compelling interest" using the least restrictive means. Religious Freedom Restoration Act of 1993, § 2(b)(1), 42 U.S.C.A. § 2000bb(b)(1).

#### 12. Civil Rights ⇌1032, 1406

A Religious Freedom Restoration Act (RFRA) plaintiff has the burden of showing that the government's action burdens

the adherent's practice of his or her religion by pressuring him or her to commit an act forbidden by the religion or by preventing him or her from engaging in conduct or having a religious experience which the faith mandates. Religious Freedom Restoration Act of 1993, § 2(b), 42 U.S.C.A. § 2000bb-1(b).

#### 13. Civil Rights ⇌1073

Under Religious Freedom Restoration Act (RFRA), government's land management decision will not be a "substantial burden" absent a showing that it coerces someone into violating his or her religious beliefs or penalizes his or her religious activity. Religious Freedom Restoration Act of 1993, § 2(b), 42 U.S.C.A. § 2000bb-1(b).

#### 14. Civil Rights ⇌1073

On its own, Religious Freedom Restoration Act (RFRA) does not provide a freestanding right to free exercise of religion on another's property. Religious Freedom Restoration Act of 1993, § 2(b), 42 U.S.C.A. § 2000bb-1(b).

#### 15. Civil Rights ⇌1073

Native American tribes failed to establish prima facie case that Forest Service's approval of upgrades to facilities at an existing ski area on national forest lands considered sacred to Native American tribes violated Religious Freedom Restoration Act (RFRA); the decision, which did not bar tribes' access, use, or ritual practice on the lands, did not coerce tribes into violating their religious beliefs or penalize their religious activity since they identified no shrines or religious ceremonies that would be impacted by the decision. Religious Freedom Restoration Act of 1993, § 2(b), 42 U.S.C.A. § 2000bb-1(b).

**16. Civil Rights** ¶1073

Forest Service's decision to authorize upgrades to an existing ski area on national forest lands considered sacred to Native American tribes was not a violation of Religious Freedom Restoration Act (RFRA); Forest Service had a compelling interest in authorizing upgrades at national forest ski area to ensure that users of the ski area had a safe experience, to ensure compliance with the Establishment Clause and to manage the public land for recreational uses, and Forest Service chose the least restrictive means for achieving its land management decision. U.S.C.A. Const.Amend. 1; Religious Freedom Restoration Act of 1993, § 2(b), 42 U.S.C.A. § 2000bb-1(b); Forest and Rangeland Renewable Resources Planning Act of 1974, § 6(e), 16 U.S.C.A. § 1604(e).

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1. The Complaint for the Navajo Nation and the Sierra Club was initially filed on June 17, 2005. However, on June 23, 2005, before the Complaint was served, the Navajo Nation and Sierra Club filed a First Amended Complaint that added as Plaintiffs the White Mountain Apache Tribe, the Yavapai-Apache Tribe, the Center for Biological Diversity and the Flagstaff Activist Network. These parties will be referred to as the Navajo Plaintiffs throughout this opinion. Shortly after the Navajo Plaintiffs amended their Complaint, three separate Complaints were filed by: (1) Hualapai Tribe, Norris Nez, and Bill Bucky Preston ("Hualapai Plaintiffs"); (2) Rex Tilousi, Dianna Uqualla, and the Havasupai Tribe ("Havasupai Plaintiffs"); and (3) the Hopi Tribe. On unopposed motion, these matters were transferred and consolidated with the instant action on July 13, 2005.

Brown & Lacounte LLP, Madison, WI, Anthony Scott Canty, Lynelle Kym Hartway, Hopi Indian Tribe, Office of General Counsel, Kykotsmovi, AZ, for Plaintiffs.

Rachel Anne Dougan, US Dept. of Justice, Washington, DC, for Defendants.

Janice M. Schneider, Latham & Watkins, LLP, Washington, DC, Bruce Babbitt, Washington, DC, Philip A. Robbins, Paul G. Johnson, Robbins & Green, PA, Phoenix, AZ, for Arizona Snowbowl Resort Limited Partnership.

**ORDER**

ROSENBLATT, District Judge.

This consolidated matter comes before the Court on the parties' cross-motions for summary judgment and following a bench trial on Plaintiffs' claims brought under the Religious Freedom Restoration Act, 42 U.S.C. §§ 2000bb-2000bb-4 ("RFRA").<sup>1</sup> The Court now makes its ruling.

**I. Factual Background**

This case involves a challenge to the Forest Service's decision to authorize upgrades to facilities at the Arizona Snowbowl ("Snowbowl"), an existing ski area in the Coconino National Forest ("CNF").<sup>2</sup> The Plaintiffs in this consolidated case include the Navajo Nation, the Hopi Tribe,

1. The Complaint for the Navajo Nation and the Sierra Club was initially filed on June 17, 2005. However, on June 23, 2005, before the Complaint was served, the Navajo Nation and Sierra Club filed a First Amended Complaint that added as Plaintiffs the White Mountain Apache Tribe, the Yavapai-Apache Tribe, the Center for Biological Diversity and the Flagstaff Activist Network. These parties will be referred to as the Navajo Plaintiffs throughout this opinion. Shortly after the Navajo Plaintiffs amended their Complaint, three separate Complaints were filed by: (1) Hualapai Tribe, Norris Nez, and Bill Bucky Preston ("Hualapai Plaintiffs"); (2) Rex Tilousi, Dianna Uqualla, and the Havasupai Tribe ("Havasupai Plaintiffs"); and (3) the Hopi Tribe. On unopposed motion, these matters were transferred and consolidated with the instant action on July 13, 2005.

2. The current proposal does not seek to expand the existing Snowbowl Special Use Permit ("SUP") of 777-acres, but instead, seeks to upgrade the Snowbowl's existing facilities and infrastructure. Many of the activities approved by the current Snowbowl decision were previously authorized by the 1979 Environmental Impact Statement ("EIS"), and all of the approved activities are within the preexisting permit boundary.

the Havasupai Tribe, the Hualapai Tribe, the Yavapai Apache Nation, the White Mountain Apache Nation, Bill Bucky Preston (a member of the Hopi Tribe), Norris Nez (a member of the Navajo Nation), Rex Tilousi (a member of the Havasupai Tribe), Dianna Uqualla (a member of the Havasupai Tribe), the Sierra Club, the Center for Biological Diversity, and the Flagstaff Activist Network. The Defendants are the United States Forest Service ("Forest Service"), Nora Rasure, the Forest Supervisor, and Harv Forsgren, who was the appeal deciding officer and Regional Forester. Both Ms. Rasure and Mr. Forsgren were named as Defendants in their individual capacity. In addition, the Arizona Snowbowl Resort Limited Partnership ("ASR"), the current owner and operator of the facilities located at the Snowbowl ski area, moved to intervene in these proceedings on June 27, 2005. After receiving briefing on ASR's motion and hearing oral argument, the Court granted ASR's Motion to Intervene (Doc. 45) on July 18, 2005.

The Snowbowl lies on the western flank of the San Francisco Peaks ("Peaks"), and is operated under a 777-acre Forest Service-issued SUP, which is renewable on a 40-year basis. The CNF Land and Resource Management Plan ("Forest Service Plan"), which was subject to its own process under the National Environmental Policy Act ("NEPA") and adopted in 1987, designates the entirety of the Snowbowl SUP as a "Developed Recreation Site." Under the Forest Service Plan, the Snowbowl is located within management area ("MA") 15, which has a management emphasis of developed recreation, including the Snowbowl recreation facilities. Furthermore, the Snowbowl is surrounded on three sides by the 18,963-acre Kachina Peaks Wilderness, which is designated as MA 1 and managed for wilderness values.

The Snowbowl has been used as a ski area since 1938. In 1979, the Forest Service conducted an extensive process pursuant to NEPA to evaluate proposed upgrades to the Snowbowl, which included the installation of new lifts, trails and facilities. Specifically, the 1979 Snowbowl decision approved 206 acres of skiable terrain and facilities to support a comfortable carrying capacity ("CCC")—the number of guests that the Snowbowl facilities could comfortably carry at one time—of 2,825 skiers. The Forest Service's decision to approve the proposed action was challenged in court by several Indian tribes. The tribes asserted that development of the Peaks would be a profane act, and an affront to the deities, and that, in consequence, the Peaks would lose their healing power and otherwise cease to benefit the tribes. *Wilson v. Block*, 708 F.2d 735, 738 (D.C.Cir.1983), *cert. denied*, 464 U.S. 956, 104 S.Ct. 371, 78 L.Ed.2d 330 (1983). In addition, the tribes argued that development would seriously impair their ability to pray and conduct ceremonies upon the Peaks. *Id.* However, the District of Columbia Court of Appeals eventually upheld the Forest Service's decision to move forward with the upgrades. *Id.* at 760.

Since 1979, the Snowbowl has operated under the direction of the EIS upheld in *Wilson*. Many of the improvements authorized by the Forest Service in 1979, and later upheld by the *Wilson* decision, have been implemented over the years. However, in September of 2002, ASR sought to implement the remaining previously authorized upgrades (including cutting certain ski runs), and submitted a formal proposal to implement snowmaking at the facility using A+ reclaimed water. After an extensive environmental review under NEPA that spanned several years of public participation, tribal consultation and input, and analysis, the Forest Service ultimately approved ASR's proposal.

Specifically, in February of 2005, Forest Supervisor Nora Rasure issued a Final Environmental Impact Statement (“FEIS”) and a Record of Decision (“ROD”). The Forest Service’s ROD approved, in part: (a) approximately 205 acres of snowmaking coverage throughout the area, utilizing reclaimed water; (b) a 10 million-gallon reclaimed water reservoir near the top terminal of the existing chairlift and catchments pond below Hart Prairie Lodge; (c) construction of a reclaimed water pipeline between Flagstaff and the Snowbowl with booster stations and pump houses; (d) construction of a 3,000 to 4,000 square foot snowmaking control building; (e) construction of a new 10,000 square foot guest services facility; (f) an increase in skiable acreage from 139 to 205 acres—an approximate 47% increase;<sup>3</sup> and (g) approximately 47 acres of thinning and 87 acres of grading/stumping and smoothing. The Plaintiffs appealed the Forest Supervisor’s decision, and the Forest Service’s Southwestern Regional Office arranged a technical review team to evaluate the administrative appeals. On June 8, 2005, the Forest Service issued its final administrative decision and affirmed the Forest Supervisor’s original conclusions. This litigation followed.<sup>4</sup>

On August 12, 2005, the parties filed cross-motions for summary judgment on, in part, claims brought pursuant to the

3. It is important to note that although only 139 acres of skiable terrain currently exist at the Snowbowl, the *Wilson* decision specifically approved 206 acres of skiable terrain. Accordingly, the current proposal, to the extent it seeks to increase skiable acreage, is fully consistent with the D.C. Circuit’s previous ruling in 1983 upholding the Forest Service’s 1979 decision.

4. Shortly after filing their complaints, the Plaintiffs filed a Motion for Temporary Restraining Order Or, In the Alternative, Preliminary Injunction (Doc. 5). A few days later, the Plaintiffs filed a Stipulated Motion to

Administrative Procedure Act, 5 U.S.C. §§ 701–706 (“APA”). The APA claims are based on the Forest Service’s alleged failure to comply with requirements of NEPA, 42 U.S.C. §§ 4321–4307d (“NEPA”), the National Historic Preservation Act, 16 U.S.C. §§ 470 *et seq.* (“NHPA”), RFRA, 42 U.S.C. §§ 2000bb–2000bb–4 (“RFRA”), the Endangered Species Act, 16 U.S.C. § 1531 *et seq.* (“ESA”), the Grand Canyon National Park Enlargement Act, 16 U.S.C. § 228i (“GCEA”), and the National Forest Management Act, 16 U.S.C. §§ 1600–1687 (“NFMA”). In addition, an alleged failure of the Forest Service to comply with its trust responsibility to the tribes was included in these motions.

## II. Legal Standard and Analysis

In reviewing administrative agency decisions, the function of the district court is to determine, as a matter of law, whether evidence in the administrative record permitted the agency to render the decision it did. Accordingly, summary judgment is an appropriate mechanism for deciding the legal question of whether an agency could reasonably have found the facts as it did.

A person suffering legal wrong because of an agency action, or adversely affected or aggrieved by an agency action within the meaning of the relevant statute, is

Withdraw Plaintiffs’ Motion for Temporary Restraining Order (Doc. 12), and requested that the Court set a briefing schedule for Plaintiffs’ preliminary injunction motion. The stipulated motion was granted by the Court. On July 13, 2005, the Court heard oral argument on the Plaintiffs’ Motion for Preliminary Injunction. However, the request for relief was denied as moot after the parties agreed that ASR would not move forward with the project until after the Court ruled on the anticipated summary judgment motions and, if necessary, held a bench trial on the RFRA claims.

entitled to judicial review thereof. 5 U.S.C. § 702. Agency action made reviewable by statute, and final agency action for which there is no other adequate remedy in a court, are subject to judicial review. 5 U.S.C. § 704. Under the APA, a reviewing court may “hold unlawful and set aside agency action, findings and conclusions” that are found to be “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.” 5 U.S.C. § 706; *Center for Biological Diversity v. United States Forest Service*, 349 F.3d 1157, 1165 (9th Cir.2003). To determine whether agency action was arbitrary or capricious, a court must consider “whether the decision was based upon a consideration of the relevant factors and whether there has been a clear error of judgment.” *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 368, 109 S.Ct. 1851, 104 L.Ed.2d 377 (1989).

#### A. National Environmental Policy Act

The purpose of NEPA, 42 U.S.C. §§ 4321 *et seq.*, is to focus the attention of federal agencies and the public on a proposed action so that the environmental impacts of the action can be studied before a decision is made. By focusing the agency’s attention on the environmental consequences of a proposed project, NEPA ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 109 S.Ct. 1835, 104 L.Ed.2d 351, (1989). Accordingly, NEPA requires federal agencies to prepare an EIS for all “major federal actions significantly affecting the quality of the human environment.” 42 U.S.C. § 4332(2). However, NEPA

does not mandate certain substantive results, but instead prescribes the necessary process an agency must undergo to evaluate a proposed action’s potential environmental impact. *Methow Valley*, 490 U.S. at 350, 109 S.Ct. 1835.

[1] In reviewing the required EIS, the court must determine whether the document contained a “reasonably thorough discussion of the significant aspects of the probable environmental consequences.” *Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1519 (9th Cir.1992). Within the Ninth Circuit Court of Appeals, courts are directed to employ a “rule of reason” standard to make this finding. *Center for Biological Diversity*, 349 F.3d at 1166. Under the rule of reason standard, which is essentially applied in the same manner as the arbitrary and capricious standard, review consists only of ensuring that the agency has taken a hard look at the environmental effects of the proposed action.<sup>5</sup> *Id.* Once the court is satisfied that a proposing agency has taken the requisite hard look at a decision’s environmental consequences, the review is at an end. *Friends of the Southeast’s Future v. Morrison*, 153 F.3d 1059, 1063 (9th Cir.1998).

[2] It is the Plaintiffs’ position that the Forest Service failed to take the required hard look at the environmental consequences of its actions, and that as a result, the Forest Service’s actions were arbitrary, capricious and not otherwise in accordance with law. However, the Defendants and Intervenor respond that the Forest Service fully discharged its NEPA responsibilities by preparing an EIS with public involvement. Each NEPA violation alleged by the Plaintiffs is discussed individually below.

5. The Court notes that the adjective “hard,” and the phrase “hard look,” are subject to at least twenty-five different definitions or meanings. Nevertheless, the parties have used the

phrase “hard look” to define the nature of the inquiry required of the Forest Service; therefore, it is reluctantly adopted by the Court.

### 1. Statement of Purpose and Need

The Plaintiffs in this case allege that the stated purpose and need for the proposed action is impermissibly narrow, improperly focused solely on improving the Snowbowl's financial viability, and based on faulty data. The Defendants and Intervenor assert that the stated purpose and need is reasonable and provided the basis for the Forest Service's consideration of a reasonable range of alternatives. The Forest Service identified the overall purpose and need for the project as follows: (1) to ensure a consistent and reliable operating season, thereby maintaining the economic viability of the Snowbowl and stabilizing employment levels and winter tourism within the local community; and (2) to improve safety, skiing conditions, and recreational opportunities, bringing terrain and infrastructure into balance with current use levels.

The regulations implementing NEPA explain that an EIS "shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." 40 C.F.R. § 1502.13. Furthermore, the Ninth Circuit has determined that agencies should be afforded considerable discretion in defining the purpose and need of a project. *Morrison*, 153 F.3d at 1066. However, this discretion is not without limitations. *Id.* For example, "an agency cannot define its objectives in unreasonably narrow terms." *City of Carmel-By-The-Sea v. United States Dep't. of Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1997); see also *City of New York v. United States Dep't of Transp.*, 715 F.2d 732, 743 (2d Cir.1983) ("[A]n agency will not be permitted to narrow the objective of its action artificially and thereby circumvent the requirement that relevant alternatives be considered.").

The Court concludes that the Forest Service's statement of purpose and need

for the proposed project is not unreasonable. See *City of Carmel-By-The-Sea*, 123 F.3d at 1155 (Forest Service's statement of purposes is to be evaluated under a reasonableness standard). The Forest Service Plan, which the Forest Service points out was subject to its own NEPA process, designates the entirety of the Snowbowl SUP as a "Developed Recreation Site." Under the Forest Service Plan, the Snowbowl is located within MA 15, which has a management emphasis of developed recreation, including the Snowbowl recreation facilities. Furthermore, the Final EIS explains that the proposed action "responds to the goals and objectives outlined in the Forest Service Plan, and helps move the project area towards desired conditions described in it." For example, the FEIS states that one purpose of the proposed action is to "ensure a consistent and reliable operating season" at the Snowbowl. According to the Forest Service, because skier visits at the Snowbowl are directly correlated to the amount of snow on the ground, the significant variability in snowfall has resulted in an inconsistent operating season. In addition, the goal of providing a reliable ski season is consistent with the Forest Service's multiple-use mandate and direction to provide recreational opportunities for the public.

The Court notes that the FEIS also identifies the need "to improve safety, skiing conditions, and recreational opportunities by bringing existing terrain and infrastructure into balance with existing demand." For example, the Forest Service identified a need to "[i]mprove the quantity and distribution of beginner and intermediate (including low intermediate and advanced intermediate) terrain and skier safety by developing additional terrain within the existing SUP area." The FEIS adequately documents that the Snowbowl has a deficit of intermediate and beginner terrain when compared to

ski industry norms. In sum, the Court concludes that the Forest Service developed a reasonable statement of purposes and needs under the standard developed by the Ninth Circuit.

## 2. Reasonable Range of Alternatives

Next, the Plaintiffs contend that the Forest Service violated NEPA by failing to consider a reasonable range of alternatives. For example, the Navajo Plaintiffs contend that the Forest Service should have considered a proposal to close the ski area, a buy-out by the tribes, or an alternative with reduced snowmaking coverage. In addition, the Havasupai Plaintiffs maintain that the Forest Service should have considered water trading. In response, the Forest Service states that it did, in fact, consider many of the alternatives raised by the Plaintiffs, but reasonably eliminated them from more detailed evaluation because they did not meet the purposes and needs for the proposed action. Moreover, the agency points out that many of the alternatives proposed by the Plaintiffs do not represent feasible propositions.

The Code of Federal Regulations requires that only reasonable alternatives be considered. 40 C.F.R. § 1502.14.

In this section agencies shall:

- (a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.
- (b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.
- (c) Include reasonable alternatives not within the jurisdiction of the lead agency.
- (d) Include the alternative of no action.
- (e) Include appropriate mitigation

measures not already included in the proposed action or alternatives.

40 C.F.R. § 1502.14.

[3] “An agency’s discussion of alternatives must be bound by some notion of feasibility.” *Muckleshoot v. United States Forest Service*, 177 F.3d 800, 814 (9th Cir. 1999). In addition, an agency need not consider every available alternative. *Headwaters, Inc. v. Bureau of Land Management*, 914 F.2d 1174, 1180 (9th Cir. 1990). The range of alternatives is reviewed under a rule of reason that requires an agency to set forth only those alternatives necessary to permit a reasoned choice. *Id.* NEPA does not require a separate analysis of alternatives which are not significantly distinguishable from alternatives actually considered, or which have substantially similar consequences. *Id.* at 1181. However, NEPA does require federal agencies to rigorously explore and objectively evaluate all reasonable alternatives. With respect to alternatives that were eliminated from detailed study, NEPA simply requires a brief discussion of the reasons for their elimination. 40 C.F.R. § 1502.14(a). As the parties correctly identify, “[t]he existence of reasonable but unexamined alternatives renders an EIS inadequate.” *Morrison*, 153 F.3d at 1065; *see also Muckleshoot*, 177 F.3d at 814.

A review of the EIS shows that the Forest Service gave detailed consideration to three alternatives: (1) the no action alternative; (2) the proposed action; and (3) the no snowmaking or snowplay alternative, which responds to public concerns over the use of reclaimed water on the Peaks. Furthermore, the Forest Service also gave consideration to an alternative to remove the ski area; several alternatives that would have included night lighting; an alternative with a lower amount of new skiable terrain; an alternative with re-

duced snowmaking coverage; alternatives that would have included summer recreational activities such as mountain biking; alternatives that would have used on-site or nearby water sources instead of reclaimed water; and an alternative that would have used other pipeline alignments. In addition, the Court concludes that the Forest Service properly eliminated closure of the Snowbowl from detailed analysis because it did not meet the stated purposes and needs for the proposed action. Since the Coconino Forest Service Plan instructs that the 777 acres of the Snowbowl be managed to emphasize developed recreations, an alternative that would dismantle the ski area was certainly outside the scope of the proposed action and need not have been considered in detail. As the Ninth Circuit has previously stated, “[w]hen the purpose is to accomplish one thing, it makes no sense to consider the alternative ways by which another thing might be achieved.” *City of Angoon v. Hodel*, 803 F.2d 1016, 1021 (9th Cir.1986).

The statement of purposes and needs for the Snowbowl proposal permitted the Forest Service to evaluate a reasonable range of alternatives. The Plaintiffs bear the

burden of demonstrating to the Court that they brought a reasonable alternative to the Forest Service’s attention during the public NEPA process, and that such an alternative was not adequately considered. *City of Angoon*, 803 F.2d at 1021–22. The Plaintiffs have failed to meet this burden.<sup>6</sup> Accordingly, the Court concludes that the Forest Service did not act unreasonably in rejecting the various alternatives raised by the Plaintiffs during the project’s public scoping process.

### 3. Cumulative and Indirect Impacts

#### a. Impacts of Diverting 1.5 Million Gallons of Reclaimed Water a Day

The Plaintiffs contend that the Forest Service failed to take the requisite hard look at the environmental impacts of the Snowbowl expansion project by neglecting to consider the cumulative impacts and/or indirect effects of diverting 1.5 million gallons of reclaimed water a day from Flagstaff’s aquifer to the Snowbowl for snowmaking.<sup>7</sup> The Plaintiffs assert that “the proposed snowmaking will result in a decrease to the aquifer” and point to a technical report prepared by Peter Schwartz-

6. Many of the reasonable alternatives Plaintiffs now advance in their respective motions for summary judgment were never raised in the NEPA comment process or in the administrative appeals. Accordingly, this failure now bars them from judicial review due to the requirement of exhaustion. For example, although they now claim otherwise, not one tribal plaintiff comment letter or appeal letter mentions the buy-out alternative now advanced by the Navajo Plaintiffs. However, the Court notes that even if the alternative was properly raised before the Forest Service, it is not significantly distinguishable from an alternative to close the ski area, which was considered. See *Headwaters*, 914 F.2d at 1180–81.

7. The Plaintiffs also maintain that the Forest Service failed to address the cumulative and indirect impacts on noise, on aesthetics, on

traffic and ski area access, and on wildlife and habitat. However, a review of the FEIS reveals that the Forest Service specifically evaluated and disclosed the anticipated effects of each of these categories. For example, regarding noise impacts, the Forest Service determined that from a distance of 1.5 miles and closer, the snowmaking system would be audible and above ambient noise levels. With respect to impacts on aesthetics, the Forest Service used the Visual Management System—a landscape management tool—to evaluate the proposed action’s impacts to certain visual quality objectives and disclosed the cumulative visual effects in the FEIS. In addition, the FEIS documents careful consideration of impacts to traffic and ski area access in Section 3C. Lastly, Section 3K of the FEIS contains a detailed analysis of the Snowbowl proposal’s potential impacts on wildlife.

man and Abe Springer, along with other public comments as the basis for their argument. However, the Court concludes that the Forest Service did not refuse or fail to consider this impact.

A review of the FEIS reveals that the Forest Service identified the proposed action's potential impacts on aquifer recharge as an area requiring additional analysis and disclosure. The Snowbowl FEIS Section on Watershed Resources—Chapter 3H—specifically analyzed the potential long-term effects on the regional aquifer from diversions of reclaimed water for snowmaking. For example, the agency contracted hydrologists to study “precipitation; water loss to evaporation, transpiration, and sublimation; and the resulting water available for groundwater recharge or surface water run off.” This data was then used to analyze how much water would be available for recharge to the regional aquifer. The Forest Service found that the proposed snowmaking would result in a reduction in groundwater recharge to the regional aquifer of slightly less than two percent of the City of Flagstaff's total annual water production. The cumulative watershed impact as a result of the diversion was determined to be negligible to moderate.<sup>8</sup> The Court also notes that in reaching this estimate, the Forest Service considered, among other sources, the Schwartzmann and Springer report raised by the Plaintiffs. In sum, the record demonstrates and the Court is satisfied that the Forest Service responded to concerns about the impacts to recharge of the aquifer by conducting reasonable analysis.

#### **b. Impacts of Snowmaking Using Reclaimed Water**

Next, the Plaintiffs contend that the Forest Service failed to conduct a reason-

able scientific analysis of the environmental impacts of the proposed snowmaking. However, the Defendants and Intervenor maintain that the Forest Service took a hard look at the impacts of snowmaking using reclaimed water. The Court concludes that the record shows that the Forest Service conducted a reasonable scientific analysis of the environmental impacts of the proposed snowmaking based on the best available scientific evidence.

First and foremost, it is important for the Court to note that the Arizona Department of Environmental Quality (“ADEQ”) has adopted water quality standards for the direct reuse of reclaimed water aimed at protecting health and the environment. Furthermore, the ADEQ specifically allows Class A+ reclaimed water—the class of water to be used at the Snowbowl—for direct reuse in snowmaking. As such, the Forest Service properly relied, in part, upon the ADEQ's determination that snowmaking is an acceptable and safe use of reclaimed water. In addition, the Forest Service evaluated extensive data monitoring Class A+ reclaimed water from the Rio de Flag WRF for wastewater constituent, as well as monitoring for metals, organic chemicals, and other parameters. Furthermore, the Forest Service also retained experts in hydrogeology to evaluate the effects of reclaimed water use on the quantity and quality of groundwater. In sum, the Court determines that the agency took a hard look at the effects of using Class A+ reclaimed water to make artificial snow at the Snowbowl.

#### **4. Opposing Scientific Viewpoints**

The Plaintiffs claim that the Forest Service failed to consider certain scientific evidence about the use of reclaimed water.

<sup>8</sup> Even with the amount of reclaimed water diverted to the Snowbowl, the Rio de Flag Water Reclamation Facility (“WRF”) would

still have over 500,000 gallons per day available for release to the Rio de Flag.

Specifically, the Plaintiffs contend that the Forest Service failed to adequately discuss and disclose the results of the studies conducted by the United States Geological Survey (“U.S.G.S.”) and Dr. Catherine Propper and the report submitted by Dr. Paul Torrence.<sup>9</sup> The Defendants and Intervenor maintain that the Forest Service adequately evaluated and responded to all reasonable opposing scientific viewpoints submitted during the NEPA process.

[4] The Council on Environmental Quality’s (“CEQ”) regulations delineate the analysis that environmental impact statements must contain. Specifically, the agency “shall discuss at appropriate points in the final statement any responsible opposing view which was not adequately discussed in the draft statement and shall indicate the agency’s response to the issues raised.” 40 C.F.R. § 1502.9(b); *Center for Biological Diversity*, 349 F.3d at 1167. This disclosure requirement obligates the agency to make available to the public high quality information, including accurate scientific analysis and expert agency comments, before decisions are made and actions are taken. 40 C.F.R. § 1500.1(b). Furthermore, “an agency is entitled to wide discretion in assessing the scientific evidence, so long as it takes a hard look at the issues and responds to reasonable opposing viewpoints.” *Earth Island Institute v. U.S. Forest Service*, 351 F.3d 1291, 1301 (9th Cir.2003). “Because analysis of scientific data requires a high level of technical expertise, courts must defer to the informed discretion of the responsible federal agencies.” *Id.* “When specialists express conflicting views, an agency must have discretion to rely on the

reasonable opinions of its own experts, even if a court may find contrary views more persuasive.” *Marsh*, 490 U.S. at 377, 109 S.Ct. 1851.

In this case, the record demonstrates that the agency evaluated and disclosed the research by Dr. Propper. For example, the FEIS explains that Dr. Propper “conducted in vitro (test tube) and in vivo (whole body) tests of Flagstaff wastewater effluent to evaluate vertebrate behavior and physiological effects on the endocrine system.” In addition, her project proposal and the results of her research are included in the Administrative Record. The Forest Service included within the FEIS the conclusion that the “proposed use of reclaimed water for snowmaking at the Arizona Snowbowl will not result in comparable environmental exposure as investigated by Dr. Propper.” Based on the Forest Service’s analysis and disclosure of Dr. Propper’s research, the Court cannot conclude that the agency violated NEPA.

In addition, the Forest Service also responded to the concerns voiced by Dr. Torrence within the FEIS. Dr. Torrence’s comments made in response to the DEIS all focus on variations of the same allegation: that the agency failed to fully consider the range of implications of endocrine disruptors that may be present in reclaimed water. However, a review of the FEIS reveals that the Forest Service considered the presence of synthetic organic chemicals from pharmaceutical and personal care products in water and the potential that some of the compounds will impact the endocrine system in wildlife and humans. The Forest Service explained that “[r]ecent research indicates

9. Dr. Catherine Propper, Ph.D., is an Associate Professor in the Department of Biological Sciences at Northern Arizona University (“NAU”). Dr. Paul Torrence holds a Ph.D. in organic chemistry and is a Professor of Chemistry and Biochemistry at NAU. He is also a

Full Investigator at the Arizona Cancer Center in Tucson. Both individuals submitted comments during the public scoping process concerning the potential health and environmental impacts of using reclaimed wastewater for snowmaking.

that endocrine disruptors have aquatic habitat impacts, but no health impacts, at concentrations found in receiving waters.” The FEIS explains that the agency’s analysis of this issue was based on its review of recent studies, as well as the Global Assessment on the State-of-the Science of Endocrine Disruptors, a report prepared by an expert panel on behalf of the World Health Organization.

The Court is satisfied that the Forest Service properly evaluated and disclosed all comments and reasonable opposing scientific viewpoints that were available during the NEPA process. Even if the Court were to find the viewpoints of Dr. Propper and Dr. Torrence more persuasive than the Forest Service’s interpretation of the overall scientific evidence, that would not be enough to declare the agency’s decision arbitrary and capricious. As indicated above, the Court is obligated to defer to the responsible federal agency’s informed assessment of the scientific evidence.

#### **5. Failure to Make Decisional Materials Available**

The Plaintiffs also argue that the Forest Service violated NEPA by failing to make decisional materials publicly available before its final decision was rendered. It is undisputed that the Forest Service was required to supplement the Snowbowl Project Record with certain documents that were part of the decision-making process. These documents—which included the Forest Service Plan and various letters sent to the tribes about the National Register nomination of the Peaks—were all referenced in record documents, even though they were not initially designated as part of the project record. Accordingly, any person seeking the information referenced or described in the project record would be aware of their existence. Under NEPA, an agency is required to “[m]ake environmental impact statements, the comments received, and any underlying docu-

ments available to the public pursuant to the provisions of the Freedom of Information Act [‘FOIA’].” 40 C.F.R. § 1506.6(f). The Court concludes that the Forest Service complied with this provision. As the Forest Service points out, all of the documents that were subject to release under FOIA were available upon request at any time during the NEPA process, and the Plaintiffs have offered no evidence to the contrary.

#### **B. National Historic Preservation Act**

The Plaintiffs argue that the Forest Service did not comply with its obligations under the NHPA. For example, the Plaintiffs contend that the tribes did not have a reasonable opportunity to participate in the resolution of the adverse effects of the proposed action. In addition, the Plaintiffs assert that the timing of the completion of the Memorandum of Agreement (“MOA”), before the end of the NEPA process, suggests that a NEPA decision had already been reached rendering the NHPA consultation inadequate.

The NHPA directs federal agencies to consider the effects of their undertakings on historic properties included in or eligible for inclusion in the National Register of Historic Places and to consult with certain parties before moving forward with an agency action. 16 U.S.C. § 470f; *see* 36 C.F.R. § 800.1. Regulations implementing the NHPA have been adopted by the Advisory Council on Historic Preservation (“ACHP”). The general procedure set forth in the applicable regulations requires an agency as early as possible, and in any event before taking any action that would foreclose the ACHP’s ability to comment, to identify any National Register or eligible property located within the area of the undertaking’s potential environmental impact which may be affected by the undertaking. 36 C.F.R. § 800.4. The agency must then determine the effect of a pro-

posed undertaking on any National Register or eligible property.

An effect occurs (1) “whenever any condition of the undertaking causes or may cause any change, beneficial or adverse, in the quality of the historical, architectural, archeological or cultural characteristics that qualify the property for the National Register,” or (2) when an undertaking “changes the integrity of location, design, setting, materials, workmanship, feeling, or association of the property” that contributes to its historic significance. 36 C.F.R. § 800.3(a) and (b); *Colorado River Indian Tribes v. Marsh*, 605 F.Supp. 1425, 1435 (D.Cal.1985).

When an effect is identified, the agency, in consultation with the State Historic Preservation Office (“SHPO”), must determine whether the effect would be adverse. This process includes applying the criteria of adverse effect, which includes: (1) destruction or alteration of all or part of a property; (2) isolation from or alteration of a property’s surrounding environment; (3) introduction of visual, audible, atmospheric elements that are out of character with the property or alter its setting . . . . 36 C.F.R. § 800.3(b); *Colorado River Indian Tribes*, 605 F.Supp. at 1435.

If the agency finds an adverse effect, then it must (1) prepare a Preliminary Case Report requesting the comments of the ACHP, (2) notify the SHPO of this request, and (3) undertake the consultation process set forth in § 800.6. *Colorado River Indian Tribes*, 605 F.Supp. at 1435.

10. For example, the agency has guaranteed traditional cultural practitioners access within and outside the SUP as well as free use of the ski lifts in the summer. The agency has also committed to working to protect any plants of traditional importance that may be subsequently identified in the project area. Also, to the extent practicable, the Forest Service has indicated that the final location of new ski trails will use previously-disturbed areas.

Under the consultation process set forth in § 800.6, the agency, the SHPO, and the Executive Director of the ACHP are the consulting parties who must “consider feasible and prudent alternatives to the undertaking that could avoid, mitigate, or minimize adverse effects on a National Register or eligible property.” 36 C.F.R. § 800.4(d). The consulting parties must then execute a MOA either specifying how the adverse effects will be avoided or mitigated, or acknowledging that they cannot be avoided or mitigated and specifying any recording, salvage, or other measure to minimize the adverse effects that shall be taken before the undertaking proceeds. *Id.* Although other parties may be invited to sign the MOA as well, their participatory signature is not required under the applicable regulations. *Id.* at 800.6(c)(2). Once the MOA is “executed and implemented pursuant to [the ACHP regulations]” it evidences the agency official’s compliance with § 106 of the NHPA. *Colorado River Indian Tribes*, 605 F.Supp. at 1436.

[5] For the Snowbowl project, the agency ultimately made a “Finding of Adverse Effect.” Accordingly, the record demonstrates that the agency then sought ways to avoid, minimize or otherwise mitigate the adverse effects that were associated with each of the three alternatives under consideration.<sup>10</sup> Furthermore, the record is replete with agency efforts to involve the tribes in the resolution of those identified adverse effects.<sup>11</sup> For example,

11. Throughout the tribal consultation process, the Forest Service made over 200 phone calls, held 41 meetings, and exchanged 245 letters with tribal representatives. Although the consultation process did not end with a decision the tribal leaders supported, this does not mean that the Forest Service’s consultation process was substantively and procedurally inadequate.

three separate letters were sent out and three sets of phone calls were made specifically requesting tribal input on the resolution of the adverse effects. These communications also included invitations for the tribes to meet and discuss the MOA. The record also reveals that the Forest Service sent each tribe a draft MOA along with an invitation to participate as a consulting party in further developing the agreement.

Ultimately, the Forest Service's consultation efforts resulted in the execution of a MOA among the required parties. Four Indian tribes, including two named Plaintiffs in this case, the Hualapai and the Yavapai-Apache Nation, also signed the MOA. The MOA adequately describes the steps to mitigate the potential adverse effects of the proposed projects; therefore, it fully satisfied the Forest Service's obligations under the NHPA.<sup>12</sup> The MOA includes steps that the Forest Service and ASR must take regardless of which alternative was ultimately chosen, including the obligation to continue to consult tribes to mitigate any adverse effects and to continue to guarantee access to the Peaks for traditional cultural activities. Among other things, the MOA requires: (1) access before, during and after construction; (2) protection and regeneration of plants of traditional importance; (3) that the Forest Service must work to ensure that current ceremonial activities continue uninterrupted; (4) that the Forest Service must protect shrines; (5) that tribes must be provided water-quality information; and (6) where practicable, projects must take advantage of previously-disturbed areas. Furthermore, the MOA also permits periodic inspections by tribal representatives,

12. The consultation process with the tribes did result in changes to the proposed action. For example, the Snowbowl's request to have night lighting at the facility was not approved by the Forest Service, in part, due to Tribal comments and religious concerns that authorizing night lighting would not permit the

including prior to construction in order to minimize the impact of the pipeline route.

With respect to the Plaintiffs' argument regarding the timing of the completion of the MOA, the Court finds it unpersuasive. As the Defendants point out, NHPA encourages agencies to combine the consultation efforts with the NEPA process. 36 C.F.R. § 800.8. Nomination of a specific historic property to the National Register is a separate process that need not be complete in order for the agency to meet its consultation obligations under the NHPA.

The Court finds it important to note that consultation on the proposed Snowbowl improvements formally began in 2002 and spanned a two year period; however, the Forest Service has been consulting with approximately 13 tribes or chapters about the religious and cultural significance of the Peaks since at least 1970. The record indeed demonstrates that the Forest Service made extensive, good faith efforts to seek tribal input on the religious and cultural significance of the Peaks, and provided a reasonable opportunity for the tribes to participate in the resolution of the proposal's potential adverse effects.

### C. National Forest Management Act

[6] The Plaintiffs claim that the Forest Service failed to ensure the viability of native species in the project area in violation of the National Forest Management Act, 16 U.S.C. §§ 1600-1687. Specifically, the Plaintiffs contend that the agency failed to adequately address potential impacts on certain management indicator

Peaks to rest at night. However, as the Plaintiffs point out, the removal of night lighting from the project proposal also addressed the fact that Flagstaff is a dark sky city. Furthermore, the Forest Service found that night lighting did not meet the purposes and needs for the project.

species (“MIS”). For example, the Plaintiffs maintain that the Forest Service was required to collect population data from the project area for three MIS (Abert and red squirrels and the pygmy nuthatch). However, the Forest Service responds that the agency was not required to collect population data on these MIS in the Snowbowl area at all and satisfied NFMA by using the most up-to-date data available to assess the potential impacts on forest-wide habitat and trends for the MIS. The Forest Service contends that it carefully evaluated the potential effects of the proposed activities and determined that the project would not harm MIS or other wildlife.

The Court concludes that the Defendants satisfied NFMA’s requirements by complying with the Coconino Forest Service Plan direction related to MIS. The currently applicable Forest Service regulations specify that pending revision of Forest Plans, National Forests have the option to utilize habitat data as to any obligation regarding MIS. 36 C.F.R. § 219.14(f). Furthermore, population monitoring is required only when the Forest Service Plan so provides. *Id.* Accordingly, a review of the FEIS shows that the Forest Service analyzed the effects of the Snowbowl alternatives on forest-wide habitat and trends for the MIS. The Forest Service concluded that, under the selected alternative, habitat modifying activities within the SUP area “would not alter habitat for MIS outside the SUP area.” As pointed out by the Forest Service, the Forest Service Plan does not require the Forest Service to evaluate the impacts of the proposal on MIS because there are no MIS assigned to the management area where the Snowbowl is located. However, the Court finds that the Forest Service did conduct a thorough assessment of the effects of the proposed reclaimed water pipeline on MIS in MAs 3, 4, 5 and 9 as the pipeline will cross those management areas.

#### E. Grand Canyon Enlargement Act

In their ninth claim for relief, the Havasupai Plaintiffs allege that the Forest Service violated the GCEA “by permitting an activity that will detract from the existing scenic and natural values of . . . lands [transferred to the Havasupai Tribe pursuant to the GCEA], [and] failing to keep them ‘forever wild.’” Specifically, the Plaintiffs assert that the lands transferred to the Havasupai Tribe will be “directly impacted by the spring melt from the Snowbowl’s snow made from reclaimed water.” However, because the Plaintiffs misconstrue the GCEA, summary judgment on this claim is granted in favor of the Defendants.

[7] As part of the GCEA, “Congress declared that an additional 185,000 acres were to be held in trust enlarging the reservation of the Havasupai Tribe.” *Havasupai Tribe v. United States*, 752 F.Supp. 1471, 1483 (D.Ariz.1990) (citing 16 U.S.C. § 228i(a)). However, the plain language of the GCEA and the legislative history described in the *Havasupai Tribe* opinion demonstrate that the GCEA does not impose any limitations on the government’s uses of other lands and cannot be read to restrict activities on lands outside the Havasupai reservation. 752 F.Supp. at 1471. As such, the Defendants are entitled to summary judgment on the Plaintiffs’ GCEA claim.

#### F. Endangered Species Act

[8] In its tenth claim for relief, the Hopi Plaintiffs allege that the Forest Service violated the ESA in its approval of the proposed project. However, prior to asserting such a claim in the district court the Plaintiffs were required to have first provided written notice of the alleged violation to the Secretary of the Interior sixty days in advance of filing suit. 16 U.S.C. § 1540(g)(2)(A)(i). Since the Hopi Plain-

tiffs did not provide such notice, this Court is without the jurisdiction to consider the claim. See *Southwest Center for Biological Diversity v. Bureau of Reclamation*, 143 F.3d 515, 520–22 (9th Cir.1998); *Save the Yaak Comm. v. Block*, 840 F.2d 714, 721 (9th Cir.1988) (holding that 60-day notice requirement was not met and the ESA claim must be dismissed for lack of jurisdiction). Accordingly, the Court grants summary judgment in the Defendants' favor on this particular claim.

#### G. Breach of Trust Claim

[9] The Plaintiffs allege that the issuance of the Snowbowl SUP constitutes a violation of the government's trust responsibility to the tribes. Although it is undisputed that the United States is indeed a trustee for the tribes, at issue in this case is whether that trust imposes any additional enforceable fiduciary duties upon Defendants with regard to the issuance of the SUP beyond compliance with generally applicable regulations and statutes. Based on the governing law, the Court concludes that no such additional trust duties exist. Although there may be a general fiduciary duty of the federal government owed to the tribes, "unless there is a specific duty that has been placed on the government with respect to Indians, this responsibility is discharged by the agency's compliance with general regulations and statutes not specifically aimed at protecting Indians."

13. The Havasupai Plaintiffs specifically argue that the Defendants breached their trust obligations by allegedly compromising the quality of the tribe's water, in violation of the GCEA. However, the Court previously concluded that the Plaintiffs have failed to state a violation of the GCEA and thus cannot use this statute to support its trust claim.

14. The Navajo and Hualapai Plaintiffs both assert that the Forest Service has violated its trust responsibilities by failing to comply with certain Executive Orders; however, since these Executive Orders are not independently

*Morongo Band of Mission Indians v. FAA*, 161 F.3d 569, 574 (9th Cir.1998). Because this case does not involve tribal property, the Forest Service's duty to the tribes is to follow all applicable statutes.<sup>13</sup> *Id.* Since the Court has found that the agencies did not violate any statutes during the approval for the Snowbowl project, the agency satisfied its fiduciary duty to the local tribes.<sup>14</sup>

#### D. Religious Freedom Restoration Act

Pursuant to RFRA, the Plaintiffs seek declaratory and injunctive relief that would: (1) declare that the selected alternative, as approved, violated RFRA; and (2) stop the Forest Service and ASR from taking steps in furtherance of the selected alternative. According to the Plaintiffs, the proposed upgrades to the Snowbowl, particularly the use of reclaimed water to make snow, will have negative, irreversible, and devastating effects to their religious, traditional and cultural practices. However, the Defendants and ASR assert that since there is no evidence that the decision will exclude tribal practitioners from the Peaks, no evidence of any diminution of access, no inability to collect medicinal or ceremonial plants and other materials, and no prohibition on holding religious ceremonies anywhere on the Peaks, there is, consequently, no substantial burden on the exercise of the Plaintiffs' religion.

enforceable, such claims have no merit. The Executive Orders cited by the Plaintiffs expressly state that they "are intended only to improve the internal management of the executive branch" and do not create any trust responsibility or right to judicial review. See Exec. Order No. 12,898, 59 Fed.Reg. 7629, 7632–33 (Feb. 11, 1994) (provision 6–609); Exec. Order No. 13,007, 61 Fed.Reg. 26771, 26772 (May 24, 1996 (Sec.4)); Exec. Order No. 13,175, 65 Fed.Reg. 67429, 67252 (Nov. 6, 2000) (Sec.10). Furthermore, the FEIS documents that the Forest Service considered these Executive Orders.

Although the parties all moved for summary judgment on their RFRA claims, the Court concluded that the claims were not suitable for disposition on summary judgment. Due to the necessity for the Court to make various factual findings, a bench trial was held to determine whether the proposed action placed a substantial burden on the Plaintiffs' exercise of their religion. Having reviewed the Administrative Record filed in this matter, the pleadings, annexed declarations and exhibits on the cross-motions for summary judgment, and having heard argument of counsel and testimony during an eleven-day bench trial, the Court makes the following findings of fact and conclusions of law.<sup>15</sup>

**1. Findings of Fact**

**a. The Arizona Snowbowl and the San Francisco Peaks**

1. The San Francisco Volcanic field covers approximately 1,800 square miles of northern Arizona. The field lies along the southern perimeter of the Colorado Plateau, defined by the Mogollon Rim to the south of Flagstaff. The most prominent peak within the field is Humphrey's Peak. At 12,633 feet, Humphrey's Peak is the highest point in Arizona.
2. Collectively, Humphrey's Peak, Agassiz Peak (12,356 feet), Doyle Peak (11,460 feet), and Fremont Peak (11,696 feet) are identified on the USGS maps as the San Francis-

co Mountain. However, the mountain is more commonly referred to as the San Francisco Peaks and is identified as such herein.

3. The Snowbowl ski area is located in the CNF in Northern Arizona which comprises 1.8 million acres of public land. Specifically, the Snowbowl lies on the western flank of the San Francisco Peaks ("Peaks").
4. The Peaks cover approximately 74,000 acres of public land, and the ski area constitutes about one percent (1%) of the mountain.
5. The Peaks are extensively documented and widely recognized as a place of cultural importance to the Hopi, Navajo, and other tribes that are Plaintiffs in this case. For years, the Forest Service has recognized the cultural and religious significance of the Peaks to the tribes of the southwestern United States.
6. The Forest Service has identified the Peaks as a Traditional Cultural Property ("TCP") as defined in the National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties.<sup>16</sup> The Peaks have also been determined as eligible for inclusion on the National Register of Historic Places.
7. The Snowbowl SUP area is surrounded on three sides by the Ka-

**15.** The Court is aware that many of the findings made in the RFRA section of this opinion were previously mentioned within the Court's analysis regarding the counts subject to summary judgment. However, the Court chose to reiterate findings that were also pertinent to the RFRA claims despite the redundancy.

**16.** A TCP is a place that is associated with the cultural practices or beliefs of a living community. Those practices or beliefs must be rooted in the history of the community and be

important in maintaining the continuing cultural identity of the community. While not all TCPs are eligible for the National Register, a TCP is eligible if the property plays a role in a community's historically rooted beliefs, customs and practices and meets one of four National Register Criteria for significance: (A) is associated with significant events; (B) is associated with a significant person; (C) is an outstanding example of a type; or (D) is associated with information contained in an archaeological site.

- china Peaks Wilderness area, designated by Congress in 1984.
8. Arizona Snowbowl Resort Limited Partnership ("ASR"), the Intervenor, is the current owner and operator of the facilities located within the Snowbowl SUP. The Snowbowl is operated under a 777-acre SUP which was issued to ASR by the Forest Service in 1992 pursuant to the National Forest Ski Area Permit Act of 1986, 16 U.S.C. § 497b.
  9. The Forest Service has designated the Snowbowl as a public recreation facility under the Coconino Forest Service Plan. In doing so, the Forest Service found that the Snowbowl represented an opportunity for the general public to access and enjoy public lands in a manner that the Forest Service could not otherwise offer in the form of a major facility anywhere in Arizona.
  10. The Snowbowl is the only area dedicated as a downhill ski resort within the CNF. Furthermore, the Coconino Forest Service Plan was approved in 1987 after a separate Environmental Impact Statement process that included public involvement and comment.
  11. In addition to downhill skiing, numerous activities are conducted on the Peaks, consistent with the Coconino Forest Service Plan and multiple-use requirements, including sheep and cattle grazing, timber harvesting, road building, mining (including cinder pit mining), gas and electric transmission lines, water pipelines, cellular towers, motorcross, mountain biking, horseback riding, hiking and camping.
  12. The Snowbowl serves a growing population in Arizona based primarily in the Phoenix metropolitan and northern Arizona areas. The Snowbowl is an important public recreational resource of the CNF.
  13. Skiing has occurred in the Snowbowl area since the 1930s.
  14. In 1979, the Forest Service conducted an extensive process pursuant to the EPA to evaluate proposed upgrades to the Snowbowl, which included the installation of new lifts, trails and facilities. The 1979 Forest Service decision approved 206 acres of skiable terrain and facilities to support a comfortable carrying capacity of 2,825 skiers.
  15. The Forest Service's 1979 decision to approve the Snowbowl upgrades was challenged in the courts by several Indian tribes.
  16. In *Wilson v. Block*, 708 F.2d 735 (D.C.Cir.1983), *cert. denied*, 464 U.S. 956, 104 S.Ct. 371, 78 L.Ed.2d 330 (1983), the Court upheld the Forest Service's decision and found that the project did not substantially burden the tribes' exercise of religion. In addition, the Court upheld the more general question of whether to permit skiing in the area. Since the *Wilson* decision, the tribes have continued to use the Peaks for religious purposes.
  17. Over the last several years, the Snowbowl has experienced highly variable snowfall and associated extreme variability in skier visits, resulting in financial deficits over many years and daunting operational issues.
  18. Due to its age, many of the existing ski runs at the Snowbowl area are old, steep and narrow which raise ample safety concerns. Likewise, other Snowbowl upgrades are needed to increase the amount of

intermediate terrain to spread skiers out and eliminate congestion.

**b. The Forest Service Decision and the Snowbowl Upgrades**

19. In 2002, ASR initiated the process of having the Forest Service approve upgrades to the existing ski area, which included a proposal for snowmaking. Shortly thereafter, in June of 2002, the Forest Service began its screening process to develop a Proposed Action.
20. Prior to notifying the general public about the proposed upgrades at the Snowbowl in September of 2002, the Forest Service sought input from the tribes.
21. After the proposed action was released to the general public, the Forest Service continued to consult with the tribes, in order to determine the potential or perceived impacts of the proposed facilities improvements to the Snowbowl. The Forest Service made more than 500 contacts with tribal members as part of the Snowbowl consultation process, including between 40 and 50 meetings.
22. After the Forest Service formally accepted the ASR proposal in September of 2002, the agency initiated the National Environmental Policy Act ("NEPA") scoping process by releasing the proposed action to the general public on September 23, 2002. The Forest Service mailed the NEPA scoping notice to hundreds of community residents, interested individuals, Indian tribes, public agencies, and other organizations.
23. As a result of the NEPA scoping notice, approximately 1,200 comment letters were received and evaluated by the Forest Service.
24. The Forest Service released the Draft Environmental Impact Statement ("DEIS") to the public, including the Plaintiff tribes, on February 2, 2004, and announced that the preferred alternative included snowmaking with Class A+ reclaimed water from the City of Flagstaff's Rio de Flag Water Reclamation Plant.
25. As a result of the DEIS, the Forest Service received and evaluated close to 9,900 comments.
26. As part of its environmental analysis, the Forest Service gave detailed consideration to three alternatives: the No Action Alternative (Alternative One); the Preferred Alternative (Alternative Two); and a no snowmaking alternative (Alternative Three).
27. The Forest Service found that Alternative Two best met the purposes and needs of the proposed action.
28. The Forest Service considered at least nine additional alternatives, including: reducing the level of snowmaking, fewer upgrades, closing the Snowbowl altogether, and using potable water rather than reclaimed water for snowmaking. The Forest Service determined that these alternatives did not warrant detailed evaluation, or were not feasible.
29. In February of 2005, the Forest Service issued the Final Environmental Impact Statement ("FEIS") and the Coconino National Forest Supervisor signed the Record of Decision ("ROD") approving Alternative Two.
30. The Plaintiffs appealed the Forest Supervisor's decision on April 25, 2005. Accordingly, the Forest Ser-

- vice's Southwestern Regional Office arranged a technical review team to evaluate the administrative appeals.
31. On June 8, 2005, the Forest Service responded to and denied these appeals. In pertinent part, the Forest Service denied Plaintiffs' claims that the project would have a substantial burden on their ability to practice their religion.
  32. Under the ROD, the Snowbowl facilities improvements include realignment and/or lengthening of three existing chair lifts; installation of one new chair lift and four surface lifts; development of new ski terrain, increasing the ski acreage within the SUP area from approximately 138 acres to approximately 204 acres; development of a new snowplay/tubing area, with associated improvements to parking and guest service facilities; installation of snowmaking infrastructure to cover approximately 204 acres of the SUP; and improvements to other service facilities and ski area infrastructure, such as lodges.
  33. With the exception of the snowplay facility and the snowmaking, the infrastructure improvements authorized by the Forest Service are comparable to those first authorized by the Forest Service in 1979 and upheld in *Wilson*. For example, the 2005 Snowbowl decision and the 1979 decision both approved about 205 acres of skiable terrain and facilities to comfortably support 2,825 skiers at one time.
  34. The authorized skiable terrain remains at just over 200 acres and the Snowbowl's comfortable carrying capacity ("CCC") remains unchanged at 2,825 skiers at one time, as previously approved by the Forest Service in 1979.
  35. The area proposed for snowmaking is approximately one quarter of one percent (1%) of the Peaks.
  36. All authorized improvements will occur within the existing 777-acre SUP area, with the exception of a 14.8 mile buried reclaimed water pipeline that will be constructed within existing road or utility right-of-ways.
  37. The pipeline will also be equipped with fire hydrants to provide a water source for fire suppression needs within the rural residential areas between Flagstaff and the ski area as well as to fight forest fires. Likewise, a reservoir of water will be maintained at the ski area and will be available for forest fire suppression.
  38. The snowplay facility will address safety issues associated with snowplay on the trails within the SUP that conflicts with downhill skiers, as well as unmanaged snowplay and unauthorized parking along Snowbowl Road that the Forest Service has had a long time interest in addressing.
  39. The upgrades to existing trails and other features, including snowmaking, will improve safety conditions and minimize the potential for accidents at the Snowbowl.
  40. The snowmaking component of the Snowbowl upgrades includes the use of reclaimed water from the Rio de Flag WRF. The WRF is a tertiary water reclamation facility, also known as an advanced treatment facility.
  41. To ensure that reclaimed water is used safely without adversely af-

- fecting public health or environment, the Arizona Department of Environmental Quality (“ADEQ”) has established five water categories (A+, A, B+, B, C) specifying the minimum levels of treatment and water quality criteria.
42. Reclaimed water that has been treated at the WRF is categorized as Class A+ water, which is the highest quality of reclaimed water classified by the ADEQ.
  43. The Class A+ water proposed to be used in the snowmaking by the Snowbowl is therefore the highest grade of reclaimed water recognized under Arizona statutes and regulations. Class A+ reclaimed water has been approved for use in snowmaking by the ADEQ.
  44. The level of treatment and the water quality criteria required for use of reclaimed water depends upon the expected degree of human, animal, and plant contact. Pursuant to the ADEQ’s regulations, the reclaimed water to be used at the Snowbowl will undergo specific advanced treatment requirements, including tertiary treatment with disinfection. In addition, the reclaimed water will comply with specific monitoring requirements, including frequent microbiological testing to assure pathogens are removed, and reporting requirements.
  45. Reclaimed water from the WRF is subject to a variety of tests to ensure that the water is adequately treated to remove bodily fluids, such as blood.
  46. Reclaimed water from the WRF must comply with extensive treatment and monitoring requirements under three separate permit programs: the Arizona Pollutant Discharge Elimination System (“AZPDES”) Permit, the Arizona Aquifer Protection Permit Program, and the Water Reuse Program. Additionally, industrial facilities in the City of Flagstaff are required to comply with the city’s Industrial Pre-Treatment requirements.
- c. Plaintiffs’ Religious Beliefs and Practices on the Peaks**
47. Certain Indian religious ceremonies are conducted on the Peaks, such as the Navajo Blessingway Ceremony, and certain plants, water and other materials are collected from the Peaks for Navajo medicine bundles and other tribal healing ceremonies.
  48. The Plaintiff tribes believe that the Peaks is a living entity and that the presence of the Snowbowl desecrates the mountain.
  49. Certain practitioners believe that the alleged desecration of the Peaks has caused many ills to mankind, including attacks on 9/11/01, the Columbia Shuttle crash, and the increase in natural disasters, such as recent hurricanes, tornados, and the tsunami.
  50. Certain practitioners believe that upgrades to the Snowbowl will result in further ills and will harm their beliefs.
  51. Certain practitioners believe that upgrades to the Snowbowl will jeopardize the continuation of their religion.
  52. Native practitioners also believe that certain deities, such as Kachina or Ga’an, dwell on the Peaks, and that snowmaking (irrespective of the source of water) will nega-

- tively impact the deities, potentially causing drought or other suffering.
53. Certain practitioners also believe that the Class A+ reclaimed water from the City of Flagstaff to be used for snowmaking contains the souls of the dead because the city hospital, morgue and mortuary contribute minor amounts to the discharge from the Rio de Flag WRF and that the use of the reclaimed water will affect the purity of the Peaks.
  54. Although the Indian tribes and their members differ in their use of the Peaks for religious purposes and have different views on how to best manage the area, the Plaintiff tribes and their members do hold the uniform beliefs that the Peaks are sacred, and this project should not be allowed to move forward to further desecrate their sacred mountain.<sup>17</sup>
  55. The Plaintiff tribes have not identified any shrines, trails or cultural resources located within the 777-acre SUP area.
  56. The Plaintiff tribes acknowledged that they have shrines and specific places where ceremonies are conducted in other areas on the Peaks, including within the Kachina Peaks Wilderness area.
  57. Tribal beliefs, ceremonies and practices have not changed since 1983 when some of the upgrades authorized by the 1979 Forest Service decision were implemented.
  58. The Forest Service called two archaeologists as witnesses: Dr. Judith Propper and Heather Provencio. Dr. Propper and Ms. Provencio discussed their understanding of how the tribes subjectively perceive the Snowbowl project. Dr. Propper is the Regional Archaeologist for the Southwestern Region of the Forest Service. Ms. Provencio is the Forest Service Zone Archaeologist for the Peaks and the Mormon Lakes Districts; She was the lead archaeologist for the tribal consultation on the Snowbowl proposal.
  59. Dr. Propper agreed that the tribes view the Peaks: (a) as a home of spiritual beings; (b) a place where significant mythological events occurred; (c) a place where spirits of the dead went to be changed into bringers of rain; (d) a personification of gods and goddesses; (e) an area where important societies originated; and (f) as a source of life.
  60. Dr. Propper testified that although practitioners sincerely felt that the Forest Service decision would impact their beliefs and exercise of religion, the impacts did not amount to a substantial burden.
  61. Ms. Provencio testified that the types of Native American religious practices that occur on the Peaks range from the collection of traditional plants, for ceremonial, traditional and medicinal use, to members actually conducting healing ceremonies and religious ceremonies on the Peaks.
- i. Navajo Plaintiffs**
62. The Navajo Nation has approximately 225,000 members and is the largest federally recognized Indian Tribe in the United States. The

17. While there is evidence to suggest that the Peaks may be more sacred to some of the

tribes than to others, the Court need not make such a finding.

Navajo Nation covers the corners of three states, Arizona, New Mexico and Utah, consisting of 27,635 square miles. The Navajo Nation lies to the north and east of the Peaks.

63. Navajo Nation President, Joe Shirley, the Historic Preservation Department Assistant Manager, Steven Begay, and Larry Foster, member of the Navajo Nation, testified on behalf of the Navajo Nation.
64. The Peaks are one of four mountains sacred to the Navajo people. In the Navajo religion, the creation of the Navajo people took place at the Peaks. Accordingly, the Peaks are considered in Navajo culture and religion to be the “Mother of the Navajo People,” their essence and their home. The whole of the Peaks is the holiest of shrines in the Navajo way of life.
65. The Peaks are home to many of the Navajo people’s deities, including White Corn Girl, White Corn Boy, Twilight Girl, Twilight Boy, and Yellow Wind.
66. The Snowbowl upgrades will not interfere with or inhibit any religious practice of the Navajo Plaintiffs. Although the witnesses generally testified that the Peaks were central and indispensable to the Navajo way of life, President Shirley and Mr. Begay provided no evidence that they use the Snowbowl SUP area for any religious purpose.
67. The Snowbowl SUP area is not the exclusive site of any Navajo religious activities. All plants and wildlife used by the Navajo Plaintiffs for religious purposes are available outside the SUP area.

**ii. Plaintiff Norris Nez  
 (“Plaintiff Nez”)**

68. Plaintiff Nez is a Navajo medicine man who testified as a named Plaintiff.
69. The SUP area is not the exclusive location for any religious activities. All plants and wildlife that Mr. Nez uses for religious purposes are available outside of the SUP and, in fact, Mr. Nez collects plants outside of the SUP area.
70. Mr. Nez has never been denied access to any part of the Peaks in relation to the practice of his religion.
71. The Snowbowl upgrades will not inhibit the religious practices of traditional Navajo practitioners or prevent Plaintiff Nez from engaging in religious conduct.

**iii. White Mountain Apache Plaintiffs**

72. The White Mountain Apache (“WMA”) is a federally recognized Indian tribe with more than 12,600 members. The reservation is located in east central Arizona in portions of Navajo, Apache and Gila counties. It measures 75 miles long and 45 miles wide, comprising more than 1.6 million acres.
73. The WMA Plaintiffs presented testimony of Ramon Riley, the Cultural Resource Director for the WMA and Dallas Massey, the Chairman of the WMA, neither of whom have ever been to the Snowbowl SUP area.
74. The four mountains sacred to the WMA are the Black Mountain (Mount Baldy), the Turquoise Mountain (Mount Graham), the Red Mountain (Four Peaks), and

- the White Mountain (the San Francisco Peaks).
75. Two of the religious ceremonies in which the Peaks play a role are the Sunrise Ceremony and the ceremonies performed by Crown Dancers. The Sunrise Ceremony is a rite of passage for young ladies who go from adolescence to womanhood. The Crown Dancers perform healing ceremonies "used to heal people."
  76. Mr. Riley testified that the proposed project will have a large negative impact on the ability of the Apache people to perform the Sunrise Ceremony allowing a young lady to pass into womanhood and the Crown Dancer ceremonies. "Some of the medicine people, including myself, will lose focus. Our medicine [and] our prayers [are] not going to be strong."
  77. Although Mr. Riley testified to the devastating impacts the Snowbowl upgrades will have on his culture, neither he nor the WMA Plaintiffs presented evidence that the Snowbowl upgrades will interfere with or inhibit any particular religious practice. For example, plants collected by the members of the WMA for religious purposes, such as "white medicine," are available throughout the Peaks.
  78. Portions of the WMA reservation, considered sacred by tribal members, are dedicated to recreational uses. For example, the White Mountains, considered sacred to some members of the WMA, are home to the Sunrise Ski Resort that is owned and operated by the WMA.
  79. The water used for snowmaking at Sunrise is derived from Ono Lake and is, in part, reclaimed water.
- Sunrise has a permit to discharge treated wastewater into Ono Lake.
80. The WMA are currently planning to expand the snowmaking capabilities at Sunrise.
  81. Although there are technically four ski areas in the state of Arizona, Sunrise and the Snowbowl are the two largest.
  82. The WMA Plaintiffs would prefer complete removal of the Snowbowl ski facilities. Specifically, the WMA Plaintiffs would oppose the Snowbowl upgrades even if fresh water was used to make snow. Moreover, the WMA Plaintiffs are opposed to any upgrades that would alter the terrain, even upgrades proposed for safety reasons.
- iv. Plaintiff Bill Bucky Preston (Plaintiff Preston)**
83. Plaintiff Preston is a member of the Hopi Tribe who testified as a named Plaintiff in this case. During trial, Plaintiff Preston chose not to discuss his specific role in the Hopi community. Specifically, Plaintiff Preston was unable to disclose many of his specific religious beliefs due to their sacred nature.
  84. Plaintiff Preston failed to demonstrate that the Snowbowl upgrades will interfere with or inhibit any religious practices that he may perform. In fact, Plaintiff Preston would not respond to questions about his specific religious activities.
  85. Plaintiff Preston does not conduct any religious activities within the SUP area. Plaintiff Preston testified that the Snowbowl's presence on the Peaks prevents him from doing so.

86. All plants and wildlife that Preston uses for religious purposes are available outside the SUP area. In fact, Plaintiff Preston collects plants and wildlife outside the SUP area.

**v. Hualapai Plaintiffs**

87. The Hualapai Tribe is a federally recognized Indian tribe with more than 1,500 members. The Hualapai Reservation, created by Executive Order in 1883, presently comprises approximately 185,000 acres in the Northwestern Arizona Counties of Coconino, Mojave and Yavapai. The northern boundary of the reservation is the middle of the Colorado River within the Grand Canyon. The Tribal Capitol is located in Peach Springs, Hualapai Reservation, Arizona, approximately 95 miles west of the Peaks.

88. Frank Mapatis, a traditional practitioner and Charles Vaughn, Chairman of the Hualapai Tribe, testified on behalf of the Hualapai Tribe.

89. The Hualapai Plaintiffs presented no evidence that they conduct religious activities within the SUP area. All plants and wildlife that the Hualapai Plaintiffs use for religious purposes are available outside the SUP area. In fact, the Hualapai Plaintiffs collect plants and wildlife outside the SUP area.

90. Mr. Mapatis collects plants from the Peaks once a year as part of his religious beliefs, but he does not collect plants within the SUP area.

91. Mr. Mapatis does not collect water from within the SUP area; however, Mr. Mapatis believes that water travels down the mountain, through the SUP area, to springs and seeps where water is collected for cere-

monial purposes and for healing the sick.

92. Mr. Mapatis does not leave offerings within the SUP area.

93. Previous forest management activities on the Peaks, such as road construction, cell tower construction, and the operation of sewage septic systems have not inhibited Mr. Mapatis' religious practices.

94. Since 1983, when the D.C. Circuit upheld the original EIS for the development of the Snowbowl ski area, the number of practitioners of the Hualapai Tribe's religion has increased.

95. The Hualapai Plaintiffs failed to demonstrate that snowmaking authorized by the Snowbowl upgrades will impact the water collected from the Peaks by traditional practitioners.

96. The Hualapai Plaintiffs did not present evidence demonstrating that members have ever been or will be denied access to the Peaks to conduct religious activities.

97. The Hualapai Tribe has undertaken activities that impact the religious practices of its own members. For example, some members of the Hualapai Tribe oppose the Sky Walk Project, a multi-million dollar expansive recreational development project in the Grand Canyon, which is considered to be sacred. As part of the Sky Walk Project, a tourist center will be built on the edge of the Grand Canyon along with a sky walk that extends over the canyon enabling visitors to look down into it.

**vi. Plaintiffs Havasupai Tribe, Rex Tilousi, and Diana Sue Uqualla**

98. The Havasupai are a federally recognized Indian tribe with over 600

- enrolled members. The Havasupai Reservation consists of 188,077 acres of canyon land and broken plateaus abutting the western edge of the Grand Canyon's south rim. The Havasupai Tribe's main village is Supai, and it is located in the bottom of the Grand Canyon. A majority of the tribal members reside in Supai.
99. Havasupai Tribe Chairman Rex Tilousi ("Plaintiff Tilousi") and Havasupai Vice-Chair Diana Sue Uquala ("Plaintiff Uquala") testified as named Plaintiffs. Roland Manakaja, Cultural Resources Director for the Havasupai Tribe, testified on behalf of the Havasupai Plaintiffs.
  100. The Peaks were included within the Havasupai Tribe's traditional territory, and they traditionally exercised caretaker responsibility for the Peaks which the other tribes in the region acknowledged.
  101. For the Havasupai, the Peaks are the origin of the human race; it is the point of their creation. Specifically, they believe that the water from the Peaks impregnated their Grandmother by the Sun Father melting the snow on the Peaks.
  102. The Havasupai traditional practitioners pray to the Peaks and visit them spiritually daily. Furthermore, traditional practitioners of the Havasupai religion deem the entirety of the Peaks as one living being and that portions of the mountain cannot be carved out from the whole.
  103. The Havasupai Plaintiffs believe that the act of snowmaking modifies the seasons and is considered a profane act; however, the Havasupai Plaintiffs did not present evidence that the Snowbowl project will inhibit the religious practices of the tribe or penalize members of the tribe for practicing their religion.
  104. The Havasupai Plaintiffs did not present evidence that any member of the tribe conducts religious or cultural activities within the SUP area.
  105. The Havasupai Tribe have gathered from the Peaks ceremonial items, food, water and fallen trees for fuel for hundreds of years and still use such articles today. However, the Havasupai Plaintiffs did not present evidence that members collect plants, rocks, or trees from within the SUP area.
  106. The SUP area is not the exclusive location of any plants, such as aspen trees and pinyon pines, that Havasupai tribal members use for religious purposes. Volcanic rocks that are collected for religious purposes are also widely available throughout the Peaks. In addition, the SUP area is not the exclusive location for any wildlife that are used for religious purposes.
  107. The Havasupai Plaintiffs did not present evidence permitting the Court to find that water from the snowmelt at the Snowbowl ski area will go to Havasu Creek, over 60 miles away.
  108. Snowmelt at the Snowbowl ski area is highly unlikely to run off as surface water for any great distance. Even if surface water were to run off from the Snowbowl ski area, it would flow mainly within the Little Colorado surface water drainage basin, the same basin where treated water from Rio de Flag is discharged.

109. Snowmelt from the Snowbowl area that does not evaporate or sublimate is expected to infiltrate downward through the subsurface below the perched groundwater systems. The infiltrated snowmelt would not likely be a source of water to springs located down-slope of the Snowbowl ski area.
  110. Snowmelt from the Snowbowl ski area that infiltrates the regional Coconino Aquifer (“C-Aquifer”) would likely move north toward Blue Springs or toward the boundary of the groundwater drainage basin east of the Mesa-Butte fault, at which point the water would infiltrate down into the other regional aquifer known as Redwall-Muave Aquifer (“R-Aquifer”).
  111. Groundwater within the R-Aquifer will not move across the Mesa-Butte fault because the uplifted westward side of the fault has a damming effect and because the movement of water along the fault in the northeast and southwest direction will direct the movement of water to the northeast and southwest, away from Supai Village. The Mesa-Butte fault is a conduit for flow along the fault, causing water in the R-Aquifer to move along the fault—to the north, toward Blue Springs or south to the Verde area—away from Supai Village.
  112. Havasupai Plaintiffs, Plaintiff Tilousi, and Plaintiff Uqualla did not present convincing evidence to allow the Court to find that the quality of the water at Supai Village will be affected by the use of reclaimed water for snowmaking at the Snowbowl ski area.
  113. Water quality concerns at the Havasupai Tribe’s reservation are unrelated to the Snowbowl upgrades. There have been problems with the lagoon system that manages wastewater from within Supai Village. The wastewater in the Supai Village lagoon system, which includes several unlined lagoons, does not receive any chemical or ultraviolet treatment. Plaintiff Uqualla admitted that it is reasonably likely that the untreated wastewater in these unlined lagoons will infiltrate into the ground.
  114. Whereas Plaintiff Tilousi admitted that the Havasupai Tribe is most concerned with protecting Supai Village; the Havasupai Plaintiffs have used water reclaimed from this lagoon system to irrigate alfalfa sprout crops in Supai Village.
  115. The Havasupai Plaintiffs are currently interacting with the United States Environmental Protection Agency regarding the management of solid waste in Supai Village. Previously, the Havasupai Plaintiffs buried or burned their solid waste trash, but have recently discovered that they must undertake a closure.<sup>18</sup>
  116. The Havasupai Plaintiffs, Plaintiff Tilousi, and Plaintiff Uqualla did not present evidence that the Snowbowl Upgrade Project will cause flooding in Supai Village.
18. The use of the term “closure” in the above finding of fact means the permanent closing of a landfill used to burn or bury solid waste.

**vii. Hopi Plaintiffs**

117. The Hopi are a federally recognized Indian tribe with approximately 12,000 members. The Hopi Reservation is located in the high deserts of northeastern Arizona and is surrounded by the Navajo Nation. The Hopi Reservation measures 2,438 square miles.
118. The Hopi Plaintiffs presented testimony from four witnesses: Cultural Preservation Office Director Leigh J. Kuwanwisiwma, Hopi practitioner Wilton Kooyahoma, Hopi practitioner Antone Honanie, and Research Archaeologist and Hopi practitioner Emory Sekaquaptewa.
119. The Hopi Tribe's spiritual and physical connection to the Peaks goes back as far as their oral traditions—at least as long as the Hopi and their ancestors have lived in northern Arizona.
120. The Peaks are of central importance to the Hopi tradition, culture and religion. There is a direct relationship between the Hopi way of life and the environment, including the Peaks. The Peaks mark a cardinal direction defining the Hopi universe, the spiritual boundaries of the Hopi way.
121. The Peaks are known to the Hopi as Nuvatukya'ovi—the “Place of Snow on the Peaks.” The Peaks are where the Hopi direct their prayers and thoughts, a point in the physical world that defines the Hopi universe and serves as the home of the Kachinas, who bring water, snow and life to the Hopi people.<sup>19</sup>
122. There are more than 40 kivas located throughout the 12 Hopi Villages. The kivas are the focal point of all religious activity in the Hopi Villages and the central place to which the Kachina gather during their annual pilgrimage to and sojourn among the Hopi.
123. The Hopi Tribe's religious practices and their close spiritual tie to the tribe's home and sacred landscape constitute the fabric of the Hopi way, a way of perceiving and responding to the realities of daily life. The individual Hopi's practice of the Hopi way permeates every part and every day of the individual's life from birth to death.
124. To the Hopi, the Peaks are the residence of the Kachina, spiritual deities of the Hopi who travel from the Peaks to the Hopi Reservation to participate in traditional Hopi kiva practices and dances in response to petitions and prayers from the Hopi who are members of each kiva.
125. The Kachinas serve many purposes, among them is to teach lessons to the Hopi and warn them of the consequences of their improper actions.
126. Kachina songs teach messages on the principals that a community must live by to stay viable, and for the Hopi, to achieve their destiny. Hopi children are taught these songs, “[s]o that they can remember during the course of the trial.
19. The terms “Kachina” and “Katsina” are synonymous and were used interchangeably

- ber the words as they do their work and play in life.”
127. The Hopi calendar connects the months and seasons in the Hopi year, the coming and going of the Kachina from the Peaks, and the ceremonies performed in the kivas on the Hopi Reservation. Thus for the Hopi, the Kachina define the passing of the months and the continuity of the Hopi culture.
  128. The Hopi Plaintiffs testified that the proposed upgrades to the Snowbowl have affected and will continue to negatively affect the way they think about the Peaks, the Kachina and themselves when preparing for any religious activity involving the Peaks and the Kachina—from daily morning prayers to the regular calendar of religious dances that occur throughout the year.
  129. The Hopi Plaintiffs also testified that this negative effect on the practitioners’ frames of mind due to the continued and increased desecration of the home of the Kachinas will undermine the Hopi faith and the Hopi way. According to the Hopi, the Snowbowl upgrades will undermine the Hopi faith in daily ceremonies and undermine the Hopi faith in their Kachina ceremonies as well as their faith in the blessings of life that they depend on the Kachina to bring.
  130. Although the Hopi Plaintiffs’ testified about the important role that the Kachinas and Kachina songs play in Hopi religion, they presented no evidence that the Snowbowl upgrades would impact any exercise of religion related to the Kachinas or the Kachina songs. The Kachinas have continued to
- come to the Hopi villages since the establishment of the Snowbowl ski area in the late 1930s, and since the Forest Service approved the expansion of the Snowbowl in 1979.
131. Plaintiffs’ witness Mr. Kooyahoma stated that despite the Snowbowl upgrades, the Kachinas will continue to come to the Hopi villages. Mr. Sekaquaptewa agreed that the Hopi will continue to conduct religious activities on the Peaks, such as the collection of Douglas fir and tobacco.
  132. The Hopi Plaintiffs presented evidence that the Snowbowl upgrades are contrary to their beliefs, and that making artificial snow will affect them “emotionally”; however, the Hopi Plaintiffs provided no evidence that the decision would impact any religious ceremony, gathering, pilgrimage, shrine, or any other religious use of the Peaks. The Hopi Plaintiffs presented no evidence that they use the Snowbowl SUP for any religious purpose.
- viii. Plaintiff Yavapai–Apache Nation**
133. The Yavapai–Apache Nation is a federally recognized Indian tribe consisting of approximately 1,550 enrolled members. The 636–acre Yavapai–Apache Reservation is located in the Verde Valley in central Yavapai County, Arizona.
  134. The Yavapai–Apache Plaintiffs offered the testimony of only one witness: Tribal Council member Vincent E. Randall.
  135. The four sacred mountains to the Yavapai–Apache Nation are the Peaks, the Red Mountain just south of Fort McDowell, Pinal

Mountain, and the eastern Mount Baldy in New Mexico.

136. The Yavapai–Apache Nation view the Peaks as one living being and believe that the use of reclaimed water for snowmaking may make the mountain impotent.
137. Although the Yavapai Apache members collect medicine at the Peaks, the Yavapai–Apache Plaintiffs presented no evidence that they use the Snowbowl SUP for any religious purpose.
138. Mr. Randall discussed certain Apache beliefs and ceremonies; however, he did not provide evidence that the Snowbowl project would impact any discernable religious exercise.
139. Mr. Randall testified that four or five Yavapai–Apache members collect herbs on the Peaks; however, these holy herbs occur all over the Peaks and not exclusively in the SUP area. The Snowbowl decision would not prohibit the collection of these herbs in any way.

**d. Compelling Governmental Interest**

140. National Forests must be managed for multiple uses. *See* National Forest Management Act, 16 U.S.C. §§ 1600 *et seq.* (“NFMA”). Specifically, Congress has mandated that the Forest Service manage the National Forests for “outdoor recreation, range, timber, watershed, and wildlife and fish purposes.”
141. In addition to NFMA, the Forest Service must consider a variety of other federal laws and executive orders in managing the CNF, including but not limited to NEPA, the NHPA, the ESA, the National Forest Ski Area Permit Act, the Wilderness Act, 16 U.S.C. §§ 1131, *et seq.*, and the Multiple–Use Sustained Yield Act, 16 U.S.C. §§ 528–531.
142. National Forest Service Plans provide guidance for the management of the National Forests. Every National Forest must prepare a Forest Plan in accordance with NFMA. Forest Plans are subject to the requirements of NEPA. Therefore, a public review and comment period is provided for every Forest Plan.
143. After a lengthy public review and comment period, the Coconino Forest Service Plan was approved in 1987. The Coconino Forest Service Plan provides for integrated multiple-use and sustained yield of goods and services from the forest in a way that maximizes long-term public benefits in an environmentally sound manner.
144. The CNF’s Peaks Ranger District, which is home to the Peaks, has a diversity of vegetation types and geography. The cultural resources on the Peaks Ranger District are also diverse, ranging from lithic scatters to prehistoric and habitation sites to the “paramount cultural resource” of the Peaks.
145. The Coconino Forest Service Plan calls for various future uses, including recreational and wilderness uses. The Forest Plan also specifically adopted several prior management decisions, including the Environmental Impact Statement for the Arizona Snowbowl and the prior allocation of areas with the CNF as Wilderness.
146. The Coconino Forest Service Plan designates 37 MAs within the

- CNF. Each MA is subject to specific management guidelines. The MA designations in the Coconino Forest Service Plan accommodate a variety of uses and users, such as cattle and sheep grazing, power lines, gas lines and mining. The Navajo Nation, which grazes cattle on the northern slopes of the Peaks is one such user.
147. Pursuant to the Coconino Forest Plan, the Peaks Ranger District is managed for a variety of uses, including wildlife, timber, live-stock grazing, and outdoor recreation. The Forest Service and, more specifically, the Forest Supervisor have a responsibility to all of the users of the CNF.
  148. The Forest Coconino designates the Snowbowl SUP area as MA-15 (i.e., Developed Recreation Sites) and therefore, directs that the Snowbowl SUP area be managed as a developed ski area.
  149. The SUP for the Arizona Snowbowl reflects the decision of the Forest Service to operate and maintain the ski area for 40 years. The SUP also directs the Forest Service's management of the SUP area.
  150. The need to manage National Forests for multiple uses is complicated by the sheer number of sites that are considered to be sacred by tribes.
  151. The Southwestern Region of the National Forest regularly consults with about 50 tribes who have traditional use and ancestral ties to National Forests. The Region consults with tribes on 900 to 1,000 projects each year.
  152. On National Forest lands within Arizona and New Mexico alone there are at least 40 to 50 mountains that are generally considered sacred by tribes. Pursuant to the agency's multiple-use mandate, these mountains are managed for recreational use, wildlife purposes, forest health purposes, special uses ranging from pipelines to summer homes, and wilderness values.
  153. In the CNF, almost a dozen mountains have been identified by tribes as being sacred. In addition, tribes find other landscapes to be sacred, including canyons and canyon systems, rivers and river drainages, lakes, discrete mesas and buttes and rock formations. There are additional areas considered to be sacred by tribes such as shrines, gathering areas, pilgrimage routes and prehistoric sites. Between 40,000 and 50,000 prehistoric sites have been inventoried within the Southwestern Region forest lands.
  154. Including the Snowbowl, the National Forests in the Southwestern Region are home to eleven ski areas, several of which are located on or near areas that are sacred to tribes.
  155. Millions of acres of public land-Forest Service lands and other federal lands-are considered sacred to Plaintiffs.
  156. There are likely thousands of sites and shrines that are sacred to the Hualapai Tribe. The Hualapai Plaintiffs consider the entire Colorado River to be sacred.
  157. Within the Navajo Nation's four cardinal mountains, all of which are located on federal land, there are several thousand sacred sites. For example, the Navajo Plaintiffs consider the entire Colorado Riv-

- er—from the headwaters to Mexico—and the Little Colorado River to be sacred.
158. There are thousands of sites considered to be sacred to the Havasupai Plaintiffs. For example, the Havasupai Plaintiffs consider 277 miles of the Colorado River to be sacred.
  159. There are hundreds of sacred Hopi sites and shrines throughout the American Southwest, with some as far away as Ohio. There are more than 10,000 archeological sites that have specific Hopi clan traditions tied to them.
  160. Moreover, new sacred areas are continuously being created.
  161. The management decisions of the Plaintiff tribes with respect to their own lands suggest that the Plaintiff tribes face similar complications.
  162. For example, land on the WMA Plaintiff's reservation, which is considered sacred by members of the tribe, is allocated to a variety of uses. Some portion of the reservation is managed as a "closed area," where developed recreation is not permitted and other portions of the WMA reservation are dedicated to recreational uses. Recreational activities on the reservation include 7,000 camp sites, hiking trails, fishing, hunting, boating, guided white water rafting tours, rodeos, and skiing. According to Chairman Massey, recreation can be a positive influence on people's lives, especially tribal youth.
  163. Also, the White Mountains, considered sacred to members of the WMA, are home to the Sunrise ski resort, which is owned and operated by the WMA Tribe. In fact, the Sunrise ski resort relies upon artificial snowmaking, and the water source for this snowmaking is, in part, reclaimed water. Many WMA spiritual leaders consider the presence of the Sunrise ski resort on the White Mountains to be a desecration.
  164. Reclaimed water is used by many of the Plaintiff tribes. The Navajo Nation uses reclaimed water for irrigation, for dust control at construction sites, and for soil compacting on dirt roads.
  165. The White Mountain Apache Tribe used reclaimed water as part of the Canyon Day Irrigation Project, and currently uses reclaimed water in its stock pond at the Hon-Dah casino. The Yavapai-Apache Nation has used reclaimed water to irrigate the grounds around Cliff Castle Casino in Camp Verde, Arizona. The Havasupai Plaintiffs have used reclaimed water from a lagoon system, which does not provide any chemical or ultraviolet treatment, to irrigate alfalfa sprout crops in Supai Village.
  166. Also, mining is conducted on Black Mesa although the Navajo Nation and the Hopi Tribe consider it to be sacred. The Hopi Tribe transferred Hopi water rights in order to provide water for a coal slurry pipeline at Black Mesa.
  167. Wastes from medical clinics on the reservation are disposed in lagoons or on the ground at the Navajo reservation, which is considered sacred.

**i. Safety**

168. The Snowbowl upgrades have a number of features that would address the CNF's safety concerns.
169. Upgrades were needed because the existing terrain is insufficient for current use levels, which leads to overcrowding and safety issues on peak-attendance days, especially given the area's high utilization rates.
170. When snow levels permit operation, the Snowbowl significantly exceeds the ski area's comfortable carrying capacity of 2,825 guests. Over the past 10 seasons, average peak day attendance has been approximately 3,434 guests.
171. The Snowbowl upgrades will address safety issues associated with overcrowding on the ski slopes by providing more skiable acreage, providing more novice and intermediate ski terrain, and enabling the owners of the Snowbowl ski area to make improvements to narrow trails with congestion problems.
172. Adding additional ski terrain will permit skiers to spread out across the slope and reduce some of the safety concerns related to overcrowding.
173. The Forest Service identified a need to respond to unregulated snowplay activities on the National Forest System lands on and around the Snowbowl. The Forest Service explained that people seeking to sled, slide, and saucer have historically done so on unmanaged areas of the CNF along Snowbowl Road and along Highway 180. These activities have lead "to injuries, traffic management issues, garbage, and sanitation problems."

174. The snowplay area included in the Snowbowl Upgrade Project responds to these safety concerns.
175. Snowbowl Road was designed with pullouts in order to facilitate tribal members' access to forest areas used for cultural purposes.

**ii. Compliance with the Establishment Clause**

176. The CNF requires the ongoing management of 1.8 million acres for a variety of users and uses.
177. Conflicts associated with allocation of forest resources between the various uses and users is inevitable.
178. Nevertheless, the Forest Service has sought to accommodate the religious activities of the Plaintiff tribes. In fact, the Forest Service has sometimes even facilitated the religious practices of the Plaintiff tribes.
179. The Forest Service participated in efforts to cease mining activities at the White Vulcan Mine, a pumice mine that operated on the Peaks for about a half-century.
180. The Forest Service successfully sought to designate 19,000 acres surrounding the SUP area as the Kachina Peaks Wilderness, thus protecting the area from future development. Tribal members use the Kachina Peaks wilderness to conduct religious ceremonies and practices. The Hopi Plaintiffs agreed that the Kachina Peaks Wilderness is a benefit to Hopi culture.
181. The Forest Service is also currently in the process of nominating the Peaks to the National

- Register of Historic Properties as Traditional Cultural Property.
182. Members of the general public must pay to remove forest products, such as plants, from the Peaks. Tribal members can remove those same forest products for religious purposes for free.
  183. When the Forest is closed due to fire risk, the CNF ensures tribal access for ceremonial and other religious purposes.
  184. The east side of the Peaks has the highest archeological site density because it has more favorable farming conditions. The Snowbowl SUP is located on the west side.
  185. The Forest Service accommodated Hopi concerns by requiring the owners of the Snowbowl ski area to limit public access to the top of the Peaks.
  186. The Forest Service would be hard pressed to satisfy the religious beliefs of all Plaintiffs.
  187. For example, the Navajo Plaintiffs' official position is that the Snowbowl should be shut down completely. The Navajo Plaintiffs would oppose snowmaking at the Snowbowl even if the snow was made from fresh water. In fact, the Navajo Nation opposes any upgrades at the Snowbowl, even those designed to improve safety.
  188. Plaintiff Preston expressed his belief that there should be no development whatsoever on the Peaks and would, therefore, oppose snowmaking at the Snowbowl even if fresh water was used.
  189. According to Plaintiff Tilousi, any actions that disturb life, "whether plant life, wildlife, the earth, the air, [or] the waters" would be objectionable. However, there is less concern when an area has already been disturbed.
  190. In conclusion, the Snowbowl upgrades satisfy the government's interest in managing the CNF for multiple uses, in ensuring the safety of visitors to the Snowbowl ski area, and in complying with the Establishment Clause.
- e. Least Restrictive Means**
191. The Forest Service also sought to identify tribal concerns with the proposed Snowbowl upgrades in order to seek ways to mitigate, minimize, or avoid potential impacts.
  192. After over a dozen cultural resources surveys and decades of consultation with tribes regarding the cultural and religious significance of the Peaks, tribal members have not identified any specific plants, springs, natural resources, shrines or locations for ceremonies in the SUP area that will be impacted—much less substantially burdened—by the Snowbowl improvements.
  193. The Forest Service removed night lighting from the project, in response to opposition from the Navajo, Hopi, and Yavapai-Apache Plaintiffs.
  194. The Forest Service contacted thirteen tribes, the Medicineman's Association, and several Navajo Nation chapter houses regarding the development of a Memorandum of Agreement ("MOA").
  195. In the process of developing the MOA, the Forest Service sought the input of the thirteen tribes, the Medicineman's Association and the chapter houses to determine whether the potential and

- perceived tribal impacts could be mitigated, minimized or avoided.
196. Snowmaking would provide for a consistent operating season and enable the Forest Service to continue the operation of the ski area as a Developed Recreation Area in accordance with the Coconino Forest Service Plan. Moreover, snowmaking at ski areas is not uncommon.
  197. Four tribes signed the MOA, including the Hualapai Plaintiffs and the Yavapai–Apache Plaintiffs. While signing the MOA does not necessarily indicate that the Hualapai Plaintiffs and the Yavapai–Apache Plaintiffs approved the Forest Service’s decision, it does indicate the Forest Service’s efforts to deal with adverse effects.
  198. The agency guaranteed, in the MOA, that access to the Peaks, including the SUP, for cultural and religious uses would be protected. Pursuant to the terms of the MOA, the Forest Service also committed to work to ensure that tribal ceremonial activities conducted on the Peaks continue uninterrupted.
  199. Also, under the MOA, the Forest Service agreed to work with the tribes to provide periodic inspections by tribal representatives to examine the condition of existing shrines and other existing traditional cultural places on the Peaks.
  200. The Forest Service will continue to guarantee traditional cultural practitioners access within and outside the SUP area for traditional cultural uses, such as collection of medicinal, ceremonial, and food plants.
  201. Should any plants of traditional importance be subsequently identified within the project area, the Forest Service will encourage and protect the natural regeneration of those plants when developing site-specific plans.
  202. The Forest Service also agreed to continue working with tribal liaisons and traditional cultural practitioners to ensure that current ceremonial activities conducted on the Peaks continue uninterrupted. The MOA provides that when the final reclaimed water pipeline is field staked, the Forest Service will contact the tribes and offer to walk that area to ensure no special places are impacted.
  203. The Forest Service also committed in the MOA to sharing with the tribes any authorized monitoring reports regarding water quality and the effects of additional moisture on plants, animals, and the terrain.
  204. The MOA guaranteed that, to the extent practicable, the final locations of new ski runs will take advantage of previously-disturbed areas, such as where trees were already dead.
  205. About 900 gallons per minute are needed to make a sufficient amount of snow for the Snowbowl upgrades.
  206. Although the use of fresh water for snowmaking would not alleviate the tribes’ religious concerns, several alternative water sources were considered. However, after logistics, economics, water availability, alternate distribution systems, etc., were studied, the use of potable water sources rather than

- reclaimed water was determined to be imprudent.
207. J.R. Murray, manager of the Arizona Snowbowl ski area sought advice from several local experts regarding possible sources of water for snowmaking and the availability and sustainability of such sources.
  208. It would not be feasible to haul potable water up to the Snowbowl for snowmaking because it would not be possible to transport the necessary quantity of water up to the Snowbowl SUP area.
  209. The City of Flagstaff was unwilling to provide potable water for snowmaking at the Snowbowl ski area due to their long-term concerns with water availability.
  210. It would not be feasible to harvest water, i.e., to collect surface water off of an impermeable surface in order to make snow at the Snowbowl ski area because the volcanic rock on the Peaks has a high infiltration capacity.
  211. Perched water-bearing zones are thin, discontinuous water systems that rely on seasonal recharge to be replenished. For example, the perched water-bearing zone in the Inner Basin is typically only a seasonal supply of water.
  212. The perched water-bearing zone in the Inner Basin is a not a reliable source of water due to the nature of perched water-bearing zones, the City of Flagstaff's use of water from this area, and the fact that the availability of water in this area is entirely dependent upon snowmelt for recharge.
  213. The perched water-bearing zones in the Hart Prairie area are typically even smaller than the perched water-bearing zones in the Inner Basin.<sup>20</sup> The capacity of the perched water-bearing zones in the Hart Prairie area are relatively small. Although it is not uncommon to drill a well into the perched water-bearing zone in the Hart Prairie area and not hit water, successful wells in the perched water-bearing zones in the Hart Prairie area yield just a few gallons to a few tens of gallons per minute of water. Therefore, it would be necessary to drill at least 100 wells into the perched water-bearing zone in the Hart Prairie area to obtain about 1000 gallons of water per minute.
  214. The perched water-bearing zones in the Fort Valley area are small and discontinuous. It is common to drill a well into the perched water-bearing zone in the Fort Valley area and not hit water. The capacity of wells drilled into perched water-bearing zones in the Fort Valley area are typically a few gallons to no more than 10 or 20 gallons of water per minute.
  215. Based upon current information, the C-Aquifer underlying the Peaks is only partly saturated, and the depth to water below land surface under the Peaks would be in the order of more than 3000 feet.
  216. The cost of drilling a hole and placing casing in the hole for a well to the C-Aquifer would cost around \$500,000 to \$1 million. This amount does not include the cost of conducting hydrologic or geologic studies in advance of drilling the well, which would increase the
20. The ski area's original base was established in Hart Prairie in 1938.

likelihood of developing a successful well. It is possible to encounter difficulties in drilling to the C-Aquifer that could effectively cause the drilling program to fail. Although it is known that there is water in the R-Aquifer underlying the Peaks, at this time, it is not possible to estimate the capacity of the R-Aquifer in and around the Peaks.

217. Typically, the parts of the C-Aquifer that are unsaturated are substantially deeper.
218. The R-Aquifer is located as much as 1000 feet below the bottom of the C-Aquifer.
219. The cost of drilling a hole and placing casing in the hole for a well to the R-Aquifer around the Peaks would cost at least \$3 million. This amount does not include the cost of other actions that it would be prudent to undertake prior to drilling such a well.
220. It is possible to encounter difficulties in drilling to the R-Aquifer that could effectively cause the drilling program to fail.
221. There is a risk that a well drilled to the R-Aquifer would not have sufficient yield, and the well would fail or collapse.
222. While the Court has enumerated findings of fact herein, these findings are not intended to be all inclusive or narrowly limiting. A great number of additional findings could be made in support of the Court's conclusions of law.

#### B. Conclusions of Law

[10] 1. Under RFRA, a law of general applicability that provides conduct that substantially burdens a person's exercise of religion is invalid unless the law is the least restrictive means of serving a com-

PELLING government interest. 42 U.S.C. § 2000bb-1(b). The statutorily imposed test must be interpreted with regard to the relevant circumstances in each case. See *Hamilton v. Schriro*, 74 F.3d 1545, 1553 (8th Cir.1996).

[11] 2. To establish a *prima facie* case under RFRA, a plaintiff must show that the law substantially burdens his ability to freely exercise his religion. *Guam*, 290 F.3d at 1222. Once a plaintiff has established a *prima facie* case, the burden shifts to the defendant to demonstrate that the law furthers a "compelling interest" using the least restrictive means. *Id.*

3. The compelling interest test, which had been the standard for analyzing First Amendment free exercise claims, was rejected in *Employment Division v. Smith*, 494 U.S. 872, 110 S.Ct. 1595, 108 L.Ed.2d 876 (1990). Congress enacted RFRA to restore pre-*Smith* law and the compelling interest test. 42 U.S.C. § 2000bb(b)(1).

4. RFRA provides no definition of "substantial burden." Rather, in enacting RFRA, Congress expected "that the courts will look to free exercise cases decided prior to *Smith* for guidance in determining whether the exercise of religion has been substantially burdened." S.Rep. No. 103-111 at 8-9 (1993). Therefore, free exercise cases decided prior to *Smith* involving land management decisions—such as *Lyng v. Northwest Cemetery Protective Ass'n*, 485 U.S. 439, 108 S.Ct. 1319, 99 L.Ed.2d 534 (1988) and *Wilson*, 708 F.2d at 735, *cert. denied*, sub nom. *Navajo Medicinemen's Ass'n v. Block*, 464 U.S. 1056, 104 S.Ct. 739, 79 L.Ed.2d 197 (1984)—are instructive here.

5. The Ninth Circuit has clearly articulated the proper legal standard to be applied in this case: an action "burdens the free exercise of religion if it puts substantial pressure on an adherent to modify his behavior and violate his beliefs, including

when . . . it results in the choice of an individual of either abandoning his religious principle or facing criminal prosecution.” *Guam*, 290 F.3d at 1222.

### 1. Substantial Burden

[12] 6. A RFRA plaintiff has the burden of showing that the government’s action “burdens the adherent’s practice of his or her religion by pressuring him or her to commit an act forbidden by the religion or by preventing him or her from engaging in conduct or having a religious experience which the faith mandates.” *Worldwide Church of God v. Philadelphia Church of God, Inc.*, 227 F.3d 1110, 1121 (9th Cir.2000); see *Guru Nanak Sikh Soc’y of Yuba City v. County of Sutter*, 326 F.Supp.2d 1140, 1152 (E.D.Cal.2003) (“To meet the ‘substantial burden’ standard, the governmental conduct being challenged must *actually inhibit* religious activity in a concrete way, and cause more than a mere inconvenience.”) (emphasis in original).

[13] 7. The government’s land management decision will not be a “substantial burden” absent a showing that it coerces someone into violating his or her religious beliefs or penalizes his or her religious activity. *Lyng*, 485 U.S. at 449–53, 108 S.Ct. 1319 (the case law “does not and cannot imply that incidental effects of government programs, which may make it more difficult to practice certain religions, but which have no tendency to coerce individuals into acting contrary to their religious beliefs, require government to bring forward a compelling justification for its otherwise lawful actions”); see *Wilson*, 708 F.2d at 741 (“Many government actions may offend religious believers, and may cast doubt upon the veracity of religious beliefs, but unless such actions penalize faith, they do not burden religion.”); see also *Havasupai Tribe*, 752 F.Supp. at 1484–1486 (finding Forest Service approval of plan for operations of uranium mine

does not substantially burden exercise of religion because, although Havasupai Tribe’s religious and cultural belief systems are “intimately bound up” in the site, “Plaintiffs are not penalized for their beliefs, nor are they prevented from practicing their religion.”); *Means*, 858 F.2d at 406–07 (finding no substantial burden where “[t]he Forest Service has performed no act of compulsion to interfere with appellees’ ceremonies or practices nor has it denied them access to [the Forest lands] for religious purposes”).

8. Indeed, “Courts consistently have refused to disturb governmental land management decisions that have been challenged by Native Americans on free exercise grounds.” *Means*, 858 F.2d at 407 (providing citations to numerous cases).

9. The statutory duty imposed by RFRA is only fairly viewed in the context of other Congressional mandates, such as the National Forest Management Act’s multiple-use mandate. See 16 U.S.C. § 1604(e).

10. The evaluation of when the government’s land management decisions cross the line from legitimate conduct to unconstitutional prohibitions on the free exercise of religion “cannot depend on measuring the effects of a governmental action on a religious objector’s spiritual development.” *Lyng*, 485 U.S. at 451, 108 S.Ct. 1319.

11. Allowing such a subjective definition of substantial burden would open the door to the imposition of “religious servitudes” over large portions of federal land. *Id.* at 452–53, 108 S.Ct. 1319 (noting that while Plaintiffs “stress the limits of the religious servitude that they are now seeking” . . . “[n]othing in the principle for which they contend . . . would distinguish this case from another lawsuit in which they . . . might seek to exclude all human activity but their own from sacred areas of the public lands.”).

[14] 12. “RFRA on its own does not provide a freestanding right to free exercise of religion on another’s property.” *Benally v. Kays*, Order, Civil No. 3:03–CV–01330–PCT–NVW (D.Ariz. Sept. 7, 2005) (dismissing claim that Hopi Tribe law enforcement substantially burdened Navajos’ exercise of religion by taking various actions to interfere with their Sundance ceremony).

[15] 13. Here, Plaintiffs have failed to demonstrate that the Snowbowl decision coerces them into violating their religious beliefs or penalizes their religious activity. *Cf. Lyng*, 485 U.S. at 449, 108 S.Ct. 1319. In fact, the Forest Service has guaranteed that religious practitioners would still have access to the Snowbowl and the approximately 74,000 acres of the CNF that comprise the Peaks for religious purposes.

14. Plaintiffs have failed to present any objective evidence that their exercise of religion will be impacted by the Snowbowl upgrades. Plaintiffs have not identified any plants, springs or natural resources within the SUP area that would be affected by the Snowbowl upgrades. They have identified no shrines or religious ceremonies that would be impacted by the Snowbowl decision.

15. Plaintiffs’ assertions of perceived religious impact are near identical to those voiced by the Hopi Tribe and the Navajo Nation in *Wilson v. Block*. In that case, the plaintiffs similarly asserted that “development of the Peaks would be a profane act, and an affront to the deities, and that, in consequence, the Peaks would lose their healing power and otherwise cease to benefit the tribes.” 708 F.2d at 740. They contended “that development would seriously impair their ability to pray and conduct ceremonies upon the Peaks.” *Id.* Considering this information, the D.C. Circuit found the agency’s decision did not substantially burden the tribes’ exercise of religion. *Id.* at 745. The same decision is

warranted here. The subjective views and beliefs presented at trial, although sincerely held, are not sufficient for the proposed project to constitute a substantial burden under RFRA on the practice of religion by any Plaintiff or any members of any Plaintiff tribe or nation.

16. If the facts alleged by Plaintiffs were enough to establish a substantial burden, the Forest Service would be left in a precarious situation as it attempted to manage the millions of acres of public lands in Arizona, and elsewhere, that are considered sacred to Native American tribes.

17. As the D.C. Circuit found in *Wilson*:

The Secretary of Agriculture has a statutory duty . . . to manage the National Forests in the public interest, and he has determined that the public interest would best be served by expansion of the Snow Bowl ski area. In making that determination, the Secretary has not directly or indirectly penalized the plaintiffs for their beliefs. The construction approved by the Secretary is, indeed, inconsistent with the plaintiffs’ beliefs, and will cause the plaintiffs’ spiritual disquiet, but such consequences do not state a free exercise claim under *Sherbert*, *Thomas*, or any other authority.

*Id.* at 741–42.

18. The Snowbowl decision does not bar Plaintiffs’ access, use, or ritual practice on any part of the Peaks. The decision does not coerce individuals into acting contrary to their religious beliefs nor does it penalize anyone for practicing his or her religion.

19. Indeed, Defendants have committed, in the MOA, to ensuring that religious practitioners will have access to the 777-acre SUP area and the approximately 74,-

000 remaining acres of the Peaks for religious purposes.

20. Because Plaintiffs have not demonstrated a substantial burden to any exercise of religion, Plaintiffs have failed to establish a *prima facie* RFRA case.

## 2. Compelling Governmental Interest

21. When applying the compelling government interest standard, “[c]ontext matters.” *Cutter v. Wilkinson*, 544 U.S. 709, 125 S.Ct. 2113, 2123, 161 L.Ed.2d 1020 (2005), citing *Grutter v. Bollinger*, 539 U.S. 306, 327, 123 S.Ct. 2325, 156 L.Ed.2d 304 (2003) (alterations in original). Thus, “accommodation must be measured so that it does not override other significant interests.” *Id.*

[16] 22. The government has a compelling interest in selecting the alternative that best achieves its multiple-use mandate under the National Forest Management Act. The Forest Service here has a compelling interest in managing the public land for recreational uses such as skiing.

23. Congress has directed the Forest Service to manage the National Forests for “outdoor recreation, range, timber, watershed, and wildlife and fish purposes.” 16 U.S.C. § 1604(e). Providing the public opportunities for outdoor recreation on the public lands is thus integral to the Forest Service’s mission in managing the National Forests.

24. Congress established a permitting system in order to facilitate the operation of ski areas and facilities on National Forest land. 16 U.S.C. § 497b; 36 C.F.R. § 251.53(n). Accordingly, many National Forests, including the CNF, have established designated recreation sites for skiing. The operation of the ski areas, through the special-use permit system, allows the Forest Service to provide the type of “outdoor recreation” mandated by NFMA.

25. The CNF Forest Service Plan, which underwent its own public review process, directs the Forest Service to manage the Snowbowl as a developed ski area.

26. The protection of public safety is also a compelling governmental interest. Cf. *Wisconsin v. Yoder*, 406 U.S. 205, 230, 92 S.Ct. 1526, 32 L.Ed.2d 15 (1972); *Sherbert v. Verner*, 374 U.S. 398, 403, 83 S.Ct. 1790, 10 L.Ed.2d 965 (1963). Here, the Forest Service has a compelling interest in authorizing upgrades at Snowbowl to ensure that users of the National Forest ski area have a safe experience.

27. The Forest Service’s compliance with the Establishment Clause is an additional compelling government interest. See *Seidman v. Paradise Valley Unified Sch. District No. 69*, 327 F.Supp.2d 1098, 1112 (D.Ariz.2004) (“compliance with Establishment Clause is a state interest sufficiently compelling to justify content based restrictions on speech”) (citing *Capitol Square Review & Advisory Bd. v. Pinette*, 515 U.S. 753, 761–62, 115 S.Ct. 2440, 132 L.Ed.2d 650 (1995)); see also *Widmar v. Vincent*, 454 U.S. 263, 271, 102 S.Ct. 269, 70 L.Ed.2d 440 (1981) (government’s interest in complying with its constitutional obligations is compelling).

28. While Plaintiffs may find it offensive that lands that have cultural and religious significance to them also host recreational activities, this cannot justify a “religious servitude” over large amounts of public land. “The Supreme Court has held repeatedly that the First Amendment may not be asserted to deprive the public of its normal use of an area.” *Inupiat Community of Arctic Slope v. United States*, 548 F.Supp. 182, 189 (D.Alaska 1982) (finding government’s interest in pursuing mineral development on public lands outweighed alleged interference with religious beliefs); *Lyng*, 485 U.S. at 453, 108 S.Ct. 1319 (“Whatever

rights the Indians may have to the use of the area . . . , those rights do not divest the Government of its right to use what is, after all, *its* land.”); *see also Means*, 858 F.2d at 408 n. 7.

### 3. Least Restrictive Means

29. The Ninth Circuit has held that the government meets its burden of showing the least restrictive means if “it demonstrates that it actually considered and rejected the efficacy of less restrictive means before adopting the challenged practice.” *Warsoldier v. Woodford*, 418 F.3d 989, 999 (9th Cir.2005); *see also U.S. v. Antoine*, 318 F.3d 919, 923–24 (9th Cir.2003), *cert. denied*, 540 U.S. 1221, 124 S.Ct. 1505, 158 L.Ed.2d 157 (2004); *U.S. v. Hugs*, 109 F.3d 1375, 1378–79 (9th Cir.1997) (government permit scheme was the least restrictive means because it still permitted access to eagles and eagle parts for religious purposes, albeit not in as convenient a manner as the Indian defendants would have liked).

30. The Forest Service chose the least restrictive means for achieving its land management decision.

31. The Forest Service has determined that the Snowbowl facilities’ improvements, including snowmaking, will enable the ski area to provide a safe, reliable and consistent operating season. Furthermore, the evidence adduced at trial demonstrates that snowmaking is needed to maintain the viability of the Snowbowl as a public recreational resource.

32. In carrying out its obligations under NEPA and NHPA, the Forest Service reached a decision that enables the purposes of the Snowbowl improvements to be carried out in a manner that is designed to minimize adverse impacts, including impacts to the tribes’ culture and religion.

33. The Forest Service considered the use of fresh water, including ground water, and determined that it was not readily

available. Likewise, the Forest Service considered reduced snowmaking (and therefore a lesser amount of reclaimed water used on the mountain), but determined that this was impracticable and would not address tribal concerns.

34. The Forest Service also considered an alternative that would not permit any snowmaking (Alternative 3) on the Peaks, and a No–Action Alternative, but determined that adopting such an approach would likely lead to the loss of the Snowbowl facility

35. Plaintiffs cannot “demonstrate what, if any, less restrictive means remain unexplored.” *Hamilton*, 74 F.3d at 1555. The government is not required to “refute every conceivable option” to prove that its action is narrowly tailored. *Id.*

36. A reviewing court should not second-guess the reasonable determination of the responsible government official by means of a de novo assessment of whether there is some other, less intrusive means of achieving the government’s objective. *Ward v. Rock Against Racism*, 491 U.S. 781, 797, 109 S.Ct. 2746, 105 L.Ed.2d 661 (1989) (“The Court of Appeals erred in sifting through all the available or imagined alternative means of regulating sound volume in order to determine whether the city’s solution was ‘the least intrusive means’ of achieving the desired end.”) and *id.* at 800, 109 S.Ct. 2746. *Accord, Clark v. Community for Creative Non–Violence*, 468 U.S. 288, 299, 104 S.Ct. 3065, 82 L.Ed.2d 221 (1984); *Carew–Reid v. Metro. Transp. Auth.*, 903 F.2d 914, 917 (2d Cir. 1990).

37. The Court finds as a matter of fact and concludes as a matter of law that the Forest Service’s decision to authorize upgrades to an existing ski area on the CNF is not a violation of RFRA.

### III. Conclusion

The Forest Service properly observed all of the procedural requirements during the various stages of approving the Snowbowl project, including preparation of an extensive EIS. The Court's role is to review compliance with these procedures, not to review the substance of the agency's decision. Therefore, Defendants' and Defendant-Intervenor's motions for summary judgment are granted, and Plaintiffs' motions for summary judgment are denied. As such,

IT IS ORDERED that the Defendants' Motion for Summary Judgment (Doc. 71) is GRANTED in part and DENIED in part. The motion is denied with respect to the Plaintiffs' RFRA claims only, and is granted with respect to all other counts.

IT IS FURTHER ORDERED that Arizona Snowbowl Resort's Motion for Summary Judgment (Doc. 68) is GRANTED in part and DENIED in part. The motion is denied with respect to the Plaintiffs' RFRA claims only, and is granted as to all other counts.

IT IS FURTHER ORDERED that the Navajo Plaintiffs' Motion for Summary Judgment (Doc. 73) is DENIED.

IT IS FURTHER ORDERED that the Hopi Plaintiffs' Motion for Summary Judgment (Doc. 65) is DENIED.

IT IS FURTHER ORDERED that the Hualapai Plaintiffs' Motion for Summary Judgment (Doc. 67) is DENIED.

IT IS FURTHER ORDERED that the Havasupai Plaintiffs' Motion for Summary Judgment (Doc. 70) is DENIED.

IT IS FURTHER ORDERED that the Plaintiffs' claims under RFRA are DISMISSED.

IT IS FURTHER ORDERED that the Navajo Plaintiffs' Motion to Amend/ Correct Amended Complaint (Doc. 75) is DENIED.

IT IS FURTHER ORDERED that the Defendants' Motion for Leave to File Proposed Findings of Fact and Conclusions of Law Beyond Deadline (Doc. 259) is GRANTED.

IT IS FURTHER ORDERED that the Clerk of Court is directed to enter judgment in favor of the Defendants and Defendant-Intervenor and against Plaintiffs on all counts.



### In the Matter of the EXTRADITION OF Jose Espinoza CHAVEZ

No. 05-70601 HRL.

United States District Court,  
N.D. California.  
San Jose Division.

Nov. 22, 2005.

**Background:** United States brought action on behalf of Mexico to extradite accused to stand trial in Mexico for murder committed eight years earlier.

**Holding:** Following hearing, the District Court, Lloyd, United States Magistrate Judge, held that government did not establish probable cause to believe that accused was person of same name wanted for commission of murder, precluding extradition. Certification for extradition denied.

#### 1. Extradition and Detainers ⇌ 1

In reviewing extradition requests, courts look to whether: (1) the extradition judge had jurisdiction to conduct proceedings; (2) the extradition court had jurisdiction over the fugitive; (3) the extradition treaty was in full force and ef-

# Appendix B

Applying this test to § 104, we hold that amended § 104 was constitutionally applied to the payments Polone received in November 1996, May 1997, and November 1998. As explained above, the amendment to § 104 explicitly applied only to amounts received after its effective date, which was August 20, 1996. 26 U.S.C. § 104, Application of August 20, 1996 Amendments. Although it is possible for a statute with a seemingly prospective application to apply retroactively in some circumstances, *Landgraf*, 511 U.S. at 258–59, 114 S.Ct. 1483, the amendments to § 104 did not because they did not attach new legal consequences to completed payments. On the contrary, the amendments applied only prospectively, to payments made after their date of enactment. Compare with *Untermeyer v. Anderson*, 276 U.S. 440, 445, 48 S.Ct. 353, 72 L.Ed. 645 (1928) (a tax was retroactive where it applied to “bona fide gifts not made in anticipation of death and fully consummated prior to” the statute’s effective date) (emphasis added); *Blodgett v. Holden*, 275 U.S. 142, 147, 48 S.Ct. 105, 72 L.Ed. 206 (1927) (same).

Polone argues that the amendments to § 104 apply retroactively because his settlement with UTA was “finalized on May 3, 1996, more than three months before the enactment of the statute.” This argument is unconvincing for two reasons. First, although the settlement contract may have been “finalized” in the sense that both parties signed it, settlement of Polone’s defamation claim was nowhere near complete as of August 20, 1996. On the contrary, UTA still had to make three payments to Polone, and he had to honor his promise to guard UTA’s confidential information. Thus, the Tax Court did not apply amended § 104 to a contract that was “fully consummated” prior to the amendment’s effective date, as was the case in *Untermeyer* and *Blodgett*. Rather, amend-

ed § 104 was applied to a contract whose fulfillment was still a work in progress. Second, Polone’s argument falls squarely into the Supreme Court’s warning that “[a] statute does not operate ‘retrospectively’ merely because it is applied in a case arising from conduct antedating the statute’s enactment.” *Landgraf*, 511 U.S. at 269, 114 S.Ct. 1483. The fact that Polone’s tax dispute stemmed from his settlement with UTA—conduct that antedated the revisions to § 104—does not mean that § 104 operates retrospectively when it is applied to settlement payments that Polone received after its effective date.

## V

For the reasons explained above, we agree with the Tax Court that the settlement payments received by Polone after August, 1996 are taxable as ordinary income.

**AFFIRMED.**



**NAVAJO NATION; Havasupai Tribe; Rex Tilousi; Dianna Uqualla; Sierra Club; White Mountain Apache Nation; Yavapai–Apache Nation; The Flagstaff Activist Network, Plaintiffs–Appellants,**

and

**Hualapai Tribe; Norris Nez; Bill Bucky Preston; Hopi Tribe; Center for Biological Diversity, Plaintiffs,**

v.

**UNITED STATES FOREST SERVICE; Nora Rasure, in her official capacity as Forest Supervisor, Responsible Officer, Coconino National Forest; Harv Forsgren, appeal deciding office, Regional Forester, in his official capacity, Defendants–Appellees,**

**Arizona Snowbowl Resort Limited  
Partnership, Defendant–  
intervenor–Appellee.**

**Navajo Nation; Hualapai Tribe; Norris  
Nez; Bill Bucky Preston; Havasupai  
Tribe; Rex Tilousi; Dianna Uqualla;  
Sierra Club; White Mountain Apache  
Nation; Yavapai–Apache Nation;  
Center For Biological Diversity; The  
Flagstaff Activist Network, Plaintiffs,  
and  
Hopi Tribe, Plaintiffs–Appellant,**

v.

**United States Forest Service; Nora Ras-  
sure, in her official capacity as Forest  
Supervisor, Responsible Officer, Co-  
conino National Forest; Harv Fors-  
gren, appeal deciding office, Regional  
Forester, in his official capacity, De-  
fendants–Appellees,**

**Arizona Snowbowl Resort Limited  
Partnership, Defendant–  
intervenor–Appellee.**

**Hualapai Tribe; Norris Nez; Bill  
Bucky Preston, Plaintiffs–  
Appellants,**

v.

**United States Forest Service; Nora Ras-  
sure, in her official capacity as Forest  
Supervisor, Responsible Officer, Co-  
conino National Forest; Harv Fors-  
gren, appeal deciding office, Regional  
Forester, in his official capacity, De-  
fendants–Appellees.**

**Nos. 06–15371, 06–15436, 06–15455.**

United States Court of Appeals,  
Ninth Circuit.

Argued and Submitted Sept. 14, 2006.

Filed March 12, 2007.

**Background:** Numerous Indian tribes, their members, and environmental organization brought action challenging the Forest Service’s decision to authorize up-

grades to facilities at an existing ski area in the Coconino National Forest. Following a bench trial, the United States District Court for the District of Arizona, Paul G. Rosenblatt, J., 408 F.Supp.2d 866, held that the proposed expansion did not violate Religious Freedom Restoration Act (RFRA) and granted Forest Service’s motion for summary judgment on claims brought under National Environmental Policy Act (NEPA), and the National Historic Preservation Act (NHPA). Appeal was taken.

**Holdings:** The Court of Appeals, W. Fletcher, Circuit Judge, held that:

- (1) the proposed use of treated sewage effluent on the San Francisco Peaks to create snow for commercial ski area would impose a substantial burden on the exercise of religion of multiple Indian tribes, as required to establish prima facie claim under the RFRA
- (2) the proposed use of treated sewage effluent to create snow for commercial ski area was not a compelling governmental interest by the least restrictive means, as required to outweigh the substantial burden it would put on the exercise of religion by multiple Indian tribes under RFRA;
- (3) declining to allow a commercial ski resort in a national forest to put treated sewage effluent on a sacred mountain to create artificial snow was an accommodation that fell far short of an Establishment Clause violation; and
- (4) Final Environmental Impact Statement (FEIS) did not satisfy NEPA with respect to the risks of ingesting artificial snow made from treated sewage effluent for commercial ski resort.

Affirmed in part, reversed in part, and remanded.

**1. Federal Courts** ⇨776, 850.1

Following a bench trial, an appellate court reviews the district court's conclusions of law de novo and its findings of fact for clear error.

**2. Civil Rights** ⇨1032

Religious Freedom Restoration Act (RFRA) plaintiffs must prove that the burden on their religious exercise is substantial; the burden must be more than an inconvenience, and must prevent the plaintiff from engaging in religious conduct or having a religious experience. Religious Freedom Restoration Act of 1993, § 2, 42 U.S.C.A. § 2000bb.

**3. Civil Rights** ⇨1032

To establish a prima facie case under RFRA, a plaintiff must show that the government's proposed action imposes a substantial burden on the plaintiff's ability to practice freely his or her religion, and the burden must prevent the plaintiff from engaging in religious conduct or having a religious experience. Religious Freedom Restoration Act of 1993, § 5(4), 42 U.S.C.A. § 2000bb-2(4); Religious Land Use and Institutionalized Persons Act of 2000, § 8(7)(A), § 2000cc-5(7)(A).

**4. Civil Rights** ⇨1073**Indians** ⇨6.2

The proposed use of treated sewage effluent on the San Francisco Peaks to create snow for commercial ski area would impose a substantial burden on the exercise of religion of multiple Indian tribes, as required to establish a prima facie claim under the RFRA; the tribes' religions had revolved around the Peaks for centuries, their religious practices required pure, natural resources from the Peaks, and because their religious beliefs dictated that the mountain be viewed as a whole living being, the treated sewage effluent would have, in their view, contaminated the natural resources throughout the Peaks. Religious Freedom Restoration Act of 1993,

§ 5(4), 42 U.S.C.A. § 2000bb-2(4); Religious Land Use and Institutionalized Persons Act of 2000, § 8(7)(A), § 2000cc-5(7)(A).

**5. Civil Rights** ⇨1073**Indians** ⇨6.2

The proposed use of treated sewage effluent on San Francisco Peaks to create snow for commercial ski area was not a compelling governmental interest by the least restrictive means, as required to outweigh the substantial burden it would put on the exercise of religion by multiple Indian tribes under RFRA; evidence did not support conclusion that the ski area would necessarily go out of business if it were required to continue to rely on natural snow and to remain a relatively small, low key resort, and, even if there was a substantial threat that the ski area would close entirely as a commercial ski area, that was not a compelling governmental interest in allowing the ski area to make artificial snow from treated sewage effluent. Religious Freedom Restoration Act of 1993, § 2(b), 42 U.S.C.A. § 2000bb-1(b).

**6. Constitutional Law** ⇨84.5(11)**Woods and Forests** ⇨8

Declining to allow a commercial ski resort in a national forest to put treated sewage effluent on a sacred mountain to create artificial snow was an accommodation that fell far short of an Establishment Clause violation; such a refusal was a permitted accommodation to avoid callous indifference to Indian tribes' religious practices, as prohibited by the First Amendment. U.S.C.A. Const.Amend. 1.

**7. Environmental Law** ⇨665

Numerous Indian tribes, their members, and environmental organization satisfied NEPA exhaustion requirement with respect to claim that Final Environmental Impact Statement (FEIS) failed to consid-

er adequately the risks posed by human ingestion of artificial snow made from treated sewage effluent, as required under the Administrative Procedure Act (APA); the plaintiffs raised the issue both in comments on the draft environment impact statement and in administrative appeals, and the comments and appeals were more than sufficient to put the Forest Service on notice of the claim and to exhaust administrative remedies. 5 U.S.C.A. § 704; National Environmental Policy Act of 1969, § 102(2)(C), 42 U.S.C.A. § 4332(2)(C); Fed.Rules Civ.Proc.Rule 8(a)(2), 28 U.S.C.A.

#### 8. Environmental Law ⇌577

NEPA does not mandate particular results, but simply provides the necessary process' to ensure that federal agencies take a hard look at the environmental consequences of their actions. National Environmental Policy Act of 1969, § 102(2)(C), 42 U.S.C.A. § 4332(2)(C).

#### 9. Environmental Law ⇌689

Under NEPA, in reviewing an Environmental Impact Statement (EIS), a court must not substitute its judgment for that of the agency, but rather must uphold the agency decision as long as the agency has considered the relevant factors and articulated a rational connection between the facts found and the choice made. National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

#### 10. Environmental Law ⇌604(6)

Final Environmental Impact Statement (FEIS) did not satisfy NEPA with respect to the risks of ingesting artificial snow made from treated sewage effluent for commercial ski resort; Forest Service failed to provide a reasonably thorough discussion of any risks posed by human ingestion of artificial snow made from treated sewage effluent or articulate why such a discussion was unnecessary, failed to provide a candid acknowledgment of any

such risks, and failed to provide an analysis that would foster both informed decision-making and informed public participation. National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

#### 11. Environmental Law ⇌604(6)

Final Environmental Impact Statement (FEIS) concerning the use of treated sewage effluent to make artificial snow for commercial ski resort adequately disclosed to the public, and made clear that the Forest Service considered, the risk posed by endocrine disruptors, as required by NEPA; the main body of the FEIS contained a subsection on endocrine disruptors that cited a range of research and discusses the growing scientific and governmental concern about their effects on wildlife, humans, and the environment, disclosed and discussed studies done on endocrine disruptors in the treated sewage effluent proposed for use, contained a table listing the amounts of suspected disruptors measured in the water and briefly summarizes a study of its effect on various animals in experiments conducted by a university professor, and commented that the concentrations of the suspected endocrine disruptors were significantly lower in the water than in other waste water also measured in the study, and that the proposed use of reclaimed water for snowmaking would not result in comparable environmental exposure. National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

#### 12. Environmental Law ⇌604(6)

Final Environmental Impact Statement (FEIS) concerning the use of treated sewage effluent to make artificial snow for commercial ski resort adequately considered the environmental impact of diverting the treated sewage effluent from regional aquifer, as required by NEPA; immediately after describing the parameters of the

study area for the watershed analysis, the FEIS identified as one of the cumulative effects to be analyzed the potential long-term effects on the regional aquifer from diversions of reclaimed water for snowmaking, and, provided a quantitative analysis concluding that the snowmaking would result in an estimated net average reduction in groundwater recharge to the regional aquifer of slightly less than two percent of the city's total annual water production. National Environmental Policy Act of 1969, § 102(2)(C), 42 U.S.C.A. § 4332(2)(C).

### 13. Environmental Law ⇔604(6)

Final Environmental Impact Statement (FEIS) prepared by the Forest Service concerning the use of treated sewage effluent to make artificial snow for commercial ski resort satisfied its obligations under NEPA to discuss the effects of the proposed action on the human environment; the FEIS made clear that the Forest Service conducted an extensive analysis of the issue, drawing from existing literature and extensive consultation with the affected Indian tribes and the FEIS described at length the religious beliefs and practices of the tribes and the "irretrievable impact" the proposal would likely have on those beliefs and practices. National Environmental Policy Act of 1969, § 102(2)(A), 42 U.S.C.A. § 4332(2)(A).

### 14. Environmental Law ⇔89

In preparing Final Environmental Impact Statement (FEIS) concerning the use of treated sewage effluent to make artificial snow for commercial ski resort, the Forest Service's consultation process concerning the effects on historic properties to which Indian tribes attached religious and cultural significance was substantively and procedurally adequate under the Na-

tional Historic Preservation Act (NHPA). 16 U.S.C.A. § 470a(d)(6).

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Appeal from the United States District Court for the District of Arizona; Paul G. Rosenblatt, District Judge, Presiding. D.C. Nos. CV-05-01824-PGR, CV-05-01914-PGR, CV-05-01949-PGR, CV-05-01966-PGR.

Before W. FLETCHER and RAWLINSON, Circuit Judges, and THELTON E. HENDERSON,\* District Judge.

WILLIAM A. FLETCHER, Circuit Judge.

The San Francisco Peaks in the Coconino National Forest in northern Arizona have long-standing religious significance to numerous Indian tribes of the American

\* The Honorable Thelton E. Henderson, Senior United States District Judge for the Northern

District of California, sitting by designation.

Southwest. The Arizona Snowbowl is a ski area on Humphrey's Peak, the highest and most religiously significant of the San Francisco Peaks. After preparing an Environmental Impact Statement, the United States Forest Service approved a proposed expansion of the Snowbowl's facilities. One component of the expansion would enable the Snowbowl to make artificial snow from recycled sewage effluent. Plaintiffs challenged the Forest Service's approval of the expansion under the Religious Freedom Restoration Act ("RFRA"), 42 U.S.C. §§ 2000bb *et seq.*, the National Environmental Protection Act ("NEPA"), 42 U.S.C. §§ 4321 *et seq.*, and the National Historic Preservation Act ("NHPA"), 16 U.S.C. §§ 470 *et seq.*

After a bench trial, the district court held that the proposed expansion did not violate RFRA. *Navajo Nation v. U.S. Forest Serv.*, 408 F.Supp.2d 866, 907 (D.Ariz. 2006). At the same time, the district court granted summary judgment to the defendants on the plaintiffs' NEPA and NHPA claims. *Id.* at 872–80. This appeal followed as to all three claims.

Plaintiffs-appellants are the Navajo Nation, the Hopi Tribe, the Havasupai Tribe, the Hualapai Tribe, the Yavapai–Apache Nation, the White Mountain Apache Nation, Bill Bucky Preston (of the Hopi Tribe), Norris Nez (of the Navajo Nation), Rex Tilousi (of the Havasupai Tribe), Dianna Uqualla (of the Havasupai Tribe), the Sierra Club, the Center for Biological Diversity, and the Flagstaff Activist Network. Defendants-appellees are the United States Forest Service; Nora Rasure, the Forest Supervisor; Harv Forsgren, the Regional Forester; and intervenor Arizona Snowbowl Resort Limited Partnership ("ASR"), the owner of the Snowbowl.

We reverse the decision of the district court in part. We hold that the Forest Service's approval of the Snowbowl's use

of recycled sewage effluent to make artificial snow on the San Francisco Peaks violates RFRA, and that in one respect the Final Environmental Impact Statement prepared in this case does not comply with NEPA. We affirm the grant of summary judgment to Appellees on four of Appellants' five NEPA claims and their NHPA claim.

### I. Background

Humphrey's Peak, Agassiz Peak, Doyle Peak, and Fremont Peak form a single large mountain commonly known as the San Francisco Peaks, or simply the Peaks. The Peaks tower over the desert landscape of the Colorado Plateau in northern Arizona. At 12,633 feet, Humphrey's Peak is the highest point in the state. The Peaks are located within the 1.8 million acres of the Coconino National Forest.

In 1984, Congress designated 18,960 acres of the Peaks as the Kachina Peaks Wilderness. Arizona Wilderness Act of 1984, Pub.L. No. 98–406, § 101(a)(22), 98 Stat. 1485. The Forest Service has identified the Peaks as eligible for inclusion in the National Register of Historic Places and as a "traditional cultural property." A traditional cultural property is one "associat[ed] with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community." National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (rev. ed.1998), available at <http://www.cr.nps.gov/nr/publications/bulletins/nrb38/>.

The Forest Service has described the Peaks as "a landmark upon the horizon, as viewed from the traditional or ancestral lands of the Hopi, Zuni, Acoma, Navajo, Apache, Yavapai, Hualapai, Havasupai, and Paiute." The Service has acknowl-

edged that the Peaks are sacred to at least thirteen formally recognized Indian tribes, and that this religious significance is of centuries' duration. Though there are differences among these tribes' religious beliefs and practices associated with the Peaks, there are important commonalities. As the Service has noted, many of these tribes share beliefs that water, soil, plants, and animals from the Peaks have spiritual and medicinal properties; that the Peaks and everything on them form an indivisible living entity; that the Peaks are home to deities and other spirit beings; that tribal members can communicate with higher powers through prayers and songs focused on the Peaks; and that the tribes have a duty to protect the Peaks.

Organized skiing has existed at the Arizona Snowbowl since 1938. The original lodge was destroyed by fire in 1952. A replacement lodge was built in 1956. A poma lift was installed in 1958, and a chair lift was installed in 1962. In 1977, the then-owner of the Snowbowl requested authorization to clear 120 acres of new ski runs and to do additional development. In 1979, after preparing an Environmental Impact Statement, the Forest Service authorized the clearing of 50 of the 120 requested acres, the construction of a new lodge, and some other development. An association of Navajo medicine men, the Hopi tribe, and two nearby ranch owners brought suit under, *inter alia*, the Free Exercise Clause of the First Amendment and NEPA. The D.C. Circuit upheld the Forest Service's decision. *Wilson v. Block*, 708 F.2d 735 (D.C.Cir.1983).

The Snowbowl has always depended on natural snowfall. In dry years, the operating season is short, with few skiable days and few skiers. The driest year in recent memory was 2001–02, when there were 87 inches of snow, 4 skiable days, and 2,857 skiers. Another dry year was 1995–96, when there were 113 inches of snow, 25

skiable days, and 20,312 skiers. By contrast, in wet years, there are many skiable days and many skiers. For example, in 1991–92, there were 360 inches of snow, 134 skiable days, and 173,000 skiers; in 1992–93, there were 460 inches of snow, 130 skiable days, and 180,062 skiers; in 1997–98, there were 330 inches of snow, 115 skiable days, and 173,862 skiers; and in 2004–05, there were 460 inches of snow, 139 skiable days, and 191,317 skiers.

ASR, the current owner, purchased the Snowbowl in 1992 for \$4 million. In September 2002, ASR submitted a facilities improvement proposal to the Forest Service. In February 2004, the Forest Service issued a Draft Environmental Impact Statement. A year later, in February 2005, the Forest Service issued a Final Environmental Impact Statement (“FEIS”) and Record of Decision (“ROD”). The ROD approved “Alternative Two” of the FEIS, the alternative preferred by the Snowbowl. Under Alternative Two, a number of changes were proposed, including: an area for snowplay and snow tubing would be developed; a new high-speed ski lift would be added; three existing lifts would be relocated and upgraded; 66 new acres of skiable terrain would be developed; 50 acres of trails would be re-contoured; a three-acre beginner's area would be re-contoured and developed; an existing lodge would be upgraded; and a new lodge would be built.

Alternative Two also included a proposal to make artificial snow using treated sewage effluent. Treated sewage effluent is waste-water discharged by households, businesses, and industry that has been treated for certain kinds of reuse. Under Alternative Two, the City of Flagstaff would provide the Snowbowl with up to 1.5 million gallons per day of its treated sewage effluent from November through February. A new 14.8-mile pipeline would be

built between Flagstaff and the Snowbowl to carry the treated effluent. At the beginning of the ski season, during November and December, the Snowbowl would cover 205.3 acres of Humphrey’s Peak with artificial snow to build a base layer. The Snowbowl would then make additional artificial snow as necessary during the rest of the season, depending on the amount of natural snow.

## II. Standards of Review

[1] Following a bench trial, we review the district court’s conclusions of law *de novo* and its findings of fact for clear error. *Lentini v. Cal. Ctr. for the Arts*, 370 F.3d 837, 843 (9th Cir.2004).

We review *de novo* a grant of summary judgment. *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 804 (9th Cir.1999). Appellants bring their NEPA and NHPA claims under the Administrative Procedure Act (“APA”), which provides that courts shall “hold unlawful and set aside agency action, findings, and conclusions of law” that are either “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law,” or “without observance of procedure required by law.” 5 U.S.C. § 706(2)(A), (D).

## III. Religious Freedom Restoration Act

Under the Religious Freedom Restoration Act of 1993 (“RFRA”), the federal government may not “substantially burden a person’s exercise of religion even if the burden results from a rule of general applicability, except as provided in subsection (b).” 42 U.S.C. § 2000bb–1(a). “Exercise of religion” is defined to include “any exercise of religion, whether or not compelled by, or central to, a system of religious belief.” 42 U.S.C. §§ 2000bb–2(4), 2000cc–5(7)(A); *see also id.* § 2000cc–5(7)(B) (further specifying that “[t]he use, building, or conversion of real property for the purpose of religious exercise shall be considered to be religious exercise”). Sub-section (b) of

§ 2000bb–1 qualifies the ban on substantially burdening the free exercise of religion. It provides, “Government may substantially burden a person’s exercise of religion only if it demonstrates that application of the burden to the person—(1) is in furtherance of a compelling governmental interest; and (2) is the least restrictive means of furthering that compelling governmental interest.”

These provisions of RFRA were prompted by two Supreme Court decisions. RFRA was originally adopted in response to the Court’s decision in *Employment Division, Department of Human Resources of Oregon v. Smith*, 494 U.S. 872, 110 S.Ct. 1595, 108 L.Ed.2d 876 (1990). In *Smith*, an Oregon statute denied unemployment benefits to drug users, including Indians who used peyote in religious ceremonies. *Id.* at 890, 110 S.Ct. 1595. The Court held that the First Amendment’s Free Exercise Clause does not prohibit burdens on religious practices if they are imposed by laws of general applicability, such as the Oregon statute. Characterizing its prior cases striking down generally applicable laws as “hybrid” decisions invoking multiple constitutional interests, the Court refused to apply the “compelling government interest” test to a claim brought solely under the Free Exercise Clause. *Id.* at 881–82, 885–86, 110 S.Ct. 1595. The Court acknowledged, however, that although the Constitution does not require a compelling interest test in such a case, legislation could impose one. *Id.* at 890, 110 S.Ct. 1595.

In RFRA, enacted three years later, Congress made formal findings that the Court’s decision in *Smith* “virtually eliminated the requirement that the government justify burdens on religious exercise imposed by laws neutral toward religion,” and that “the compelling interest test as set forth in prior Federal court rulings is a

workable test for striking sensible balances between religious liberty and competing prior governmental interests.” Pub.L. No. 103–141, § 2(a), 107 Stat. 1488, 1488 (1993) (codified at 42 U.S.C. § 2000bb(a)). Congress declared that the purposes of RFRA were “to provide a claim or defense to persons whose religious exercise is substantially burdened by government” and “to restore the compelling interest test as set forth in *Sherbert v. Verner*, 374 U.S. 398, 83 S.Ct. 1790, 10 L.Ed.2d 965 (1963) and *Wisconsin v. Yoder*, 406 U.S. 205, 92 S.Ct. 1526, 32 L.Ed.2d 15 (1972) and to guarantee its application in all cases where free exercise of religion is substantially burdened.” *Id.* § 2(b), 107 Stat. at 1488 (codified at 42 U.S.C. § 2000bb(b)). In this initial version of RFRA, adopted in 1993, Congress defined “exercise of religion” as “exercise of religion under the First Amendment to the Constitution.” *Id.* § 5, 107 Stat. at 1489 (codified at 42 U.S.C. § 2000bb–2(4) (1994) (repealed)).

In 1997, in *City of Boerne v. Flores*, 521 U.S. 507, 117 S.Ct. 2157, 138 L.Ed.2d 624 (1997), the Supreme Court held RFRA unconstitutional as applied to state and local governments because it exceeded Congress’s authority under § 5 of the Fourteenth Amendment. *Id.* at 529, 534–35, 117 S.Ct. 2157. The Court did not, however, invalidate RFRA as applied to the federal government. *See Guam v. Guerrero*, 290 F.3d 1210, 1220–21 (9th Cir. 2002) (holding RFRA constitutional as applied to the federal government). Three years later, in response to *City of Boerne*, Congress enacted the Religious Land Use and Institutionalized Persons Act of 2000 (“RLUIPA”). Pub.L. No. 106–274, 114 Stat. 803 (codified at 42 U.S.C. §§ 2000cc *et seq.*). RLUIPA prohibits state and local governments from imposing substantial burdens on the exercise of religion through prisoner or land-use regulations. 42 U.S.C. §§ 2000cc, 2000cc–1. In addition,

RLUIPA replaced RFRA’s original, constitution-based definition of “exercise of religion” with the broader definition quoted above. RLUIPA §§ 7–8, 114 Stat. at 806–07. Under RLUIPA, and under RFRA after its amendment by RLUIPA in 2000, “exercise of religion” is defined to include “any exercise of religion, whether or not compelled by, or central to, a system of religious belief.” 42 U.S.C. § 2000bb–2(4), 2000cc–5(7)(A).

In several ways, RFRA provides greater protection for religious practices than did the Supreme Court’s pre-*Smith* free exercise cases. First, as we have previously noted, RFRA “goes beyond the constitutional language that forbids the ‘prohibiting’ of the free exercise of religion and uses the broader verb ‘burden’: a government may burden religion only on the terms set out by the new statute.” *United States v. Bauer*, 84 F.3d 1549, 1558 (9th Cir.1996) (as amended). *Cf.* U.S. Const. amd. 1 (“Congress shall make no law . . . prohibiting the free exercise [of religion.]”); *Lyng v. Nw. Indian Cemetery Protective Ass’n*, 485 U.S. 439, 451, 108 S.Ct. 1319, 99 L.Ed.2d 534 (1988) (“The crucial word in the constitutional text is ‘prohibit’: ‘For the Free Exercise Clause is written in terms of what the government cannot do to the individual, not in terms of what the individual can exact from the government.’” (quoting *Sherbert*, 374 U.S. at 412, 83 S.Ct. 1790 (Douglas, J., concurring))).

Second, as the Supreme Court noted in *City of Boerne*, RFRA provides stronger protection for free exercise than the First Amendment did under the pre-*Smith* cases because “the Act imposes in every case a least restrictive means requirement—a requirement that was not used in the pre-*Smith* jurisprudence RFRA purported to codify.” 521 U.S. at 535, 117 S.Ct. 2157.

Third, RFRA provides broader protection for free exercise because it applies *Sherbert's* compelling interest test “in all cases” where the free exercise of religion is substantially burdened. 42 U.S.C. § 2000bb(b). Prior to *Smith*, the Court had refused to apply the compelling interest analysis in various contexts, exempting entire classes of free exercise cases from such heightened scrutiny. *Smith*, 494 U.S. at 883, 110 S.Ct. 1595 (“In recent years, we have abstained from applying the *Sherbert* test (outside the unemployment compensation field) at all.”); *see, e.g., O’Lone v. Estate of Shabazz*, 482 U.S. 342, 349, 107 S.Ct. 2400, 96 L.Ed.2d 282 (1987) (not applicable to prison regulations); *Bowen v. Roy*, 476 U.S. 693, 707, 106 S.Ct. 2147, 90 L.Ed.2d 735 (1986) (Burger, J., for plurality) (not applicable in enforcing “facially neutral and uniformly applicable requirement for the administration of welfare programs”); *Goldman v. Weinberger*, 475 U.S. 503, 506–07, 106 S.Ct. 1310, 89 L.Ed.2d 478 (1986) (not applicable to military regulations).

Finally, and perhaps most important, Congress expanded the statutory protection for religious exercise in 2000 by amending RFRA’s definition of “exercise of religion.” Under the amended definition—“any exercise of religion, whether or not compelled by, or central to, a system of religious belief”—RFRA now protects a broader range of religious conduct than the Supreme Court’s interpretation of “exercise of religion” under the First Amendment. *See Guru Nanak Sikh Soc’y v. County of Sutter*, 456 F.3d 978, 995 n. 21 (9th Cir.2006) (noting same). To the extent that our RFRA cases prior to RLUIPA depended on a narrower definition of “religious exercise,” those cases are no longer good law. *See, e.g., Bryant v. Gomez*, 46 F.3d 948, 949 (9th Cir.1995) (burden must prevent adherent “from engaging in conduct or having a religious experience which the faith mandates” and

must be “an interference with a tenet or belief that is central to religious doctrine”) (quoting *Graham v. Comm’r*, 822 F.2d 844, 850–51 (9th Cir.1987)); *Stefanow v. McFadden*, 103 F.3d 1466, 1471 (9th Cir.1996) (no substantial burden because prisoner was not prevented from “engaging in any practices mandated by his religion”); *Goehring v. Brophy*, 94 F.3d 1294, 1299 (9th Cir.1996) (plaintiffs failed to establish “a substantial burden on a central tenet of their religion”). The district court in this case therefore erred by disregarding the amended definition and requiring Appellants to prove that the proposed action would prevent them “from engaging in conduct or having a religious experience *which the faith mandates.*” 408 F.Supp.2d at 904 (quoting *Worldwide Church of God, Corp. v. Philadelphia Church of God, Inc.*, 227 F.3d 1110, 1121 (9th Cir.2000), decided before RLUIPA’s passage) (emphasis added).

[2] Even after RLUIPA, RFRA plaintiffs must prove that the burden on their religious exercise is “substantial.” The burden must be “more than an ‘inconvenience,’” *Guerrero*, 290 F.3d at 1222 (quoting *Worldwide Church of God*, 227 F.3d at 1121), and must prevent the plaintiff “from engaging in [religious] conduct or having a religious experience,” *Bryant*, 46 F.3d at 949 (quoting *Graham*, 822 F.2d at 850–51). Thus, in addressing the tribes’ RFRA claim we must answer the following questions: (1) What is the “exercise of religion” in which the tribal members engage with respect to the San Francisco Peaks? (2) What “burden,” if any, would be imposed on that exercise of religion if the proposed expansion of the Snowbowl went forward? (3) If there is a burden, would the burden be “substantial”? (4) If there would be a substantial burden, can the “application of the burden” to the tribal members be justified as “in furtherance of a compelling

governmental interest” and “the least restrictive means of furthering that compelling governmental interest”? We address these questions in turn.

#### A. “Exercise of Religion”

RFRA protects “any exercise of religion, whether or not compelled by, or central to, a system of religious belief.” 42 U.S.C. §§ 2000bb-2(4), 2000cc-5(7)(A). The district court stated that it was not “challenging the honest religious beliefs of any witness.” Nor do Appellees dispute the sincerity of Appellants’ testimony concerning their religious beliefs and practices. Indeed, Appellees concede that the Peaks as a whole are significant to Appellants’ “exercise of religion.” We focus our analysis on the Peaks’ significance to the Hopi and Navajo, and to a lesser extent on the Hualapai and Havasupai.

##### 1. The Hopi

Hopi religious practices center on the Peaks. As stated by the district court, “The Peaks are where the Hopi direct their prayers and thoughts, a point in the physical world that defines the Hopi universe and serves as the home of the Kachinas, who bring water, snow and life to the Hopi people.” 408 F.Supp.2d at 894. The Hopi have been making pilgrimages to the Peaks since at least 1540, when they first encountered Europeans, and probably long before that.

The Hopi believe that when they emerged into this world, the clans journeyed to the Peaks (or *Nuvatukyaovi*, “high place of snow”) to receive instructions from a spiritual presence, *Ma’saw*. At the Peaks, they entered a spiritual covenant with *Ma’saw* to take care of the land, before they migrated down to the Hopi villages. The Hopi re-enact their emergence from the Peaks annually, and Hopi practitioners look to the Peaks in their daily songs and prayers as a place of tranquility, sanctity, and purity.

The Peaks are also the primary home of the powerful spiritual beings called *Katsinam* (Hopi plural of *Katsina*, or Kachina in English). Hundreds of specific *Katsinam* personify the spirits of plants, animals, people, tribes, and forces of nature. The *Katsinam* are the spirits of Hopi ancestors, and the Hopi believe that when they die, their spirits will join the *Katsinam* on the Peaks. As spiritual teachers of “the Hopi way,” the *Katsinam* teach children and remind adults of the moral principles by which they must live. These principles are embodied in traditional songs given by the *Katsinam* to the Hopi and sung by the Hopi in their everyday lives. One Hopi practitioner compared these songs to sermons, which children understand simplistically but which adults come to understand more profoundly. Many of these songs focus on the Peaks.

*Katsinam* serve as intermediaries between the Hopi and the higher powers, carrying prayers from the Hopi villages to the Peaks on an annual cycle. From July through January, the *Katsinam* live on the Peaks. In sixteen days of ceremonies and prayers at the winter solstice, the Hopi pray and prepare for the *Katsinam*’s visits to the villages. In February or March, the *Katsinam* begin to arrive, and the Hopi celebrate with nightly dances at which the *Katsinam* appear in costume and perform. The *Katsinam* stay while the Hopi plant their corn and it germinates. Then, in July, the Hopi mark the *Katsinam*’s departure for the Peaks.

The Hopi believe that pleasing the *Katsinam* on the Peaks is crucial to their livelihood. Appearing in the form of clouds, the *Katsinam* are responsible for bringing rain to the Hopi villages from the Peaks. The *Katsinam* must be treated with respect, lest they refuse to bring the rains from the Peaks to nourish the corn crop. In preparation for the *Katsinam*’s

arrival, prayer sticks and feathers are delivered to every member of the village, which they then deposit in traditional locations, praying for the spiritual purity to receive the *Katsinam*. The *Katsinam* will not arrive until the peoples' hearts are in the right place, a state they attempt to reach through prayers directed at the spirits on the Peaks.

The Hopi have at least fourteen shrines on the Peaks. Every year, religious leaders select members of each of the approximately 40 congregations, or *kiva*, among the twelve Hopi villages to make a pilgrimage to the Peaks. They gather from the Peaks both water for their ceremonies and boughs of Douglas fir worn by the *Katsinam* in their visits to the villages.

## 2. The Navajo

The Peaks are also of fundamental importance to the religious beliefs and practices of the Navajo. The district court found, “[T]he Peaks are considered . . . to be the ‘Mother of the Navajo People,’ their essence and their home. The whole of the Peaks is the holiest of shrines in the Navajo way of life.” 408 F.Supp.2d at 889. Considering the mountain “like family,” the Navajo greet the Peaks daily with prayer songs, of which there are more than one hundred relating to the four mountains sacred to the Navajo. Witnesses described the Peaks as “our leader” and “very much an integral part of our life, our daily lives.”

The Navajo creation story revolves around the Peaks. The mother of humanity, called the Changing Woman and compared by one witness to the Virgin Mary, resided on the Peaks and went through puberty there, an event that the people celebrated as a gift of new life. Following this celebration, called the *kinaalda*, the Changing Woman gave birth to twins, from whom the Navajo are descended. The Navajo believe that the Changing

Woman’s *kinaalda* gave them life generation after generation. Young women today still celebrate their own *kinaalda* with a ceremony one witness compared to a Christian confirmation or a Jewish bat mitzvah. The ceremony sometimes involves water especially collected from the Peaks because of the Peaks’ religious significance.

The Peaks are represented in the Navajo medicine bundles found in nearly every Navajo household. The medicine bundles are composed of stones, shells, herbs, and soil from each of four sacred mountains. One Navajo practitioner called the medicine bundles “our Bible,” because they have “embedded” within them “the unwritten way of life for us, our songs, our ceremonies.” The practitioner traced their origin to the Changing Woman: When her twins wanted to find their father, Changing Woman instructed them to offer prayers to the Peaks and conduct ceremonies with medicine bundles. The Navajo believe that the medicine bundles are conduits for prayers; by praying to the Peaks with a medicine bundle containing soil from the Peaks, the prayer will be communicated to the mountain.

As their name suggests, medicine bundles are also used in Navajo healing ceremonies, as is medicine made with plants collected from the Peaks. Appellant Norris Nez, a Navajo medicine man, testified that “like the western doctor has his black bag with needles and other medicine, this bundle has in there the things to apply medicine to a patient.” Explaining why he loves the mountain as his mother, he testified, “She is holding medicine and things to make us well and healthy. We suckle from her and get well when we consider her our Mother.” Nez testified that he collects many different plants from the Peaks to make medicine.

The Peaks play a role in every Navajo religious ceremony. The medicine bundle is placed to the west, facing the Peaks. In the Blessingway ceremony, called by one witness "the backbone of our ceremony" because it is performed at all ceremonies' conclusion, the Navajo pray to the Peaks by name.

The purity of nature, including the Peaks, plays an important part in Navajo beliefs. Among other things, it affects how a medicine bundle—described by one witness as "a living basket"—is made. The making of a medicine bundle is preceded by a four-day purification process for the medicine man and the keeper of the bundle. By Navajo tradition, the medicine bundle should be made with leather from a buck that is ritually suffocated; the skin cannot be pierced by a weapon. Medicine bundles are "rejuvenated" regularly, every few years, by replacing the ingredients with others gathered on pilgrimages to the Peaks and three other sacred mountains.

The Navajo believe their role on earth is to take care of the land. They refer to themselves as *nochoka dine*, which one witness translated as "people of the earth" or "people put on the surface of the earth to take care of the lands." They believe that the Creator put them between four sacred mountains of which the westernmost is the Peaks, or *Do'ok'oos-liid* ("shining on top," referring to its snow), and that the Creator instructed them never to leave this homeland. Although the whole reservation is sacred to the Navajo, the mountains are the most sacred part. One witness drew an analogy to a church, with the area within the mountains as the part of the church where the people sit, and the Peaks as "our altar to the west."

As in Hopi religious practice, the Peaks are so sacred in Navajo beliefs that, as testified by Joe Shirley, Jr., President of the Navajo Nation, a person "cannot just

voluntarily go up on this mountain at any time. It's—it's the holiest of shrines in our way of life. You have to sacrifice. You have to sing certain songs before you even dwell for a little bit to gather herbs, to do offerings." After the requisite preparation, the Navajo go on pilgrimages to the Peaks to collect plants for ceremonial and medicinal use.

### 3. The Hualapai

The Peaks figure centrally in the beliefs of the Hualapai. The Hualapai creation story takes place on the Peaks. The Hualapai believe that at one time the world was deluged by water, and the Hualapai put a young girl on a log so that she could survive. She landed on the Peaks, alone, and washed in the water. In the water, she conceived a son, who was a man born of water. She washed again, and conceived another son. These were the twin warriors or war gods, from whom the Hualapai are today descended. Later, one of the twins became ill, and the other collected plants and water from the Peaks, thereby healing his brother. From this story comes the Hualapai belief that the mountain and its water and plants are sacred and have medicinal properties. One witness called the story of the deluge, the twins, and their mother "our Bible story" and drew a comparison to Noah's ark. As in Biblical parables and stories, Hualapai songs and stories about the twins are infused with moral principles.

Hualapai spiritual leaders travel to the Peaks to deliver prayers. Like the Hopi and the Navajo, the Hualapai believe that the Peaks are so sacred that one has to prepare oneself spiritually to visit. A spiritual leader testified that he prays to the Peaks every day and fasts before visiting to perform the prayer feather ceremony. In the prayer feather ceremony, a troubled family prays into an eagle feather for days,

and the spiritual leader delivers it to the Peaks; the spirit of the eagle then carries the prayer up the mountain and to the Creator.

The Hualapai collect water from the Peaks. Hualapai religious ceremonies revolve around water, and they believe water from the Peaks is sacred. In their sweat lodge purification ceremony, the Hualapai add sacred water from the Peaks to other water, and pour it onto heated rocks to make steam. In a healing ceremony, people seeking treatment drink from the water used to produce the steam and are cleansed by brushing the water on their bodies with feathers. At the conclusion of the healing ceremony, the other people present also drink the water. A Hualapai tribal member who conducts healing ceremonies testified that water from the Peaks is used to treat illnesses of “high parts” of the body like the eyes, sinuses, mouth, throat, and brain, including tumors, meningitis, forgetfulness, and sleepwalking. He testified that the Peaks are the only place to collect water with those medicinal properties, and that he travels monthly to the Peaks to collect it from Indian Springs, which is lower on the mountain and to the west of the Snowbowl. The water there has particular significance to the Hualapai because the tribe’s archaeological sites are nearby.

In another Hualapai religious ceremony, when a baby has a difficult birth, a Hualapai spiritual leader brings a portion of the placenta to the Peaks so that the child will be strong like the twins and their mother in the Hualapai creation story. The Hualapai also grind up ponderosa pine needles from the Peaks in sacred water from the Peaks to aid women in childbirth.

A Hualapai religious law forbids mixing the living and the dead. In testimony in the district court, a spiritual leader gave the example of washing a baby or planting corn immediately after taking part in a

death ceremony. Mixing the two will cause a condition that was translated into English as “the ghost sickness.” The leader testified that purification after “touching death” depends on the intensity of the encounter. If he had just touched the dead person’s clothes or belongings, he might be purified in four days, but if he touched a body, it would require a month.

#### 4. The Havasupai

The Peaks are similarly central to the beliefs of the Havasupai, as the Forest Service has acknowledged in the FEIS: “The Hualapai and the Havasupai perceive the world as flat, marked in the center by the San Francisco Peaks, which were visible from all parts of the Havasupai territory except inside the Grand Canyon. The commanding presence of the Peaks probably accounts for the Peaks being central to the Havasupai beliefs and traditions, even though the Peaks themselves are on the edge of their territory.” The Chairman of the Havasupai testified that the Peaks are the most sacred religious site of the Havasupai: “That is where life began.” The Havasupai believe that when the earth was submerged in water, the tribe’s “grandmother” floated on a log and landed and lived on the Peaks, where she survived on water from the Peaks’ springs and founded the tribe.

Water is central to the religious practices of the Havasupai. Although they do not travel to the Peaks to collect water, Havasupai tribal members testified that they believe the water in the Havasu creek that they use in their sweat lodges comes ultimately from the Peaks, to which they pray daily. They believe that spring water is a living, life-giving, pure substance, and they do not use tap water in their religious practices. They perform sweat lodge ceremonies, praying and singing as they use the spring water to make steam; they

believe that the steam is the breath of their ancestors, and that by taking it into themselves they are purified, cleansed, and healed. They give water to the dead to take with them on their journey, and they use it to make medicines. The Havasupai also gather rocks from the Peaks to use for making steam.

#### B. "Burden"

The proposed expansion of the Snow-bowl entails depositing millions of gallons of treated sewage effluent—often euphemistically called "reclaimed water"—from the City of Flagstaff onto the Peaks. Depending on weather conditions, substantially more than 100 million gallons of effluent could be deposited over the course of the winter ski season.

Before treatment, the raw sewage consists of waste discharged into Flagstaff's sewers by households, businesses, and industry. The FEIS describes the treatment performed by Flagstaff:

In the primary treatment stage, solids settle out as sludge. . . . Scum and odors are also removed. . . . Wastewater is then gravity-fed for secondary treatment through the aeration/denitrification process, where biological digestion of waste occurs . . . in which a two-stage anoxic/aerobic process removes nitrogen, suspended solids, and [digestible organic matter] from the wastewater. The secondary clarifiers remove the by-products generated by this biological process, recycle microorganisms back into the process from return activated sludge, and separate the solids from the waste system. The waste sludge is sent to [a different plant] for treatment. The water for reuse then passes through the final sand and anthracite filters prior to disinfection by ultraviolet light radiation. . . . Water supplied for reuse is further treated with a hypochlorite solution to assure that residual disinfection is maintained. . . .

Although the treated sewage effluent would satisfy the requirements of Arizona law for "reclaimed water," the FEIS explains that the treatment does not produce pure water: "Fecal coliform bacteria, which are used as an indicator of microbial pathogens, are typically found at concentrations ranging from 105 to 107 colony-forming units per 100 milliliters (CFU/100 ml) in untreated wastewater. Advanced waste-water treatment may remove as much as 99.9999+ percent of the fecal coliform bacteria; however, the resulting effluent has detectable levels of enteric bacteria, viruses, and protozoa, including *Cryptosporidium* and *Giardia*." According to Arizona law, the treated sewage effluent must be free of "detectable fecal coliform organisms" in only "four of the last seven daily reclaimed water samples." Ariz. Admin. Code § R18-11-303(B)(2)(a). The FEIS acknowledges that the treated sewage effluent also contains "many unidentified and unregulated residual organic contaminants."

Treated sewage effluent may be safely and beneficially used for many purposes. *See id.* § R18-11-309 Tbl. A (2005) (permitting its use for, *inter alia*, irrigating food crops and schoolyards; flushing toilets; fire protection; certain commercial air conditioning systems; and non-self-service car washes); 7 Ariz. Admin. Reg. 876 (Feb. 16, 2001) ("Water reclamation is an important strategy for conserving and augmenting Arizona's drinking water supply. Source substitution, or the reuse of reclaimed water to replace potable water that currently is used for nonpotable purposes, conserves higher quality sources of water for human consumption and domestic purposes."). However, the Arizona Department of Environmental Quality ("ADEQ") requires that users take precautions to avoid human ingestion. For example, users must "place and maintain signage . . . so the public is informed that

reclaimed water is in use and that no one should drink from the system.” Ariz. Admin. Code § R18–9–704(H) (2005). Irrigation users must employ “application methods that reasonably preclude human contact with reclaimed water,” including preventing “contact with drinking fountains, water coolers, or eating areas,” and preventing the treated effluent from “standing on open access areas during normal periods of use.” *Id.* § R18–9–704(F). Arizona law prohibits uses involving “full-immersion water activity with a potential of ingestion,” and “evaporative cooling or misting.” *Id.* § R18–9–704(G)(2).

Under the proposed action challenged in this case, up to 1.5 million gallons per day of treated sewage effluent would be sprayed on the mountain from November through February. In November and December, the Snowbowl would use it to build a base layer of artificial snow over 205.3 acres of Humphrey’s Peak. The Snowbowl would then spray more as necessary depending on the amount of natural snowfall. The proposed action also involves constructing a reservoir on the mountain with a surface area of 1.9 acres to hold 10 million gallons of treated sewage effluent. The stored effluent would allow snowmaking to continue after Flagstaff cuts off the supply at the end of February.

The ADEQ approved the use of treated sewage effluent for snowmaking in 2001, noting that four other states already permitted its use for that purpose. 7 Ariz. Admin. Reg. 880 (Feb. 16, 2001). However, the Snowbowl would be the first ski resort in the nation to make its snow entirely from undiluted treated sewage effluent. The Snowbowl’s general manager testified in the district court that no other resort in the country currently makes its artificial snow “exclusively” out of undiluted sewage effluent.

Appellants claim that the use of treated sewage effluent to make artificial snow on the Peaks would substantially burden their exercise of religion. Because Appellants’ religious beliefs and practices are not uniform, the precise burdens on religious exercise vary among the Appellants. Nevertheless, the burdens fall roughly into two categories: (1) the inability to perform a particular religious ceremony, because the ceremony requires collecting natural resources from the Peaks that would be too contaminated—physically, spiritually, or both—for sacramental use; and (2) the inability to maintain daily and annual religious practices comprising an entire way of life, because the practices require belief in the mountain’s purity or a spiritual connection to the mountain that would be undermined by the contamination.

The first burden—the contamination of natural resources necessary for the performance of certain religious ceremonies—has been acknowledged and described at length by the Forest Service. The FEIS summarizes: “Snowmaking and expansion of facilities, especially the use of reclaimed water, would contaminate the natural resources needed to perform the required ceremonies that have been, and continue to be, the basis for the cultural identity for many of these tribes.” Further, “the use of reclaimed water is believed by the tribes to be impure and would have an irretrievable impact on the use of the soil, plants, and animals for medicinal and ceremonial purposes throughout the entire Peaks, as the whole mountain is regarded as a single, living entity.”

Three Navajo practitioners’ testimony at the bench trial echoed the Forest Service’s assessment in describing how the proposed action would prevent them from performing various ceremonies. Larry Foster, a Navajo practitioner who is training to become a medicine man, testified that “once

water is tainted and if water comes from mortuaries or hospitals, for Navajo there's no words to say that that water can be reclaimed." He further testified that he objected to the current use of the Peaks as a ski area, but that using treated sewage effluent to make artificial snow on the Peaks would be "far more serious." He explained, "I can live with a scar as a human being. But if something is injected into my body that is foreign, a foreign object—and reclaimed water, in my opinion, could be water that's reclaimed through sewage, wastewater, comes from mortuaries, hospitals, there could be disease in the waters—and that would be like injecting me and my mother, my grandmother, the Peaks, with impurities, foreign matter that's not natural."

Foster testified that if treated sewage effluent were used on the Peaks he would no longer be able to go on the pilgrimages to the Peaks that are necessary to rejuvenate the medicine bundles, which are, in turn, a part of every Navajo healing ceremony. He explained:

Your Honor, our way of life, our culture we live in—we live in the blessingway, in harmony. We try to walk in harmony, be in harmony with all of nature. And we go to all of the sacred mountains for protection. We go on a pilgrimage similar to Muslims going to Mecca. And we do this with so much love, commitment and respect. And if one mountain—and more in particular with the San Francisco Peaks—which is our bundle mountain, or sacred, bundle mountain, were to be poisoned or given foreign materials that were not pure, it would create an imbalance—there would not be a place among the sacred mountains. We would not be able to go there to obtain herbs or medicines to do our ceremonies, because that mountain would then become impure. It would not be pure anymore. And it would be a devastation for our people.

Appellant Navajo medicine man Norris Nez testified that the proposed action would prevent him from practicing as a medicine man. He told the district court that the presence of treated sewage effluent would "ruin" his medicine, which he makes from plants collected from the Peaks. He also testified that he would be unable to perform the fundamental Blessingway ceremony, because "all [medicine] bundles will be affected and we will have nothing to use eventually."

Foster, Nez, and Navajo practitioner Steven Begay testified that because they believe the mountain is an indivisible living entity, the entire mountain would be contaminated even if the millions of gallons of treated sewage effluent are put onto only one area of the Peaks. According to Foster, Nez, and Begay, there would be contamination even on those parts of the Peaks where the effluent would not come into physical contact with particular plants or ceremonial areas. To them, the contamination is not literal in the sense that a scientist would use the term. Rather, the contamination represents the poisoning of a living being. In Foster's words, "[I]f someone were to get a prick or whatever from a contaminated needle, it doesn't matter what the percentage is, your whole body would then become contaminated. And that's what would happen to the mountain." In Nez's words, "All of it is holy. It is like a body. It is like our body. Every part of it is holy and sacred." In Begay's words, "All things that occur on the mountain are a part of the mountain, and so they will have connection to it. We don't separate the mountain."

The Hualapai also presented evidence that the proposed action would prevent them from performing particular religious ceremonies. Frank Mapatis, a Hualapai practitioner and spiritual leader who visits the Peaks approximately once a month to

collect water for ceremonies and plants for medicine, testified that the use of treated sewage effluent would prevent him from performing Hualapai sweat lodge and healing ceremonies with the sacred water from the Peaks. Mapatis testified that he believes that the treated sewage effluent would seep into the ground and into the spring below the Snowbowl where he collects his sacred water, so that the spring water would be “contaminated” by having been “touched with death.” Because contact between the living and the dead induces “ghost sickness,” which involves hallucinations, using water touched with death in healing ceremonies “would be like malpractice.” Further, Mapatis would become powerless to perform the healing ceremony for ghost sickness itself, because that ceremony requires water from the Peaks, the only medicine for illnesses of the upper body and head, like hallucinations.

The second burden the proposed action would impose—undermining Appellants’ religious faith, practices, and way of life by desecrating the Peaks’ purity—is also shown in the record. The Hopi presented evidence that the presence of treated sewage effluent on the Peaks would fundamentally undermine all of their religious practices because their way of life, or “beliefway,” is largely based on the idea that the Peaks are a pure source of their rains and the home of the *Katsinam*.

Leigh Kuwanwisiwma, a Hopi religious practitioner and the director of the tribe’s Cultural Preservation Office, explained the connection between contaminating the Peaks and undermining the Hopi religion:

The spiritual covenant that the Hopi clans entered into with the Caretaker I refer to as Ma’saw, the spiritual person and the other d[ei]ties that reside—and the Katsina that reside in the Peaks started out with the mountains being in

their purest form. They didn’t have any real intrusion by humanity.

The purity of the spirits, as best we can acknowledge the spiritual domain, we feel were content in receiving the Hopi clans. So when you begin to intrude on that in a manner that is really disrespectful to the Peaks and to the spiritual home of the Katsina, it affects the Hopi people. It affects the Hopi people, because as clans left and embarked on their migrations and later coming to the Hopi villages, we experienced still a mountain and peaks that were in their purest form as a place of worship to go to, to visit, to place our offerings, the tranquility, the sanctity that we left a long time ago was still there.

Antone Honanie, a Hopi practitioner, testified that he would have difficulty preparing for religious ceremonies, because treated sewage effluent is “something you can’t get out of your mind when you’re sitting there praying” to the mountain, “a place where everything is supposed to be pure.” Emory Sekaquaptewa, a Hopi tribal member and research anthropologist, testified that the desecration of the mountain would cause *Katsinam* dance ceremonies to lose their religious value. They would “simply be a performance for performance[s] sake” rather than “a religious effort”: “Hopi people are raised in this belief that the mountains are a revered place. And even though they begin with kind of a fantasy notion, this continues to grow into a more deeper spiritual sense of the mountain. So that any thing that interrupts this perception, as they hold it, would tend to undermine the—the integrity in which they hold the mountain.”

Summarizing the Hopi’s testimony, the district court wrote:

The individual Hopi’s practice of the Hopi way permeates every part and ev-

ery day of the individual's life from birth to death. . . . The Hopi Plaintiffs testified that the proposed upgrades to the Snowbowl have affected and will continue to negatively affect the way they think about the Peaks, the Kachina and themselves when preparing for any religious activity involving the Peaks and the Kachina—from daily morning prayers to the regular calendar of religious dances that occur throughout the year. . . . The Hopi Plaintiffs also testified that this negative effect on the practitioners' frames of mind due to the continued and increased desecration of the home of the Kachinas will undermine the Hopi faith and the Hopi way. According to the Hopi, the Snowbowl upgrades will undermine the Hopi faith in daily ceremonies and undermine the Hopi faith in their Kachina ceremonies as well as their faith in the blessings of life that they depend on the Kachina to bring.

408 F.Supp.2d at 894–95.

The Havasupai presented evidence that the presence of treated sewage effluent on the Peaks would, by contaminating the Peaks, undermine their sweat lodge purification ceremonies and could lead to the end of the ceremonies. Rex Tilousi, Chairman of the Havasupai, testified that Havasupai religious stories teach that the water in Havasu creek, which they use for their sweat ceremonies, flows from the Peaks, where the Havasupai believe life began. Although none of the three Havasupai witnesses stated that they would be completely unable to perform the sweat lodge ceremonies as a consequence of the impurity introduced by the treated sewage effluent, Roland Manakaja, a traditional practitioner, testified that the impurity would disrupt the ceremony:

If I was to take the water to sprinkle the rocks to bring the breath of our ancestors—we believe the steam is the breath of our ancestors. And the rocks

placed in the west signify where our ancestors go, the deceased. . . . Once the steam rises, like it does on the Peaks, the fog or the steam that comes off is creation. And once the steam comes off and it comes into our being, it purifies and cleanses us and we go to the level of trance. . . . It's going to impact mentally my spirituality. Every time I think about sprinkling that water on the rocks, I'm going to always think about this sewer that they're using to recharge the aquifer.

He further testified that he was “concerned” that the water's perceived impurity might cause the sweat lodge ceremony to die out altogether, if tribal members fear “breathing the organisms or the chemicals that may come off the steam.”

#### C. “Substantial Burden” on the “Exercise of Religion”

[3] To establish a prima facie case under RFRA, a plaintiff must show that the government's proposed action imposes a substantial burden on the plaintiff's ability to practice freely his or her religion. *Guerrero*, 290 F.3d at 1222. Although the burden need not concern a religious practice that is “compelled by, or central to, a system of religious belief,” 42 U.S.C. §§ 2000bb–2(4), 2000cc–5(7)(A), the burden “must be more than an ‘inconvenience,’” *Guerrero*, 290 F.3d at 1222 (quoting *Worldwide Church of God*, 227 F.3d at 1121). The burden must prevent the plaintiff “from engaging in [religious] conduct or having a religious experience.” *Bryant*, 46 F.3d at 949 (quoting *Graham*, 822 F.2d at 850–51).

[4] The record supports the conclusion that the proposed use of treated sewage effluent on the San Francisco Peaks would impose a burden on the religious exercise of all four tribes discussed above—the Navajo, the Hopi, the Hualapai, and the Ha-

vasupai. However, on the record before us, that burden falls most heavily on the Navajo and the Hopi. The Forest Service itself wrote in the FEIS that the Peaks are the most sacred place of both the Navajo and the Hopi; that those tribes' religions have revolved around the Peaks for centuries; that their religious practices require pure natural resources from the Peaks; and that, because their religious beliefs dictate that the mountain be viewed as a whole living being, the treated sewage effluent would in their view contaminate the natural resources throughout the Peaks. Navajo Appellants presented evidence in the district court that, were the proposed action to go forward, contamination by the treated sewage effluent would prevent practitioners from making or rejuvenating medicine bundles, from making medicine, and from performing the Blessingway and healing ceremonies. Hopi Appellants presented evidence that, were the proposed action to go forward, contamination by the effluent would fundamentally undermine their entire system of belief and the associated practices of song, worship, and prayer, that depend on the purity of the Peaks, which is the source of rain and their livelihoods and the home of the *Katsinam* spirits.

We conclude that Appellants have shown that the use of treated sewage effluent on the Peaks would impose a substantial burden on their exercise of religion. This showing is particularly strong for the Navajo and the Hopi. Because we hold that the Navajo and the Hopi have shown a substantial burden on their exercise of religion, we need not reach the somewhat closer question of whether the Hualapai and the Havasupai have also done so.

D. "Compelling Governmental Interest" and "Least Restrictive Means"

[5] The Forest Service and the Snowbowl argue that even if Appellants have shown a substantial burden on their reli-

gious exercise, approving the use of treated sewage effluent to make artificial snow at a commercial ski area is "in furtherance of a compelling governmental interest" and constitutes "the least restrictive means of furthering that compelling governmental interest." 42 U.S.C. § 2000bb-1(b). "Requiring a State to demonstrate a compelling interest and show that it has adopted the least restrictive means of achieving that interest is the most demanding test known to constitutional law." *City of Boerne*, 521 U.S. at 534, 117 S.Ct. 2157. "[O]nly those interests of the highest order and those not otherwise served can overbalance legitimate claims to the free exercise of religion." *Yoder*, 406 U.S. at 215, 92 S.Ct. 1526.

The Supreme Court has recently emphasized that, even with respect to governmental interests of the highest order, a "categorical" or general assertion of a compelling interest is not sufficient. In *Gonzales v. O Centro Espirita Beneficente*, 546 U.S. 418, 126 S.Ct. 1211, 163 L.Ed.2d 1017 (2006), the Court held under RFRA that the government's general interest in enforcing the Controlled Substances Act was insufficient to justify the substantial burden on religious exercise imposed on a small religious group by a ban on a South American hallucinogenic plant. *Id.* at 1220-21. The Court stated that it did not "doubt the general interest in promoting public health and safety . . . , but under RFRA invocation of such general interests, standing alone, is not enough." *Id.* at 1225. "[S]trict scrutiny 'at least requires a case-by-case determination of the question, sensitive to the facts of each particular claim.'" *Id.* at 1221 (quoting *Smith*, 494 U.S. at 899, 110 S.Ct. 1595 (O'Connor, J., concurring in the judgment)).

The Forest Service and the Snowbowl argued successfully in the district court, and argue here, that approving the use of

treated sewage effluent to make artificial snow serves several compelling governmental interests. In the words of the district court, those compelling interests are: (1) “selecting the alternative that best achieves [the Forest Service’s] multiple-use mandate under the National Forest Management Act,” which includes “managing the public land for recreational uses such as skiing”; (2) protecting public safety by “authorizing upgrades at Snowbowl to ensure that users of the National Forest ski area have a safe experience”; and (3) complying with the Establishment Clause. 408 F.Supp.2d at 906. The district court concluded that all three were compelling governmental interests and that approving the proposed action was “the least restrictive means for achieving [the government’s] land management decision.” *Id.* at 907. Before this court, the Forest Service argues that the first two interests are compelling. The Snowbowl argues that all three are compelling. We disagree. We take the proffered interests in turn.

First, the Forest Service’s interests in managing the forest for multiple uses, including recreational skiing, are, in the words of the Court in *O Centro Espirita*, “broadly formulated interests justifying the general applicability of government mandates” and are therefore insufficient on their own to meet RFRA’s compelling interest test. 126 S.Ct. at 1220. Appellants argue that approving the proposed action serves the more particularized compelling interest in providing skiing at the Snowbowl, because the use of artificial snow will allow a more “reliable and consistent operating season” at one of the only two major ski areas in Arizona, where public demand for skiing and snowplay is strong. We are unwilling to hold that authorizing the use of artificial snow at an already functioning commercial ski area in order to expand and improve its facilities, as well as to extend its ski season in dry years, is a governmental interest “of the

highest order.” *Yoder*, 406 U.S. at 215, 92 S.Ct. 1526.

However, Appellees contend that the very survival of the Arizona Snowbowl as a commercial ski area depends on their being able to make artificial snow with treated sewage effluent. They point to the district court’s statement that “the evidence adduced at trial demonstrates that snowmaking is needed to maintain the viability of the Snowbowl as a public recreational resource.” 408 F.Supp.2d at 907. The record does not support the conclusion that the Snowbowl will necessarily cease to exist as a ski area if the proposed expansion does not go forward. As we noted above, there were two very dry years in 1995–96 and 2001–02. But in other recent years there has been heavy snowfall, particularly in 1991–91, 1992–93, 1997–98, and 2004–05. Relying only on natural snowfall, the Snowbowl has been in operation since 1938, and it undertook a substantial expansion in 1979. The current owners purchased the Snowbowl in 1992 for \$4 million and now seek approval for another substantial expansion. It is clear that the current owners expect that the resort would be substantially more profitable—and the income stream more consistent—if the expansion were allowed to proceed. But the evidence in the record does not support a conclusion that the Snowbowl will necessarily go out of business if it is required to continue to rely on natural snow and to remain a relatively small, low-key resort. The current owners may or may not decide to continue their ownership. But a sale by the current owners is not the same thing as the closure of the Snowbowl.

Even if there is a substantial threat that the Snowbowl will close entirely as a commercial ski area, we are not convinced that there is a compelling *governmental* interest in allowing the Snowbowl to make arti-

ficial snow from treated sewage effluent to avoid that result. We are struck by the obvious fact that the Peaks are located in a desert. It is (and always has been) predictable that some winters will be dry. The then-owners of the Snowbowl knew this when they expanded the Snowbowl in 1979, and the current owners knew this when they purchased it in 1992. The current owners now propose to change these natural conditions by adding treated sewage effluent. Under some circumstances, such a proposal might be permissible or even desirable. But in this case, we cannot conclude that authorizing the proposed use of treated sewage effluent is justified by a compelling governmental interest in providing public recreation. Even without the proposed expansion of the Snowbowl, members of the public will continue to enjoy many recreational activities on the Peaks. Such activities include the downhill skiing that is now available at the Snowbowl. Even if the Snowbowl were to close (which we think is highly unlikely), continuing recreational activities on the Peaks would include “motorcross, mountain biking, horseback riding, hiking and camping,” as well as other snow-related activities such as cross-country skiing, snowshoeing, and snowplay. 408 F.Supp.2d at 884.

Second, although the Forest Service undoubtedly has a general interest in ensuring public safety on federal lands, there has been no showing that approving the proposed action advances that interest by the least restrictive means. Appellees provide no specific evidence that skiing at the Snowbowl in its current state is unsafe. We do recognize that there is a legitimate safety concern about snowplay by non-skiers who drive to the Peaks and park beside the road. The district court found that such snowplay next to the road has caused “injuries, traffic management issues, garbage, and sanitation problems.” *Id.* at 899. The court further found that

the proposed action would address the problem by creating an off-road managed snowplay area as part of the Snowbowl complex. *Id.* But this safety concern is not a compelling interest that can justify the burden imposed by the Snowbowl’s expansion. The current dangerous conditions caused by snowplay do not result from the operation of the Snowbowl. These conditions are not caused by skiers, but rather by non-skiers who have stopped along the road. The Snowbowl’s proposed expansion and the creation of a snowplay area at the Snowbowl have become linked only because the Forest Service insisted in the negotiations leading to the FEIS that, in return for approval of the proposed action, the Snowbowl agree to create a snowplay area for non-skiers. Even assuming that remedying the safety concerns motivating the creation of the snowplay area is a compelling interest, we do not agree that inducing a commercial ski resort, which is not the source of the danger, to develop a snowplay area as a quid pro quo for approval of the resort’s use of treated sewage effluent is the least restrictive means of furthering that interest.

[6] Third, approving the proposed action does not serve a compelling governmental interest in avoiding conflict with the Establishment Clause. The Supreme Court has repeatedly held that the Constitution “affirmatively mandates accommodation, not merely tolerance, of all religions, and forbids hostility toward any.” *Lynch v. Donnelly*, 465 U.S. 668, 673, 104 S.Ct. 1355, 79 L.Ed.2d 604 (1984). “Anything less would require the ‘callous indifference’ we have said was never intended by the Establishment Clause.” *Id.* (citations omitted); *see also Hobbie v. Unemp. App. Comm’n of Fla.*, 480 U.S. 136, 144–45, 107 S.Ct. 1046, 94 L.Ed.2d 190 (1987) (“This Court has long recognized that the government may (and sometimes must) ac-

commodate religious practices and that it may do so without violating the Establishment Clause.”). Declining to allow a commercial ski resort in a national forest to put treated sewage effluent on a sacred mountain is an accommodation that, in our view, falls far short of an Establishment Clause violation. Indeed, the Forest Service does not argue that avoiding a conflict with the Establishment Clause is a compelling interest served by the proposed action. Only the Snowbowl makes that argument.

In support of its argument, the Snowbowl cites *Estate of Thornton v. Caldor, Inc.*, 472 U.S. 703, 105 S.Ct. 2914, 86 L.Ed.2d 557 (1985), in which the Supreme Court struck down a statute allowing all Sabbath observers “an absolute and unqualified right not to work on whatever day they designate as their Sabbath,” because the law’s primary effect was to advance religion by “impos[ing] on employers and employees an absolute duty to conform their business practices to the particular religious practices of the employee by enforcing observance of the Sabbath the employee unilaterally designates.” *Id.* at 709, 105 S.Ct. 2914. The Snowbowl argues that holding for Appellants would absolutely privilege Appellants’ religious beliefs and practices over all other interests. This is not the case.

The district court found, and the evidence in the record supports, that Appellants believe that “the presence of the Snowbowl desecrates the mountain,” regardless of the use of treated sewage effluent. 408 F.Supp.2d at 887. Indeed, representatives of several of the tribes brought an unsuccessful First Amendment Free Exercise challenge to the 1979 expansion of the Snowbowl on that basis. *Wilson v. Block*, 708 F.2d 735, 739–45 (D.C.Cir.1983). In Appellants’ view, the proposed action, including the use of treated sewage effluent, would only “further

desecrate their sacred mountain.” 408 F.Supp.2d at 888 (emphasis added). Absolutely valuing Appellants’ religious beliefs over all other interests would require shutting down the existing operation of the Snowbowl—an option that was not considered as one of the three main alternatives in the FEIS and is not now sought by Appellants. In our view, declining to authorize the use of treated sewage effluent on the Peaks does not absolutely vindicate Appellants’ interests. Rather, such a refusal is a permitted accommodation to avoid “callous indifference.” *Lynch*, 465 U.S. at 673, 104 S.Ct. 1355.

We therefore hold that Appellees have not demonstrated that approving the proposed action serves a compelling governmental interest by the least restrictive means.

E. *Lyng v. Northwest Indian Cemetery Protection Association*

Appellees rely heavily on perceived similarities between this case and *Lyng v. Northwest Indian Cemetery Assoc’n*, 485 U.S. 439, 108 S.Ct. 1319, 99 L.Ed.2d 534 (1988), to argue that the proposed action does not violate RFRA. In *Lyng*, the Forest Service sought to build a six-mile section of road connecting two pre-existing roads in the Chimney Rock area of the Six Rivers National Forest in northern California. *Id.* at 442, 108 S.Ct. 1319. This area had historically been used by several Indian tribes for religious purposes. The route selected for the road was “removed as far as possible from the sites used by contemporary Indians for specific spiritual activities.” *Id.* at 443, 108 S.Ct. 1319. “Alternative routes . . . were rejected because they would have required the acquisition of private land, had serious soil stability problems, and would in any event have traversed areas having ritualistic value to American Indians.” *Id.*

Plaintiffs, including an Indian organization and several individual tribal members, challenged the proposed road under the Free Exercise Clause of the First Amendment, contending that their religious practices required use of undisturbed “prayer seats” in the Chimney Rock area. *Id.* at 443, 453, 108 S.Ct. 1319. In their words, “ ‘Prayer seats are oriented so there is an unobstructed view, and the practitioner must be surrounded by *undisturbed* naturalness.’ ” *Id.* at 453, 108 S.Ct. 1319 (emphasis added by the Court). The Court was willing to “assume that the threat to the efficacy of at least some religious practices[posed by the proposed road] is extremely grave.” *Id.* at 451, 108 S.Ct. 1319. The Court nonetheless held that building the proposed road did not violate the Free Exercise Clause. In the Court’s view, there was no principled basis for distinguishing the plaintiffs’ suit from a suit in which tribal members “might seek to exclude all human activity but their own from sacred areas of the public lands.” *Id.* at 452–53, 108 S.Ct. 1319.

For two reasons, *Lyng* does not control the result in this case. First, the plaintiffs’ challenge in *Lyng* was brought directly under the Free Exercise Clause. As we discuss, *supra*, the standard that must be satisfied to justify a burden on the exercise of religion under RFRA is significantly more demanding than the standard under the Free Exercise Clause. Most importantly, “exercise of religion” is defined more broadly under RFRA than “free exercise” under the First Amendment. Further, the test for a prima facie case under RFRA is whether there is a “substantial burden” on the exercise of religion, whereas the traditional test under the First Amendment is whether free exercise is “prohibited.” Finally, RFRA adds a “least restrictive means” requirement to the traditional compelling governmental interest test under the Free Exercise Clause. The net effect of these

changes is that it is easier for a plaintiff to prevail in a RFRA case than in a pure free exercise case.

Second, the facts in *Lyng* were materially different from those in this case. In *Lyng*, the Court was unable to distinguish the plaintiffs’ claim from one that would have required the wholesale exclusion of non-Indians from the land in question. Further, the government had made significant efforts to reduce the burden, locating the planned road so as to reduce as much as possible its auditory and visual impacts. The Court wrote, “Except for abandoning its project entirely, and thereby leaving the two existing segments of road to dead-end in the middle of a National Forest, it is difficult to see how the Government could have been more solicitous.” *Id.* at 454, 108 S.Ct. 1319. Finally, the failure to build the six-mile segment of road would have left the unconnected portions of the road virtually useless.

By contrast, Appellants in this case do not seek to prevent use of the Peaks by others. A developed commercial ski area already exists, and Appellants do not seek to interfere with its current operation. There are many other recreational uses of the Peaks, with which Appellants also do not seek to interfere. Far from “seek[ing] to exclude all human activity but their own from sacred areas of the public lands,” *id.* at 452–53, 108 S.Ct. 1319, Appellants in this case are not seeking to exclude any of the extensive human activity that now takes place on the Peaks. The currently proposed expansion of the Snowbowl may reasonably be seen as part of a continuing course of development begun in 1938 and continued in 1979. The equivalent in this case to “abandoning the project entirely” in *Lyng* would be abandoning the ski area altogether. The equivalent of the Forest Service’s minimizing the adverse impact of the road in *Lyng* by carefully choosing its

location would be minimizing the adverse impact of the Snowbowl by restricting its operation to that which can be sustained by natural snowfall.

The record in this case establishes the religious importance of the Peaks to the Appellant tribes who live around it. From time immemorial, they have relied on the Peaks, and the purity of the Peaks' water, as an integral part of their religious beliefs. The Forest Service and the Snowbowl now propose to put treated sewage effluent on the Peaks. To get some sense of equivalence, it may be useful to imagine the effect on Christian beliefs and practices—and the imposition that Christians would experience—if the government were to require that baptisms be carried out with “reclaimed water.”

The Court in *Lyng* denied the Free Exercise claim in part because it could not see a stopping place. We uphold the RFRA claim in this case in part because otherwise we cannot see a starting place. If Appellants do not have a valid RFRA claim in this case, we are unable to see how any Native American plaintiff can ever have a successful RFRA claim based on beliefs and practices tied to land that they hold sacred.

#### F. Conclusion

For the foregoing reasons, we conclude that Appellants prevail on their RFRA claim.

#### IV. National Environmental Policy Act

The National Environmental Protection Act requires federal agencies to prepare a detailed environmental impact statement for all “major Federal actions significantly affecting the quality of the human environment.” 42 U.S.C. § 4332(2)(C). This requirement “ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmen-

tal impacts,” and that “relevant information will be made available to the larger audience that may also play a role in both the decisionmaking process and the implementation of that decision.” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349, 109 S.Ct. 1835, 104 L.Ed.2d 351 (1989). Appellants assert five NEPA claims. We hold that only the first of them merits reversal. We consider each in turn.

#### A. Human Ingestion of Snow Made from Treated Sewage Effluent

[7] The Navajo Nation, the White Mountain Apache Tribe, the Yavapai-Apache Tribe, the Havasupai Tribe, Rex Tilousi, Dianna Uqualla, the Sierra Club, the Center for Biological Diversity, and the Flagstaff Activist Network (“Navajo Appellants” or “Appellants”) claim that the FEIS failed to consider adequately the risks posed by human ingestion of artificial snow made from treated sewage effluent.

#### 1. Administrative Exhaustion and Notice of Claim in the District Court

We begin by addressing Appellees' argument that we should not reach the merits of this claim. Appellees argue that Appellants failed to exhaust the claim in administrative proceedings as required by the APA, 5 U.S.C. § 704, and that Appellants failed to raise it in the district court. We conclude that Appellants sufficiently raised the claim in comments on the draft EIS and in their administrative appeals, and that they properly raised it in the district court.

We have interpreted the NEPA exhaustion requirements leniently because “[r]equiring more might unduly burden those who pursue administrative appeals unrepresented by counsel, who may frame their claims in non-legal terms.” *Native Ecosystems Council v. Dombeck*, 304 F.3d 886,

900 (9th Cir.2002). “The plaintiffs have exhausted their administrative appeals if the appeal, taken as a whole, provided sufficient notice to the [agency] to afford it the opportunity to rectify the violations that the plaintiffs alleged.” *Id.* at 899; *see also Dep’t of Transp. v. Pub. Citizen*, 541 U.S. 752, 764, 124 S.Ct. 2204, 159 L.Ed.2d 60 (2004) (plaintiffs’ participation must “ ‘alert[ ] the agency to the parties’ position and contentions,’ in order to allow the agency to give the issue meaningful consideration” (quoting *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519, 553, 98 S.Ct. 1197, 55 L.Ed.2d 460 (1978))). “Claims must be raised with sufficient clarity to allow the decision maker to understand and rule on the issue raised, but there is no bright-line standard as to when this requirement has been met and we must consider exhaustion arguments on a case-by-case basis.” *Idaho Sporting Cong., Inc. v. Rittenhouse*, 305 F.3d 957, 965 (9th Cir.2002). The aim is to prevent plaintiffs from engaging in “unjustified obstructionism by making cryptic and obscure reference to matters that ‘ought to be’ considered and then, after failing to do more to bring the matter to the agency’s attention, seeking to have that agency determination vacated on the ground that the agency failed to consider matters ‘forcefully presented.’” *Vt. Yankee*, 435 U.S. at 553–54, 98 S.Ct. 1197.

The core of Appellants’ claim is that the FEIS has insufficiently analyzed the risk of ingestion—particularly by children—of artificial snow made from treated sewage effluent. This risk was evident to the Forest Service from the beginning. At least from the standpoint of public relations, the Service responded to the risk at a very early stage. In October 2002, even before the draft EIS was published, the Service wrote what it called a “strategic talking point.” The “talking point” began with the question: “Will my kids get sick if they eat artificial snow made from treated

wastewater?” It continued with a scripted answer: “[T]his question is really one that will be thoroughly answered in the NEPA analysis process.” As we discuss below, the question was *not* subsequently “thoroughly answered in the NEPA analysis process.”

Appellants were among those who raised this issue, both in comments on the draft EIS and in administrative appeals. One member of both the Sierra Club and the Flagstaff Activist Network commented that “we’ll be dealing with treated sewage that is undiluted with fresh water and people who will be falling in great frozen piles of the stuff and probably accidentally swallowing some. Not to speak of children and even adults who indulge in the winter tradition of eating snow.” A member of the Sierra Club and the Center for Biological Diversity noted that “various disturbing trends have led researchers to believe that environmental exposures are contributing to children’s declining health status”: “If concerns about wildlife and adult human health are not sufficient to justify prudence in the further contamination of the northern Arizona Ecosystems and waters with various societal chemicals, then perhaps concerns for child health might dictate a more conservative approach.”

Further, the Navajo Nation, the Sierra Club, the Flagstaff Activist Network, the Center for Biological Diversity, and the Hualapai Tribe objected in their administrative appeal:

The Forest Service never asked for interagency consultation on this matter from any substantial government authority including the National Institute of Child Health. . . . Children respond very differently from adults to drugs and pollutants. Moreover, different genetic make-ups respond differently to drugs and chemicals. No data at all exist on the long-term effects of re-

claimed water pollutants on two major populations that can be impacted by the “preferred alternative,” children and Native Americans.

In their administrative appeal, the Havasupai protested that “[k]ids and skiers will be getting a mouthful of [the water].”

Under the circumstances, these comments and appeals were more than sufficient to put the Forest Service on notice of the claim and to exhaust Appellants’ administrative remedies. The Forest Service was aware, from the outset of the NEPA process, of concerns about possible health risks from human ingestion of artificial snow made from treated sewage effluent, and Appellants were among those who gave the Service reason to address the issue.

Appellants’ complaint in the district court satisfied the notice pleading requirement of Federal Rule of Civil Procedure 8(a)(2) with respect to the risk of ingesting snow, and the risk to children was specifically briefed in the district court at summary judgment.

## 2. Merits

[8] “NEPA ‘does not mandate particular results,’ but ‘simply provides the necessary process’ to ensure that federal agencies take a ‘hard look’ at the environmental consequences of their actions.” *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 814 (9th Cir.1999) (quoting *Robertson*, 490 U.S. at 350, 109 S.Ct. 1835). Regulations require that an EIS discuss environmental impacts “in proportion to their significance.” 40 C.F.R. § 1502.2(b). For impacts discussed only briefly, there should be “enough discussion to show why more study is not warranted.” *Id.*

[9] We employ a “ ‘rule of reason [standard] to determine whether the [EIS] contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences.’ ” *Ctr. for Bi-*

*ological Diversity v. U.S. Forest Serv.*, 349 F.3d 1157, 1166 (9th Cir.2003) (first alteration in original) (quoting *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1071 (9th Cir.2002)). In reviewing an EIS, a court must not substitute its judgment for that of the agency, but rather must uphold the agency decision as long as the agency has “considered the relevant factors and articulated a rational connection between the facts found and the choice made.” *Selkirk Conservation Alliance v. Forsgren*, 336 F.3d 944, 953–54 (9th Cir.2003) (quoting *Wash. Crab Producers, Inc. v. Mosbacher*, 924 F.2d 1438, 1441 (9th Cir.1990)). This standard consists of “a pragmatic judgment whether the EIS’s form, content and preparation foster both informed decisionmaking and informed public participation.” *Churchill County v. Norton*, 276 F.3d 1060, 1071 (9th Cir.2001) (quoting *California v. Block*, 690 F.2d 753, 761 (9th Cir.1982)).

The treated sewage effluent proposed for use in making artificial snow meets ADEQ standards for what Arizona calls “A+ reclaimed water.” The ADEQ permits use of A+ reclaimed water for snowmaking, but it has specifically disapproved human ingestion of such water. Arizona law requires users of reclaimed water to “place and maintain signage at locations [where the water is used] so the public is informed that reclaimed water is in use and that no one should drink from the system.” Ariz. Admin. Code § R18–9–704(H) (2005). Human consumption, “full-immersion water activity with a potential of ingestion,” and “evaporative cooling or misting” are all prohibited. *Id.* § R18–9–704(G)(2). Irrigation users must employ “application methods that reasonably preclude human contact,” including preventing “contact with drinking fountains, water coolers, or eating areas,” and preventing the treated effluent from “standing on

open access areas during normal periods of use.” *Id.* § R18–9–704(F).

[10] We conclude that the FEIS does not contain a reasonably thorough discussion of the risks posed by possible human ingestion of artificial snow made from treated sewage effluent, and does not articulate why such discussion is unnecessary.

The main body of the FEIS addresses the health implications of using treated sewage effluent in subchapter 3H, “Watershed Resources.” Much of the subchapter’s analysis focuses on the “hydrogeologic setting” and on the effect of the artificial snow once it has melted. The part of the subchapter describing the treated sewage effluent acknowledges that its risks to human health are not well known because it contains unregulated contaminants in amounts not ordinarily found in drinking water, including prescription drugs and chemicals from personal care products. The subchapter contains tables listing the amounts of various organic and inorganic chemical constituents that have been measured in the treated sewage effluent. One table gives a partial comparison of Flagstaff’s monitoring data on the treated sewage effluent to the national drinking water standards, showing that Flagstaff has not measured thirteen of the regulated contaminants and has not measured five of them with sufficient precision to determine whether the treated sewage effluent meets the standards. However, the FEIS does not go on to discuss either the health risks resulting from ingestion of the treated sewage effluent, or the likelihood that humans—either adults or children—will ingest the artificial snow.

Instead, the environmental impact analysis in subchapter 3H, the only part of the FEIS to discuss the characteristics of treated sewage effluent, addresses only the impact on the watersheds and aquifers. That analysis assesses the treated sewage

effluent’s impact after it has filtered through the ground, a process the FEIS estimates may result in “an order of magnitude decrease in concentration of solutes.” Thus, although the subchapter reasonably discusses the human health risks to downgradient users, it does not address the risks entailed in humans’ direct exposure to, and possible ingestion of, undiluted treated sewage effluent that has not yet filtered through the ground.

Appellees direct our attention to five responses to comments on the draft EIS, contained in the second volume of the FEIS. None of these brief responses constitutes a reasonable discussion of the issue, nor does any response articulate why such a discussion is unnecessary. The first response, objecting to a commenter’s use of the word “sewage” in advocating a “sewage-free natural environment,” notes that groundwater tainted by effluent in southern California has not been shown to have had adverse human health effects. That response does not address the risk posed by this project: that is, direct exposure to, and possible ingestion of, snow made from undiluted treated sewage effluent.

A second response purports to answer a question about who would bear liability for illnesses caused by the treated sewage effluent. The response states that the treated sewage effluent is “very strictly controlled,” “acceptable for unrestricted body contact,” and “authorized for artificial snowmaking for skiing by ADEQ.” Not only does the response fail to answer the liability question posed; the response also fails to address the fact that the ADEQ has specifically disapproved human ingestion of treated sewage effluent.

The third response is to a question about why warning signs are necessary if the reclaimed water is not harmful. The FEIS states, hypothetically: “The extent

to which reclaimed water is or is not a human health and safety concern would depend on many factors. . . . Poorly or partially treated wastewater could give rise to infectious disease. On the other hand, it is technically and economically feasible to treat wastewater to acceptable drinking water quality." As above, this is a non-responsive answer. While it may be true that "it is technically and economically feasible" to treat wastewater to the point where it meets drinking water standards, the fact in this case is that the treated sewage effluent proposed for use is *not* treated to meet standards for potable water. The FEIS then explains that the signs are required under Arizona law: "In direct response to the comment, it should be realized that there are many sites in Arizona where a lower quality of reclaimed water is used for irrigation. The law protects the public (e.g., golfers and farm workers) in the hot desert regions that might otherwise believe the water is potable." This response does not address the risk that children or adults might also think the snow may be ingested. Further, in referring to the need to guard against ingestion of "lower quality" reclaimed water, the answer implies (incorrectly) that the artificial snow would be made of potable water.

The fourth response follows three combined questions: (1) whether signs would be posted to warn that "reclaimed water" has been used to make the artificial snow; (2) how much exposure to the snow would be sufficient to make a person ill; and (3) how long it would take to see adverse effects on plants and animals downstream. The response to these questions is four sentences long. It states that signs would be posted, but it does not say how numerous or how large the signs would be. It then summarizes the treatment the sewage would undergo. The final sentence asserts: "In terms of microbiological and chemical water quality, the proposed use

of reclaimed water for snowmaking represents a low risk of acute or chronic adverse environmental impact to plants, wildlife, and humans." The response does not answer the specific and highly relevant question: How much direct exposure to the artificial snow is safe? Nor does the response provide any analysis of the extent of the likely "exposure," including the likelihood that children or adults would accidentally or intentionally ingest the snow made from non-potable treated sewage effluent.

The fifth response is on the last page of responses to comments. The Forest Service in its brief does not call attention to this response, perhaps because the Service recognizes its inadequacy. The questions and response are:

**In areas where reclaimed water is presently used, there are signs posted to warn against consumption of the water. Will these signs be posted at the Snowbowl? If so, how will that keep children from putting snow in there [sic] mouths or accidentally consuming the snow in the case of a wreck?**

There will be signs posted at Snowbowl informing visitors of the use of reclaimed water as a snowmaking water source. Much like areas of Flagstaff where reclaimed water is used, it is the responsibility of the visitor or the minor's guardian to avoid consuming snow made with reclaimed water. It is important to note that machine-produced snow would be mixed and therefore diluted with natural snow decreasing the percentage of machine-produced snow within the snowpack. *Because ADEQ approved the use of reclaimed water, it is assumed different types of incidental contact that could potentially occur*

*from use of class A reclaimed water for snowmaking were fully considered.*

(Emphasis added.)

There are several problems with this response. First, the response does not assess the risk that children will eat the artificial snow. Stating that it is the parents' responsibility to prevent their children from doing so neither responds to the question whether signs would prevent children from eating snow, nor addresses whether ingesting artificial snow would be harmful. Second, the Forest Service's assumption that the ADEQ's approval means the snow must be safe for ingestion is inconsistent with that same agency's regulations, which are designed to *prevent* human ingestion. Third, the assumption that the ADEQ actually analyzed the risk of skiers ingesting the treated sewage effluent snow is not supported by any evidence in the FEIS (or elsewhere in the administrative record). Finally, the Forest Service's answer is misleading in stating that the treated sewage effluent will be "diluted." The artificial snow would itself be made entirely from treated sewage effluent and would only be "mixed and therefore diluted" with natural snow insofar as the artificial snow intermingles with a layer of natural snow. During a dry winter, there may be little or no natural snow with which to "dilute" the treated sewage effluent.

In addition to directing our attention to the responses above, Appellees further contend that the FEIS "sets forth relevant mitigation measures" to "the possibility that someone may ingest snow." Although Appellees do not specify the "relevant mitigation measures" to which they refer, the only mitigation measure mentioned in the FEIS is the requirement under Arizona law that the Snowbowl post signs "so the public is informed that reclaimed water is in use and that no one should drink from the system." Ariz. Admin. Code § R18-

9-704(H) (2005). This "mitigation measure" is *not* listed along with the fifty-five mitigation measures catalogued in a table in the FEIS. *Cf.* 40 C.F.R. § 1502.14(f) (requiring agencies to include "appropriate mitigation measures" in the EIS's description of the proposal and its alternatives). The measure's omission from the FEIS table is hardly surprising, however, given that the FEIS does not address as an environmental impact the risk to human health from the possible ingestion of artificial snow made from treated sewage effluent.

Our role in reviewing the FEIS under the APA is not to second-guess a determination by the Forest Service about whether artificial snow made from treated sewage effluent would be ingested and, if so, whether such ingestion would threaten human health. We are charged, rather, with evaluating whether the FEIS contains "a reasonably thorough discussion of the significant aspects of the probable environmental consequences." *Ctr. for Biological Diversity*, 349 F.3d at 1166 (quotation marks omitted). An agency preparing an EIS is required to take a "hard look" that "[a]t the least . . . encompasses a thorough investigation into the environmental impacts of an agency's action and a candid acknowledgment of the risks that those impacts entail." *Nat'l Audubon Soc'y v. Dep't of the Navy*, 422 F.3d 174, 185 (4th Cir.2005) (citing *Robertson*, 490 U.S. at 350, 109 S.Ct. 1835 (stating that NEPA requires environmental costs to be "adequately identified and evaluated")). A proper NEPA analysis will "foster both informed decisionmaking and informed public participation." *Churchill*, 276 F.3d at 1071 (quoting *Block*, 690 F.2d at 761).

We conclude that the Forest Service has not provided a "reasonably thorough discussion" of any risks posed by human ingestion of artificial snow made from treat-

ed sewage effluent or articulated why such a discussion is unnecessary, has not provided a “candid acknowledgment” of any such risks, and has not provided an analysis that will “foster both informed decision-making and informed public participation.” We therefore hold that the FEIS does not satisfy NEPA with respect to the possible risks posed by human ingestion of the artificial snow.

#### B. Consideration of Alternatives

Appellants Norris Nez, Bill “Bucky” Preston, and the Hualapai Tribe (“Hualapai Appellants” or “Appellants”) claim that the Forest Service failed to consider a reasonable range of alternatives in the FEIS. They claim that the range of alternatives falls short because the Forest Service took actions that foreclosed considering other alternatives, and because the Service failed to consider the alternative of drilling for fresh water.

NEPA provides that an EIS must contain a discussion of “alternatives to the proposed action,” and that federal agencies must “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.” 42 U.S.C. § 4332(2)(C)(iii), (E). This requirement is “the heart of the environmental impact statement.” 40 C.F.R. § 1502.14.

Project alternatives derive from an EIS’s “Purpose and Need” section, which briefly specifies “the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action.” *Id.* § 1502.13. “The stated goal of a project necessarily dictates the range of ‘reasonable’ alternatives and an agency cannot define its objectives in unreasonably narrow terms.” *City of Carmel-by-the-Sea v. U.S. Dep’t of Transp.*, 123 F.3d 1142, 1155 (9th Cir.1997). Federal agencies must present the environmen-

tal impacts of the proposal in comparative form, “[r]igorously explore and objectively evaluate all reasonable alternatives,” and “briefly discuss” the reasons for eliminating any alternatives from detailed study. 40 C.F.R. § 1502.14(a). “The rule of reason guides both the choice of alternatives as well as the extent to which the EIS must discuss each alternative.” *City of Sausalito v. O’Neill*, 386 F.3d 1186, 1207 (9th Cir.2004) (alteration and internal punctuation omitted).

The regulations further provide that “[a]gencies shall not commit resources prejudicing selection of alternatives before making a final decision.” 40 C.F.R. § 1502.2(f); *see also id.* § 1506.1. An EIS “shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made.” *Id.* § 1502.2(g). However, agencies shall also “[i]dentify the agency’s preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.” *Id.* § 1502.14(e). We have interpreted this regulation to mean that “an agency can formulate a proposal or even identify a preferred course of action before completing an EIS.” *Ass’n of Pub. Agency Customers, Inc. v. Bonneville Power Admin.*, 126 F.3d 1158, 1185 (9th Cir.1997).

The FEIS and ROD define the Proposed Action’s “Purpose and Need” as follows:

#### Purpose # 1

*To ensure a consistent and reliable operating season, thereby maintaining the economic viability of the Snowbowl, and stabilizing employment levels and winter tourism within the local community.*

••••

#### Purpose # 2:

*To improve safety, skiing conditions, and recreational opportunities, bringing terrain and infrastructure into balance with current use levels.*

The district court upheld this statement of purpose and need because it responds to documented needs and because it fits with both the forest plan for the Coconino National Forest and the Forest Service's multiple-use mandate. 408 F.Supp.2d at 873–74. Although Appellants note that an agency does not have unlimited discretion to define the purpose and need for a project, they do not appeal this ruling.

Rather, the Hualapai Appellants argue that certain prescoping memoranda and notes demonstrate that the Forest Service took actions that foreclosed the consideration of a reasonable range of alternatives. They largely base their argument on the scripted “Key Messages” contained in the Forest Service’s June 2002 “Tribal Consultation Plan”:

1. We [the Forest Service] think it’s a good idea, and we already know you [tribes] don’t approve of it, but Snowbowl is there & isn’t going away.

....

6. Upgrade can’t be done without snowmaking

7. Recycled water IS clean, disease-free.

8. How can YOU help U.S. make it work? ? ?

Appellants argue that another June 2002 talking points memorandum also supports the notion that the adoption of the proposed action was predetermined, quoting part of the scripted response contained in the memorandum: “Once we accept the proposal, we DO support it . . . .” Further, they point to a note from a Forest Service meeting in August 2002, before the Snowbowl had officially submitted its proposal: “[W]e are all ambassadors of this [project] and need to provide the same messages.”

Despite what these scripted responses written early in the process suggest, the balance of the administrative record sufficiently demonstrates that the Forest Service had not foreclosed all consideration of alternatives. Among the five “objectives” listed in the Tribal Consultation Plan are “Get ideas on possible mitigating measures” and “Are there any additional tribal concerns we don’t already know about.” The full sentence from the other talking points memorandum indicates that the Forest Service had not settled on any particular proposal: “Once we accept the proposal, we DO support it—That’s why we want your input now so hopefully we can have a proposal we can all work with.” The Forest Service was entitled to have in mind a preferred course of action in advance, *see Ass’n of Pub. Agency Customers*, 126 F.3d at 1185, and Appellants are unable to point to substantial evidence indicating that the Forest Service impermissibly “commit [ted] resources prejudicing selection of alternatives before making a final decision.” 40 C.F.R. § 1502.2(f) (emphasis added).

Appellants also argue that the Forest Service failed adequately to consider fresh water drilling as an alternative to the use of treated sewage effluent for snowmaking. The Forest Service (but not the Snowbowl) argues that the doctrine of exhaustion bars this claim because Appellants did not raise the issue during the comment period or in their administrative appeal. The record contradicts the Forest Service. In his administrative appeal, Appellant Preston argued that the FEIS was inadequate because “an alternative was suggested for the use of freshwater instead of reclaimed water for snowmaking, but was summarily dismissed.”

Appellants concede that the FEIS briefly addresses multiple alternatives to using the treated sewage effluent. They object,

however, that the Forest Service relied on the Snowbowl's studies on the feasibility of water alternatives without conducting sufficient independent investigation and without disclosing sufficient information to the public to challenge the Snowbowl's studies. They further argue that the Forest Service's "assertions regarding economic and technical difficulties are questionable given the exorbitantly high costs (\$19,733,000) and the technical difficulty of the selected alternative." To the contrary, the fact the Snowbowl is apparently willing to incur such costs supports the Forest Service's conclusion that the alternative sources of water were not reasonable. In justifying its elimination of the potable water alternative, the Forest Service cited "logistical and economic considerations and water availability research," as well as "environmental and political issues." Appellants have not shown that a fresh water alternative was reasonable in the middle of the northern Arizona desert, and that the relatively brief treatment in the FEIS was therefore inadequate. Thus, although the Forest Service's discussion was indeed brief, Appellants have not shown that the discussion was inadequate under 40 C.F.R. § 1502.14(a).

### C. Disclosure of Scientific Viewpoints

The Navajo Appellants claim that the Forest Service failed to discuss and consider adequately the scientific viewpoint of Dr. Paul Torrence. Dr. Torrence criticized the draft EIS for approving the proposal despite the risks posed by endocrine-disrupting chemicals present in treated sewage effluent.

Regulations require an agency preparing an FEIS to "assess and consider comments both individually and collectively," to respond to the comments, and to state its responses in the FEIS. 40 C.F.R. § 1503.4(a). Although the agency need not "set forth at full length the views with which it disagrees," *Block*, 690 F.2d at 773,

the agency must "discuss at appropriate points in the [FEIS] any responsible opposing view which was not adequately discussed in the draft statement." 40 C.F.R. § 1502.9(b). Ordinarily, the agency must attach to the FEIS "all substantive comments . . . whether or not the comment is thought to merit individual discussion." *Id.* § 1503.4(b). However, if comments have been "exceptionally voluminous," summaries suffice. *Id.* Under some circumstances, an agency's response to a comment need not be given in the main body of the FEIS and may instead be contained in a separate "comments and responses" section. Those circumstances arise when "many of the critical comments prompted revisions in the body, [the agency] discussed in the body all of the environmental problems to which the comments were addressed, and [the agency] provided thoughtful and well-reasoned responses to most of the critical comments." *Ore. Natural Res. Council v. Marsh*, 832 F.2d 1489, 1498-99 (9th Cir.1987) (as amended), *rev'd on other grounds*, 490 U.S. 360, 109 S.Ct. 1851, 104 L.Ed.2d 377 (1989).

In *Center for Biological Diversity*, we held that an FEIS was inadequate because it failed "to disclose responsible scientific opposition to the conclusion upon which it [was] based." 349 F.3d at 1160. The FEIS in that case evaluated amendments to a forest management plan, prompted by the need to protect the habitat of the northern goshawk. *Id.* at 1160-61. The alternatives evaluated were all based upon the scientific conclusion that the birds were "habitat generalists." *Id.* at 1160. The agency received comments from multiple federal and state agencies citing studies indicating that the birds were not habitat generalists, and that therefore the proposed plans would be inadequate. *Id.* at 1162-63. The agency responded to the comments directly via letter, but did not

disclose or respond to them specifically in the FEIS. *Id.* at 1161–62. Rather, the FEIS merely acknowledged in a summary comment that “[a] few commenters expressed concern that the proposed standards and guidelines for the . . . northern goshawk are grossly inadequate to protect the birds,” and responded that “[t]he guidelines have been developed over several years using the best information and scientific review available” and could “easily be updated through future amendments.” *Id.* at 1163 (alterations in original, quotation marks omitted). We held that the Forest Service was required to disclose and respond to the comments in the FEIS itself, because the comments were undisputedly “responsible opposing scientific viewpoints,” and because the FEIS’s recommendations undisputedly “rest[ed] upon the Service’s habitat generalist conclusion.” *Id.* at 1167.

The FEIS in this case is unlike the FEIS in *Center for Biological Diversity*. The comments of Dr. Torrence alleged by Appellants to have been inadequately treated in the FEIS do not represent an undisclosed opposing viewpoint to which the Forest Service failed to respond openly in the FEIS. Appellants object to the district court’s characterization of Dr. Torrence’s comments as “all . . . variations of the same allegation: that the agency failed to fully consider the range of implications of endocrine disruptors.” 408 F.Supp.2d at 877. They assert that Dr. Torrence’s comments raise a broader set of issues that the FEIS fails to disclose and discuss. Yet the district court’s characterization is accurate because Dr. Torrence’s comments all concern endocrine disruptors.

[11] The FEIS discloses, discusses, and responds to the substance of Dr. Torrence’s comments. The main body of the FEIS contains a subsection on endocrine disruptors that cites a range of research and discusses the growing scientific and

governmental concern about their effects on wildlife, humans, and the environment. The FEIS also discloses and discusses studies done on endocrine disruptors in the treated sewage effluent proposed for use in this case. The FEIS contains a table listing the amounts of suspected disruptors measured in the water and briefly summarizes a study of its effect on various animals in experiments conducted by a Northern Arizona University professor, Dr. Catherine Propper. The FEIS comments that the concentrations of the suspected endocrine disruptors are significantly lower in the Rio de Flag water than in other waste water also measured in the study, and that “the proposed use of reclaimed water for snowmaking . . . will not result in comparable environmental exposure as investigated by Dr. Propper.” Thus, although the FEIS takes a more sanguine view of the risk than does Dr. Torrence, the main body of the FEIS adequately discloses to the public, and makes clear that the Forest Service considered, the risk posed by endocrine disruptors.

#### D. Impact on the Regional Aquifer

[12] The Navajo Appellants claim that the FEIS inadequately considers the environmental impact of diverting the treated sewage effluent from Flagstaff’s regional aquifer. The Forest Service argues that this claim was not exhausted in the administrative process. We disagree. Several comments raised the issue of diverting water that would have gone into the regional aquifer, including a comment by the Center for Biodiversity and the Flagstaff Activist Network, as well as a lengthy analysis submitted by the Sierra Club. Appellants’ administrative appeal explicitly incorporated and reasserted by reference the submissions of these organizations. Thus, “taken as a whole,” their appeal “provided sufficient notice to the [agency] to afford it the opportunity to

rectify the violations that the plaintiffs alleged.” *Native Ecosystems Council*, 304 F.3d at 899.

On the merits, Appellants claim that the FEIS inadequately considers the environmental impact of diverting the treated sewage effluent from the aquifer. Currently, during the winter, when there is little demand for “reclaimed water” for irrigation and other uses, the treated sewage effluent is pumped into the Rio de Flag, where it is diluted with fresh water and percolates into the underground regional aquifer. Much of the effluent used to make artificial snow would eventually make its way back to the aquifer, but some water would be lost to sublimation and evaporation. The FEIS contains extensive analysis on the question of the impact of this water loss on the recharge of the regional aquifer; subchapter 3H, discussed above, is largely devoted to the subject.

Nevertheless, Appellants argue that the FEIS does not adequately address the cumulative impact on the aquifer caused by diverting the water. First, they argue that the analysis is inadequate because the FEIS states that the study area of the watershed analysis is limited to the Hart Prairie Watershed and the Agassiz Subwatershed, an area that does not include the location where the treatment plant discharges the treated sewage effluent into the Rio de Flag. Therefore, they argue, the analysis fails to consider the impact on the regional aquifer caused by diverting the effluent from the Rio de Flag. However, the analysis of environmental impacts is plainly not limited to the designated “study area.” Immediately after describing the parameters of the “study area” for the watershed analysis, the FEIS identifies as one of the cumulative effects to be analyzed the “potential long-term effects on the regional aquifer from diversions of reclaimed water for snowmaking.”

Second, Appellants argue that the FEIS is inadequate, because the Forest Service “refused” to consider the impact of the wastewater diversion. They point to two portions of the FEIS that do, indeed, disclaim responsibility for analyzing the impact on the regional aquifer. The FEIS states that, due to an Arizona Supreme Court decision holding that cities can sell wastewater, “the authority of the city to provide reclaimed water to the Snowbowl is not subject to decision by the Forest Service and is therefore not within the jurisdictional purview of this analysis.” In the comments and responses portion of the FEIS, the Forest Service reiterates, “The City has the legal right to put the reclaimed water to any reasonable use they see fit and is the responsible entity to determine the most suitable and beneficial use of reclaimed water.”

Nevertheless, the FEIS contains some analysis of the environmental impact of the diversion on the regional aquifer. After stating that the issue “extends well beyond the scope of the EIS” and “is provided as general information but will not be specifically considered in selecting an alternative,” the Forest Service provides a quantitative analysis concluding that the snowmaking would “result in an estimated net average reduction in groundwater recharge to the regional aquifer of . . . slightly less than two percent of the City of Flagstaff’s total annual water production.” Ultimately, the FEIS concludes that the cumulative impact is “negligible for overall change in aquifer recharge.” Despite the odd and backhanded way in which it is presented, we conclude that the analysis in the FEIS is a “reasonably thorough discussion” of the issue. *Ctr. for Biological Diversity*, 349 F.3d at 1166.

#### E. Social and Cultural Impacts

The Hopi Appellants argue that the FEIS inadequately analyzes the social and

cultural impacts of the proposed action on the Hopi people. NEPA requires agencies to “utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man’s environment.” 42 U.S.C. § 4332(2)(A). Agencies must “identify and develop methods and procedures . . . which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations.” *Id.* § 4332(2)(B). Finally, agencies must prepare an EIS for “major Federal actions significantly affecting the quality of the human environment.” *Id.* § 4332(2)(C). The regulations define “human environment” broadly to “include the natural and physical environment and the relationship of people with that environment,” and note that “[w]hen an [EIS] is prepared and economic or social and natural or physical environmental effects are interrelated, then the [EIS] will discuss all of these effects on the human environment.” 40 C.F.R. § 1508.14. The “effects” that should be discussed include “aesthetic, historic, cultural, economic, social, or health” effects, “whether direct, indirect, or cumulative.” *Id.* § 1508.8.

[13] The FEIS addresses the “human environment” through lengthy discussions of the relationships of the Hopi and others to the San Francisco Peaks and the impact of the proposed action on those relationships. The FEIS acknowledges that “it is difficult to be precise in the analysis of the impact of the proposed undertaking on the cultural and religious systems on the Peaks, as much of the information stems from oral histories and a deep, underlying belief system of the indigenous peoples involved.” Nevertheless, the FEIS makes clear that the Forest Service conducted an extensive analysis of the issue, drawing

from existing literature and extensive consultation with the affected tribes. The FEIS describes at length the religious beliefs and practices of the Hopi and the Navajo and the “irretrievable impact” the proposal would likely have on those beliefs and practices. The Forest Service has thus satisfied its obligations under NEPA to discuss the effects of the proposed action on the human environment.

#### F. Conclusion

For the foregoing reasons, we hold that the FEIS was inadequate with respect to its discussion of the possible risks posed by human ingestion of artificial snow made from treated sewage effluent. We hold that the FEIS was adequate in the four other respects challenged.

#### V. National Historic Preservation Act

[14] If a proposed undertaking will have an effect on historic properties to which Indian tribes attach religious and cultural significance, the National Historic Preservation Act (“NHPA”) requires the federal agency to consult with the affected tribes before proceeding. *See* 16 U.S.C. §§ 470a(d)(6), 470f; 36 C.F.R. §§ 800.1 *et seq.* Under NHPA regulations, “[c]onsultation means the process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them.” 36 C.F.R. § 800.16(f).

The Hopi Appellants argue that the Forest Service did not meaningfully consult with them. They concede that the Forest Service “sought tribal consultation on the religious and cultural significance of the Peaks, and provided a reasonable opportunity for the tribes to participate in the process,” but they assert that those consultations were meaningless because the Forest Service prejudged the matter.

The evidence proffered by the Hopi Appellants does not support their claim. Their primary evidence is a letter from the Forest Service to the tribe. The Hopi Appellants contend that the letter shows that the proposal ultimately approved in the FEIS was preordained. The letter informs the Hopi that the owner of the Snowbowl is working on a draft proposal, states that the Forest Service believes the Hopi should be involved in the development of this proposal, and asks for input on "how the interests and concerns of the Hopi people might best be addressed" before the Forest Service accepts the proposal.

The Hopi Appellants specifically object to the following paragraph in the letter:

The proposed development of the Arizona Snowbowl was the subject of a bitter lawsuit in 1981. Hopefully by involving the Hopi Tribe in planning the development this time, we can all avoid expensive and time-consuming litigation. However, the result of the 1981 lawsuit was a legal decision that allows the development of the Arizona Snowbowl and the construction of a number of facilities. The Snowbowl now wishes to complete the development, and it is important to stress that the scope of the proposal, with a few exceptions, is within the concept approved by the court decision. It is also important to note that all facilities will stay within the permitted area.

They argue that this letter "informed [them] at the outset that, based on its incorrect reading of an earlier court decision (apparently referring to *Wilson v. Block*, 708 F.2d 735 (D.C.Cir.1983)), the Forest Service had no discretion to disapprove the development proposed by the Snowbowl, thus making the Proposed Action a foregone conclusion."

The Hopi Appellants' interpretation misconstrues the Forest Service's letter. The letter indicates that most but not all of the

proposal is within the scope of the 1979 decision—the "few exceptions" include snowmaking. Hence the letter specifically notes that the Snowbowl intends to introduce new components never addressed in *Wilson*, thus implying that the Forest Service need not accept the proposal. This implication is supported by the letter's suggestion that consultation might avoid a court battle. Thus, while the Forest Service's letter signals receptiveness to the Snowbowl's proposal, it does not demonstrate that the Forest Service failed to meaningfully consult with the Hopi.

The Hopi also incorporate by reference the evidence that the Hualapai presented in their argument discussed above that the Forest Service took actions that foreclosed the consideration of a reasonable range of alternatives. However, because of the extensive record of consultation undertaken by the Forest Service in this case, we agree with the district court that "[a]lthough the consultation process did not end with a decision the tribal leaders supported, this does not mean that the Forest Service's consultation process was substantively and procedurally inadequate." 408 F.Supp.2d at 879 n. 11; *see also id.* at 879–80 & n. 11 (describing the scope of the consultations in detail).

## VI. Conclusion

In sum, we reverse the district court on two grounds. First, we hold that the Forest Service's approval of the proposed expansion of the Snowbowl, including the use of treated sewage effluent to make artificial snow, violates RFRA. Second, we hold that the Forest Service's FEIS does not fulfill its obligations under NEPA because it neither reasonably discusses the risks posed by the possibility of human ingestion of artificial snow made from treated sewage effluent nor articulates why such discussion is unnecessary. We affirm the

district court's grant of summary judgment on Appellants' remaining four NEPA claims and on their NHPA claim.

AFFIRMED in part, REVERSED in part, and REMANDED. The parties shall bear their own costs on appeal.



**SPRINT TELEPHONY PCS, L.P., a Delaware limited partnership, Plaintiff–Appellant–Cross–Appellee,**

and

**Pacific Bell Wireless LLC, a Nevada limited liability company, dba Cingular Wireless, Plaintiff,**

v.

**COUNTY OF SAN DIEGO; Greg Cox, in his capacity as supervisor of the County of San Diego; Dianne Jacob, in her capacity as supervisor of the County of San Diego; Pam Slater, in her capacity as supervisor of the County of San Diego; Ron Roberts, in his capacity as supervisor of the County of San Diego; Bill Horn, in his capacity as supervisor of the County of San Diego, Defendants–Appellees–Cross–Appellants.**

Nos. 05–56076, 05–56435.

United States Court of Appeals,  
Ninth Circuit.

Argued and Submitted Oct. 26, 2006.

Filed March 13, 2007.

**Background:** Provider of wireless telephone services brought action against county, challenging county's wireless telecommunications ordinance (WTO). The United States District Court for the Southern District of California, Barry Ted Moskowitz, J., 377 F.Supp.2d 886, granted provider's motion for permanent injunction,

but denied its damages claim. Parties cross-appealed.

**Holdings:** The Court of Appeals, Bright, Circuit Judge, held that:

- (1) provider was entitled to seek permanent injunction against enforcement of WTO;
- (2) WTO's regulation of wireless facility placement was preempted by Telecommunications Act; and
- (3) provider could not recover money damages and fees under federal civil rights statute.

Affirmed.

### 1. Zoning and Planning ⇄568

Provider of wireless telephone services was entitled to seek permanent injunction against enforcement of county ordinance regulating placement of transmission antennas, under Telecommunications Act section barring state or local statutes or regulations prohibiting provision of telecommunications services, despite claim that sole recourse was under section of statute regulating challenges to particular antenna siting requests. Telecommunications Act of 1996, § 253(a), 47 U.S.C.A. § 253(a); Communications Act of 1934, § 332(c)(7), 47 U.S.C.A. § 332(c)(7).

### 2. Zoning and Planning ⇄14

County ordinance regulating wireless telephone transmission antennas was preempted by Telecommunications Act section barring state or local statutes or regulations prohibiting provision of telecommunications services; ordinance's combination of application submission requirements, discretion reserved to zoning authority, public hearing requirements, and criminal penalties for violation of use permit had effect of impermissibly prohibiting wireless service. Telecommuni-

# Appendix C

mandating that businesses quote all prices inclusive of Washington's B & O Tax. Under RCW 82.04.500, businesses are allowed to itemize the B & O Tax and pass the B & O Tax to the consumer, so long as the tax is disclosed to the consumer "during the course of negotiating a purchase price." *Appleway Chevrolet*, 157 P.3d at 851 (emphasis in original). RCW 82.04.500 therefore acts as a consumer protection statute, regulating the method of disclosure, rather than the reasonableness or propriety of the underlying rate.<sup>2</sup> The legislative history of section 332(c)(3)(A) confirms that Congress did not intend the FCA to preclude the states from adopting measures like RCW 82.04.500, but rather considered them "other terms and conditions" that are expressly excluded from section 332(c)(3)(A)'s preemption of rates. See H.R.Rep. No. 103-111, at 261 (1993), reprinted in 1993 U.S.C.C.A.N. 378, 588 (explaining that "'terms and conditions' . . . include such matters as *customer billing information* and practices and billing disputes and other *consumer protection matters*" (emphasis added)).

We hold, therefore, that the FCA does not preempt state claims brought pursuant to RCW 82.04.500.

#### IV. CONCLUSION

Having concluded that there is no federal preemption of Appellant's state law claims, this court is of the opinion that the matter should be vacated and remanded to the district court for a determination of

2. Contrary to the claims of Cingular and *amicus curiae* CTIA—The Wireless Association, we are skeptical that requiring businesses to quote prices on a tax-inclusive basis will necessarily mislead or conceal from consumers the effect of the state's tax on their rates. Cingular remains free to disclose, during ne-

whether it has subject matter jurisdiction over Appellant's claims.

**VACATED AND REMANDED.**



**NAVAJO NATION; Havasupai Tribe; Rex Tilousi; Dianna Uqualla; Sierra Club; White Mountain Apache Nation; Yavapai–Apache Nation; The Flagstaff Activist Network, Plaintiffs–Appellants,**

and

**Hualapai Tribe; Norris Nez; Bill Bucky Preston; Hopi Tribe; Center for Biological Diversity, Plaintiffs,**

v.

**UNITED STATES FOREST SERVICE; Nora Rasure, in her official capacity as Forest Supervisor, Responsible Officer, Coconino National Forest; Harv Forsgren, appeal deciding office, Regional Forester, in his official capacity, Defendants–Appellees,**

**Arizona Snowbowl Resort Limited Partnership, Defendant–intervenor–Appellee.**

gotiation or on customers' bills, how much of the purchase price is attributable to the B & O Tax. It simply "may not add a B & O charge as one of several fees and taxes after [it and its customers] negotiated and agreed upon a final purchase price." *Appleway Chevrolet*, 157 P.3d at 851.

**Navajo Nation; Hualapai Tribe; Norris Nez; Bill Bucky Preston; Havasupai Tribe; Rex Tilousi; Dianna Uqualla; Sierra Club; White Mountain Apache Nation; Yavapai–Apache Nation; Center for Biological Diversity; The Flagstaff Activist Network, Plaintiffs,**

**and**

**Hopi Tribe, Plaintiff–Appellant,**

**v.**

**United States Forest Service; Nora Rasure, in her official capacity as Forest Supervisor, Responsible Officer, Coconino National Forest; Harv Forsgren, appeal deciding office, Regional Forester, in his official capacity, Defendants–Appellees,**

**Arizona Snowbowl Resort Limited Partnership, Defendant–intervenor–Appellee.**

**Hualapai Tribe; Norris Nez; Bill Bucky Preston, Plaintiffs–Appellants,**

**v.**

**United States Forest Service; Nora Rasure, in her official capacity as Forest Supervisor, Responsible Officer, Coconino OPINION National Forest; Harv Forsgren, appeal deciding office, Regional Forester, in his official capacity, Defendants–Appellees.**

**Nos. 06–15371, 06–15436, 06–15455.**

United States Court of Appeals,  
Ninth Circuit.

Argued and Submitted Dec. 11, 2007.

Filed Aug. 8, 2008.

**Background:** Numerous Indian tribes, their members, and environmental organization brought action challenging the Forest Service’s decision to authorize proposed use of recycled wastewater to make artificial snow for commercial ski resort located in national park on mountain considered sacred by tribes. Following bench

trial, the United States District Court for the District of Arizona, Paul G. Rosenblatt, J., 408 F.Supp.2d 866, held that the proposed use did not violate the Religious Freedom Restoration Act (RFRA) and granted Forest Service’s motion for summary judgment on claims brought under National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA). Appeal was taken. The Court of Appeals, William A. Fletcher, Circuit Judge, 479 F.3d 1024, affirmed in part, reversed in part and remanded, and application for rehearing en banc was granted.

**Holdings:** The Court of Appeals, Bea, Circuit Judge, held that:

- (1) proposed use of recycled wastewater to make artificial snow for commercial ski resort located in national park on mountain considered sacred by some Indian tribes would not “substantially burden” free exercise of religion by tribal members, within meaning of the RFRA;
- (2) Final Environmental Impact Statement (FEIS) prepared by Forest Service satisfied requirements of NEPA; and
- (3) in preparing FEIS, Forest Service’s consultation process concerning effects on historic properties to which Indian tribes attached religious and cultural significance was substantively and procedurally adequate under the NHPA.

Affirmed.

William A. Fletcher, Circuit Judge, dissented and filed opinion, in which Pregeron and Fisher, Circuit Judges, joined.

**1. Federal Courts ⇄776**

Court of Appeals reviews de novo district court’s grant of summary judgment.

## 2. Federal Courts ⇌776, 850.1

Court of Appeals reviews district court's conclusions of law following a bench trial de novo and its findings of fact for clear error.

## 3. Civil Rights ⇌1073

### Indians ⇌144

Proposed use of recycled wastewater to make artificial snow for commercial ski resort located in national park on mountain considered sacred by some Indian tribes would not "substantially burden" free exercise of religion by tribal members, within meaning of the Religious Freedom Restoration Act (RFRA), though proposed action might offend tribal members' religious sensibilities and be seen as desecrating this sacred mountain, where ski resort occupied roughly one percent of surface of mountain, proposed use did not prevent tribal members from accessing mountain for purpose of carrying out religious observances, and proposed use did not coerce tribal members to act contrary to their religious beliefs under threat of sanctions, nor did it condition any governmental benefit on conduct that would violate their religious beliefs. Religious Freedom Restoration Act of 1993, § 3(a), 42 U.S.C.A. § 2000bb-1(a).

See publication Words and Phrases for other judicial constructions and definitions.

## 4. Civil Rights ⇌1032

To establish prima facie claim for violation of the Religious Freedom Restoration Act (RFRA), plaintiff must present evidence sufficient to allow trier of fact rationally to find existence of two elements: (1) that the activities allegedly burdened by government action constitute an "exercise of religion"; and (2) that the government action "substantially burdens" plaintiff's exercise of religion; if plaintiff cannot prove either of these two elements, then his RFRA claim fails. Religious

Freedom Restoration Act of 1993, § 3(a), 42 U.S.C.A. § 2000bb-1(a).

## 5. Civil Rights ⇌1406

In cause of action under the Religious Freedom Restoration Act (RFRA), once plaintiff establishes a substantial burden on his exercise of religion, burden of persuasion shifts to government to prove that challenged government action is in furtherance of compelling governmental interest and is implemented by the least restrictive means; if government cannot so prove, then court must find an RFRA violation. Religious Freedom Restoration Act of 1993, § 3(b), 42 U.S.C.A. § 2000bb-1(b).

## 6. Civil Rights ⇌1032, 1406

Government action imposes "substantial burden" on free exercise of religion, so as to shift to government the burden, in cause of action under the Religious Freedom Restoration Act (RFRA), of showing that challenged government action is in furtherance of compelling governmental interest and is implemented in the least restrictive means, only when government action forces individuals to choose between following tenets of their religion and receiving a governmental benefit or coerces them to act contrary to their religious beliefs by threat of civil or criminal sanctions; lesser burden is not a "substantial burden," within meaning of the RFRA. Religious Freedom Restoration Act of 1993, § 3, 42 U.S.C.A. § 2000bb-1.

See publication Words and Phrases for other judicial constructions and definitions.

## 7. Statutes ⇌212.6

When statute does not expressly define a term of settled meaning, courts interpreting statute must infer, unless statute otherwise dictates, that Congress means to incorporate the established meaning of that term.

**8. Civil Rights** ⇔1032, 1073

Religious Land Use and Institutionalized Persons Act (RLUIPA) does not apply to federal government action, but only to action by state or local governments, and even as to state and local governments, it applies only to government land-use regulations of private land, not to government's management of its own land. Religious Land Use and Institutionalized Persons Act of 2000, § 2 et seq., 42 U.S.C.A. § 2000cc et seq.

**9. Environmental Law** ⇔604(6)

Final Environmental Impact Statement (FEIS) concerning proposed use of recycled wastewater to make artificial snow for commercial ski resort adequately disclosed to public, and made clear that Forest Service had considered, the risk posed by endocrine disruptors, as required by the NEPA; main body of FEIS contained subsection on endocrine disruptors which cited range of research and discussed the growing scientific and governmental concern about their effects on wildlife, humans and environment, disclosed and discussed studies done on endocrine disruptors in the recycled wastewater proposed for use, contained table listing amounts of suspected disruptors measured in water, briefly summarized study of its effect on various animals in experiments conducted by university professor, and commented that concentrations of suspected endocrine disruptors were significantly lower in recycled wastewater proposed for use than in other wastewater also measured in study, and that proposed use of this recycled wastewater for snowmaking would not result in comparable environmental exposure. National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

**10. Environmental Law** ⇔604(6)

Final Environmental Impact Statement (FEIS) concerning proposed use of recycled wastewater to make artificial

snow for commercial ski resort adequately considered environmental impact of diverting this treated wastewater from regional aquifer, as required by the NEPA; immediately after describing parameters of study area for watershed analysis, FEIS identified as one of cumulative effects to be analyzed the potential long-term effects on regional aquifer from diversions of recycled wastewater for snowmaking, and provided quantitative analysis concluding that snowmaking would result in an estimated net average reduction in groundwater recharge to regional aquifer of slightly less than two percent of city's total annual water production. National Environmental Policy Act of 1969, § 102(2)(C), 42 U.S.C.A. § 4332(2)(C).

**11. Environmental Law** ⇔604(6)

Final Environmental Impact Statement (FEIS) prepared by Forest Service concerning proposed use of recycled wastewater to make artificial snow for commercial ski resort satisfied its obligations under the NEPA to discuss effects of proposed action on human environment; FEIS made clear that Forest Service had conducted extensive analysis of issue, drawing from existing literature and extensive consultation with affected Indian tribes, and the FEIS described at length the religious beliefs and practices of tribes and impact that proposal would likely have on those beliefs and practices. National Environmental Policy Act of 1969, § 102(2)(A), 42 U.S.C.A. § 4332(2)(A).

**12. Environmental Law** ⇔89

In preparing Final Environmental Impact Statement (FEIS) concerning proposed use of recycled wastewater to make artificial snow for commercial ski resort located on mountain that was considered sacred by some Indian tribes, Forest Service's consultation process concerning effects on historic properties to which Indian tribes attached religious and cultural sig-

nificance was substantively and procedurally adequate under National Historic Preservation Act (NHPA). 16 U.S.C.A. § 470a(d)(6).

West Codenotes

**Recognized as Unconstitutional**

42 U.S.C.A. § 2000bb-1, 42 U.S.C.A. § 2000bb-2, 42 U.S.C.A. § 2000bb-3, 42 U.S.C.A. § 2000bb-4

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Catherine E. Stetson (argued), Andrew L. Spielman, Hogan & Hartson LLP, Washington, DC; Janice M. Schneider, Latham & Watkins LLP, Washington, DC; Sue Ellen Wooldridge, Matthew J. McKeown, Andrew C. Mergen, Kathryn E. Kovacs, Lane M. McFadden (argued), United States Department of Justice, Environment & Natural Resources Division, Washington, DC; Philip A. Robbins, Paul G. Johnson, Michael J. O'Connor, John J. Egbert, Jennings, Strouss & Salmon, P.L.C., Phoenix, AZ, for the defendants-appellees.

1. It appears that some of the Plaintiffs would challenge any means of making artificial snow, even if no recycled wastewater were

Geraldine Link, National Ski Areas Association, Lakewood, CO; Ezekiel J. Williams, Jacy T. Rock, Faegre & Benson LLP, Denver, CO; Glenn E. Porzak, P. Fritz Holleman, Eli A. Feldman, Porzak Browning & Bushong LLP, Boulder, CO; for the National Ski Areas Association as Amicus Curiae in Support of the defendants-appellees.

William Perry Pendley, Mountain States Legal Foundation, Lakewood, CO; for the Mountain States Legal Foundation as Amicus Curiae in Support of the defendants-appellees.

Appeal from the United States District Court for the District of Arizona; Paul G. Rosenblatt, District Judge, Presiding. D.C. Nos. CV-05-01824-PGR, CV-05-01914-PGR, CV-05-01949-PGR, CV-05-01966-PGR.

Before: ALEX KOZINSKI, Chief Judge, HARRY PREGERSON, DIARMUID F. O'SCANNLAIN, PAMELA ANN RYMER, ANDREW J. KLEINFELD, BARRY G. SILVERMAN, W. FLETCHER, RAYMOND C. FISHER, RICHARD R. CLIFTON, CARLOS T. BEA, and SANDRA S. IKUTA, Circuit Judges.

Opinion by Judge BEA; Dissent by Judge WILLIAM A. FLETCHER.

BEA, Circuit Judge:

In this case, American Indians ask us to prohibit the federal government from allowing the use of artificial snow for skiing on a portion of a public mountain sacred in their religion. At the heart of their claim is the planned use of recycled wastewater, which contains 0.0001% human waste, to make artificial snow.<sup>1</sup> The Plaintiffs claim

used. Panel Oral Argument (Sept. 14, 2006) at 12:25-12:45 (Hopi Plaintiffs).

the use of such snow on a sacred mountain desecrates the entire mountain, deprecates their religious ceremonies, and injures their religious sensibilities. We are called upon to decide whether this government-approved use of artificial snow on government-owned park land violates the Religious Freedom Restoration Act of 1993 (“RFRA”), 42 U.S.C. §§ 2000bb *et seq.*, the National Environmental Policy Act of 1969 (“NEPA”), 42 U.S.C. §§ 4321 *et seq.*, and the National Historic Preservation Act (“NHPA”), 16 U.S.C. §§ 470 *et seq.* We hold that it does not, and affirm the district court’s denial of relief on all grounds.

\* \* \*

Plaintiff Indian tribes and their members consider the San Francisco Peaks in Northern Arizona to be sacred in their religion.<sup>2</sup> They contend that the use of recycled wastewater to make artificial snow for skiing on the Snowbowl, a ski area that covers approximately one percent of the San Francisco Peaks, will spiritually contaminate the entire mountain and devalue their religious exercises. The district court found the Plaintiffs’ beliefs to be sincere; there is no basis to challenge that finding. The district court also found, however, that there are no plants, springs, natural resources, shrines with religious significance, or religious ceremonies that would be physically affected by the use of such artificial snow. No plants would be destroyed or stunted; no springs polluted; no places of worship made inaccessible, or liturgy modified. The Plaintiffs continue to have virtually unlimited access to the mountain, including the ski area, for reli-

gious and cultural purposes. On the mountain, they continue to pray, conduct their religious ceremonies, and collect plants for religious use.

Thus, the sole effect of the artificial snow is on the Plaintiffs’ subjective spiritual experience. That is, the presence of the artificial snow on the Peaks is offensive to the Plaintiffs’ feelings about their religion and will decrease the spiritual fulfillment Plaintiffs get from practicing their religion on the mountain. Nevertheless, a government action that decreases the spirituality, the fervor, or the satisfaction with which a believer practices his religion is not what Congress has labeled a “substantial burden”—a term of art chosen by Congress to be defined by reference to Supreme Court precedent—on the free exercise of religion. Where, as here, there is no showing the government has coerced the Plaintiffs to act contrary to their religious beliefs under the threat of sanctions, or conditioned a governmental benefit upon conduct that would violate the Plaintiffs’ religious beliefs, there is no “substantial burden” on the exercise of their religion.

Were it otherwise, any action the federal government were to take, including action on its own land, would be subject to the personalized oversight of millions of citizens. Each citizen would hold an individual veto to prohibit the government action solely because it offends his religious beliefs, sensibilities, or tastes, or fails to satisfy his religious desires. Further, giving one religious sect a veto over the use of public park land would deprive others of

2. The Plaintiffs–Appellants in this case are the Navajo Nation, the Hopi Tribe, the Havasupai Tribe, the Hualapai Tribe, the Yavapai–Apache Nation, the White Mountain Apache Nation, Bill Bucky Preston (a member of the Hopi Tribe), Norris Nez (a member of the Navajo Nation), Rex Tilousi (a member of the Havasupai Tribe), Dianna Uqualla (a member

of the Havasupai Tribe), the Sierra Club, the Center for Biological Diversity, and the Flagstaff Activist Network.

The Defendants–Appellees are the United States Forest Service; Nora Rasure, the Forest Supervisor; Harv Forsgren, the Regional Forester; and Intervenor Arizona Snowbowl Resort Limited Partnership.

the right to use what is, by definition, land that belongs to everyone.

“[W]e are a cosmopolitan nation made up of people of almost every conceivable religious preference.” *Braunfeld v. Brown*, 366 U.S. 599, 606, 81 S.Ct. 1144, 6 L.Ed.2d 563 (1961). Our nation recognizes and protects the expression of a great range of religious beliefs. Nevertheless, respecting religious credos is one thing; requiring the government to change its conduct to avoid any perceived slight to them is quite another. No matter how much we might wish the government to conform its conduct to our religious preferences, act in ways that do not offend our religious sensibilities, and take no action that decreases our spiritual fulfillment, no government—let alone a government that presides over a nation with as many religions as the United States of America—could function were it required to do so. *Lying v. Nw. Indian Cemetery Protective Ass’n*, 485 U.S. 439, 452, 108 S.Ct. 1319, 99 L.Ed.2d 534 (1988).

### I. Factual and Procedural Background<sup>3</sup>

The Snowbowl ski area (“the Snowbowl”) is located on federally owned public land and operates under a special use permit issued by the United States Forest Service (“the Forest Service”). *Navajo Nation v. U.S. Forest Serv.*, 408 F.Supp.2d 866, 883–84 (D.Ariz.2006). Specifically, the Snowbowl is situated on Humphrey’s Peak, the highest of the San Francisco Peaks (“the Peaks”), located within the Coconino National Forest in Northern Arizona. *Id.*

3. We find no clear error in the district court’s findings of fact, so our statement of the facts is based on the district court opinion. The dissent cursorily asserts that “the majority misstates the evidence below,” Dissent at 1081, but fails to cite any fact in the opinion that it claims to be misstated, or as to which the district court erred in its findings of fact.

at 869, 883. The Peaks cover about 74,000 acres. *Id.* at 883. The Snowbowl sits on 777 acres, or approximately one percent of the Peaks. *Id.* at 883–84.

The Forest Service designated the Snowbowl as a public recreation facility after finding the Snowbowl “represented an opportunity for the general public to access and enjoy public lands in a manner that the Forest Service could not otherwise offer in the form of a major facility anywhere in Arizona.” *Id.* at 884. The Snowbowl has been in operation since the 1930s and is the only downhill ski area within the Coconino National Forest.<sup>4</sup> *Id.*

The Peaks have long-standing religious and cultural significance to Indian tribes. The tribes believe the Peaks are a living entity. *Id.* at 887. They conduct religious ceremonies, such as the Navajo Blessing-way Ceremony, on the Peaks. *Id.* The tribes also collect plants, water, and other materials from the Peaks for medicinal bundles and tribal healing ceremonies. *Id.* According to the tribes, the presence of the Snowbowl desecrates for them the spirituality of the Peaks. *Id.* Certain Indian religious practitioners believe the desecration of the Peaks has caused many disasters, including the September 11, 2001 terrorist attacks, the Columbia Space Shuttle accident, and increases in natural disasters. *Id.*

This case is not the first time Indian tribes have challenged the operation of the Snowbowl. In 1981, before the enactment of RFRA, the tribes brought a challenge to the Forest Service’s approval of a number

4. In addition to downhill skiing, many other activities are conducted on the Peaks: sheep and cattle grazing, timber harvesting, road building, mining, motorcross, mountain biking, horseback riding, hiking, and camping. *Navajo Nation*, 408 F.Supp.2d at 884. Further, gas and electric transmission lines, water pipelines, and cellular towers are located on the Peaks. *Id.*

of upgrades to the Snowbowl, including the installation of new lifts, slopes, and facilities. See *Wilson v. Block*, 708 F.2d 735, 739 (D.C.Cir.1983).<sup>5</sup> The tribes asserted that the approved upgrades would “seriously impair their ability to pray and conduct ceremonies upon the Peaks” and to gather from the Peaks sacred objects necessary to their religious practices. *Id.* at 740. According to the tribes, this constituted an unconstitutional burden on the exercise of their religion under the Free Exercise Clause of the First Amendment. *Id.*

The D.C. Circuit in *Wilson* rejected the Indian tribes’ challenge to the upgrades. *Id.* at 739–45. Although the court noted that the proposed upgrades would cause the Indians “spiritual disquiet,” the upgrades did not impose a sufficient burden on the exercise of their religion: “Many government actions may offend religious believers, and may cast doubt upon the veracity of religious beliefs, but unless such actions penalize faith, they do not burden religion.” *Id.* at 741–42. The Indian tribes have continued to conduct religious activities on the Peaks ever since. *Navajo Nation*, 408 F.Supp.2d at 884.

With this brief background, we turn to the Plaintiffs’ challenge in this case. In 2002, the Snowbowl submitted a proposal to the Forest Service to upgrade its operations. *Id.* at 885. The proposal included a request for artificial snowmaking from recycled wastewater for use on the Snowbowl. *Id.* The Snowbowl had suffered

highly variable snowfall for several years; this resulted in operating losses that threatened its ski operation. *Id.* at 884–85, 907. Indeed, the district court found that artificial snowmaking is “needed to maintain the viability of the Snowbowl as a public recreational resource.” *Id.* at 907.

The recycled wastewater to be used for snowmaking is classified as “A+” by the Arizona Department of Environmental Quality (“ADEQ”).<sup>6</sup> *Id.* at 887. A+ recycled wastewater is the highest quality of recycled wastewater recognized by Arizona law and may be safely and beneficially used for many purposes, including irrigating school ground landscapes and food crops. See Ariz. Admin. Code R18–11–309 tbl. A. Further, the ADEQ has specifically approved the use of recycled wastewater for snowmaking. *Id.*

In addition to being used to make snow, the recycled wastewater also will be used for fire suppression on the Peaks. *Navajo Nation*, 408 F.Supp.2d at 886. The pipeline that will transport the recycled wastewater to the Snowbowl will be equipped with fire hydrants to provide water for fire suppression in rural residential areas and to fight forest fires. *Id.* Further, a reservoir of recycled wastewater will be kept on the Snowbowl for forest fire suppression. *Id.*

The Forest Service conducted an extensive review of the Snowbowl’s proposal. As part of its review, the Forest Service made more than 500 contacts with Indian

5. At the time *Wilson* was decided, artificial snow from recycled wastewater was not used on the Snowbowl and was thus not at issue.

6. The recycled wastewater that will be used at the Snowbowl “will undergo specific advanced treatment requirements, including tertiary treatment with disinfection. In addition, the reclaimed water will comply with specific monitoring requirements, including frequent microbiological testing to assure pa-

thogens are removed, and reporting requirements.” *Navajo Nation*, 408 F.Supp.2d at 887. Further, the recycled wastewater will “comply with extensive treatment and monitoring requirements under three separate permit programs: the Arizona Pollutant Discharge Elimination System (‘AZPDES’) Permit, the Arizona Aquifer Protection Permit Program, and the Water Reuse Program.” *Id.*

tribes, including between 40 and 50 meetings, to determine the potential impact of the proposal on the tribes.<sup>7</sup> *Id.* at 885. In a December 2004 Memorandum of Agreement, the Forest Service committed to, among other things: (1) continue to allow the tribes access to the Peaks, including the Snowbowl, for cultural and religious purposes; and (2) work with the tribes periodically to inspect the conditions of the religious and cultural sites on the Peaks and ensure the tribes' religious activities on the Peaks are uninterrupted. *Id.* at 900–01.

Following the review process, the Forest Supervisor approved the Snowbowl's proposal, including the use of recycled wastewater to make artificial snow, and issued a Final Environmental Impact Statement and a Record of Decision in February 2005. *Id.* at 885–86. The Plaintiffs appealed the Forest Supervisor's decision approving the Snowbowl's proposal to an administrative appeal board within the Forest Service. *Id.* In June 2005, the Forest Service issued its final administrative decision and affirmed the Forest Su-

ervisor's approval of the proposed upgrades. *Id.* at 886.

After their unsuccessful administrative appeal, the Plaintiffs filed this action in federal district court. The Plaintiffs alleged that the Forest Service's authorization of the use of recycled wastewater on the Snowbowl violates: (1) RFRA; (2) NEPA; (3) NHPA; (4) ESA; (5) the Grand Canyon National Park Enlargement Act ("GCEA"), 16 U.S.C. § 228i; and (6) the National Forest Management Act of 1976 ("NFMA"), 16 U.S.C. §§ 1600 *et seq.*<sup>8</sup> *Id.* at 871. Following cross-motions for summary judgment, the district court denied the Plaintiffs' motions for summary judgment and granted the Defendants' motion for summary judgment on all claims, except the RFRA claim. *Id.* at 869, 908.

After an 11-day bench trial on the RFRA claim, the district court held that the proposed upgrades, including the use of recycled wastewater to make artificial snow on the Peaks, do not violate RFRA. *Id.* at 883, 907. The district court found that the upgrades did not bar the Plaintiffs' "access, use, or ritual practice on any part of the Peaks." *Id.* at 905. As a

7. Of course, the impact of the Snowbowl proposal on the American Indian tribes is not the only factor the Forest Service must consider in administering the Coconino National Forest. Congress has directed the Forest Service to manage the National Forests for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes." 16 U.S.C. § 528. Additionally, the Forest Service must follow a number of other directives under federal laws and executive orders in administering the Coconino National Forest, including, but not limited to: NEPA; NHPA; the Endangered Species Act of 1973 ("ESA"), 16 U.S.C. § 1531 *et seq.*; the National Forest Ski Area Permit Act of 1986, 16 U.S.C. § 497b; the Wilderness Act, 16 U.S.C. § 1131 *et seq.*; and the Multiple-Use Sustained-Yield Act of 1960, 16 U.S.C. §§ 528 *et seq.* *Navajo Nation*, 408 F.Supp.2d at 896.

The Forest Service's task is complicated by the number of sacred sites under its jurisdic-

tion. In the Coconino National Forest alone, there are approximately a dozen mountains recognized as sacred by American Indian tribes. *Id.* at 897. The district court found the tribes hold other landscapes to be sacred as well, such as canyons and canyon systems, rivers and river drainages, lakes, discrete mesas and buttes, rock formations, shrines, gathering areas, pilgrimage routes, and prehistoric sites. *Id.* Within the Southwestern Region forest lands alone, there are between 40,000 and 50,000 prehistoric sites. *Id.* The district court also found the Navajo and the Hualapai Plaintiffs consider the entire Colorado River to be sacred. *Id.* at 897–98. New sacred areas are continuously being recognized by the Plaintiffs. *Id.* at 898.

8. On appeal, the Plaintiffs have abandoned their claims under the ESA, GCEA, and NFMA, leaving only the RFRA, NEPA, and NHPA claims.

result, the court held that the Plaintiffs had failed to demonstrate the Snowbowl upgrade “coerces them into violating their religious beliefs or penalizes their religious activity,” as required to establish a substantial burden on the exercise of their religion under RFRA. *Id.*

A three-judge panel of this court reversed the district court in part, holding that the use of recycled wastewater on the Snowbowl violates RFRA, and in one respect, that the Forest Service failed to comply with NEPA. *See Navajo Nation v. U.S. Forest Serv.*, 479 F.3d 1024, 1029 (9th Cir.2007). The panel affirmed the grant of summary judgment to the Defendants on four of five NEPA claims and the NHPA claim. *Id.* We took the case en banc to revisit the panel’s decision and to clarify our circuit’s interpretation of “substantial burden” under RFRA.

## II. Standard of Review

[1,2] We review *de novo* the district court’s grant of summary judgment. *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 804 (9th Cir.1999). We review the district court’s conclusions of law following a bench trial *de novo* and its findings of fact for clear error. *Lentini v. Cal. Ctr. for the Arts, Escondido*, 370 F.3d 837, 843 (9th Cir.2004).

## III. Religious Freedom Restoration Act of 1993

[3] Plaintiffs contend the use of artificial snow, made from recycled wastewater,

on the Snowbowl imposes a substantial burden on the free exercise of their religion, in violation of the Religious Freedom Restoration Act of 1993 (“RFRA”), 42 U.S.C. §§ 2000bb *et seq.* We hold that the Plaintiffs have failed to establish a RFRA violation. The presence of recycled wastewater on the Peaks does not coerce the Plaintiffs to act contrary to their religious beliefs under the threat of sanctions, nor does it condition a governmental benefit upon conduct that would violate their religious beliefs, as required to establish a “substantial burden” on religious exercise under RFRA.<sup>9</sup>

RFRA was enacted in response to the Supreme Court’s decision in *Employment Division v. Smith*, 494 U.S. 872, 110 S.Ct. 1595, 108 L.Ed.2d 876 (1990).<sup>10</sup> In *Smith*, the Supreme Court held that the Free Exercise Clause does not bar the government from burdening the free exercise of religion with a “valid and neutral law of general applicability.” *Id.* at 879, 110 S.Ct. 1595 (citation and internal quotation marks omitted). Applying that standard, the *Smith* Court rejected the Free Exercise Clause claims of the plaintiffs, who were denied state unemployment compensation after being discharged from their jobs for ingesting peyote for religious purposes. *Id.* at 890, 110 S.Ct. 1595.

Congress found that in *Smith*, the “Supreme Court virtually eliminated the requirement that the government justify burdens on religious exercise imposed by laws neutral toward religion.” 42 U.S.C.

9. The Defendants do not contend RFRA is inapplicable to the government’s use and management of its own land, which is at issue in this case. Because this issue was not raised or briefed by the parties, we have no occasion to consider it. Therefore, we assume, without deciding, that RFRA applies to the government’s use and management of its land, and conclude there is no RFRA violation in this case.

10. In *City of Boerne v. Flores*, 521 U.S. 507, 117 S.Ct. 2157, 138 L.Ed.2d 624 (1997), the Supreme Court invalidated RFRA as applied to the States and their subdivisions, holding RFRA exceeded Congress’s powers under the Enforcement Clause of the Fourteenth Amendment. *Id.* at 532, 536, 117 S.Ct. 2157. We have held that RFRA remains operative as to the federal government. *See Guam v. Guerrero*, 290 F.3d 1210, 1220–22 (9th Cir. 2002).

§ 2000bb(a)(4). Congress further found that “laws ‘neutral’ toward religion may burden religious exercise as surely as laws intended to interfere with religious exercise.” *Id.* § 2000bb(a)(2). With the enactment of RFRA, Congress created a cause of action for persons whose exercise of religion is substantially burdened by a government action, regardless of whether the burden results from a neutral law of general applicability. *See id.* § 2000bb-1. RFRA states, in relevant part:

(a) In general

Government shall not substantially burden a person’s exercise of religion even if the burden results from a rule of general applicability, except as provided in subsection (b) of this section.

(b) Exception

Government may substantially burden a person’s exercise of religion only if it demonstrates that application of the burden to the person—

- (1) is in furtherance of a compelling governmental interest; and
- (2) is the least restrictive means of furthering that compelling governmental interest.

*Id.*

[4, 5] To establish a prima facie RFRA claim, a plaintiff must present evidence sufficient to allow a trier of fact rationally to find the existence of two elements. First, the activities the plaintiff claims are burdened by the government action must be an “exercise of religion.” *See id.* § 2000bb-1(a). Second, the government action must “substantially burden” the plaintiff’s exercise of religion. *See id.* If the plaintiff cannot prove either element, his RFRA claim fails. Conversely, should the plaintiff establish a substantial burden on his exercise of religion, the burden of persuasion shifts to the government to prove that the challenged government action is in furtherance of a “compelling governmental interest” and is implemented by

“the least restrictive means.” *See id.* § 2000bb-1(b). If the government cannot so prove, the court must find a RFRA violation.

We now turn to the application of these principles to the facts of this case. The first question is whether the activities Plaintiffs claim are burdened by the use of recycled wastewater on the Snowbowl constitute an “exercise of religion.” RFRA defines “exercise of religion” as “any exercise of religion, whether or not compelled by, or central to, a system of religious belief.” 42 U.S.C. § 2000bb-2(4); 42 U.S.C. § 2000cc-5(7)(A). The Defendants do not contest the district court’s holding that the Plaintiffs’ religious beliefs are sincere and the Plaintiffs’ religious activities on the Peaks constitute an “exercise of religion” within the meaning of RFRA.

The crux of this case, then, is whether the use of recycled wastewater on the Snowbowl imposes a “substantial burden” on the exercise of the Plaintiffs’ religion. RFRA does not specifically define “substantial burden.” Fortunately, we are not required to interpret the term by our own lights. Rather, we are guided by the express language of RFRA and decades of Supreme Court precedent.

A.

Our interpretation begins, as it must, with the statutory language. RFRA’s stated purpose is to “restore the compelling interest test as set forth in *Sherbert v. Verner*, 374 U.S. 398, 83 S.Ct. 1790, 10 L.Ed.2d 965 (1963) and *Wisconsin v. Yoder*, 406 U.S. 205, 92 S.Ct. 1526, 32 L.Ed.2d 15 (1972) and to guarantee its application in all cases where free exercise of religion is substantially burdened.” 42 U.S.C. § 2000bb(b)(1). RFRA further states “the compelling interest test as set forth in . . . Federal court rulings [prior to *Smith*] is a workable test for striking sensible balances between religious liberty

and competing prior governmental interests.” *Id.* § 2000bb(a)(5).

Of course, the “compelling interest test” cited in the above-quoted RFRA provisions applies only if there is a substantial burden on the free exercise of religion. That is, the government is not required to prove a compelling interest for its action or that its action involves the least restrictive means to achieve its purpose, unless the plaintiff first proves the government action substantially burdens his exercise of religion. The same cases that set forth the compelling interest test also define what kind or level of burden on the exercise of religion is sufficient to invoke the compelling interest test. *See Hernandez v. Comm’r*, 490 U.S. 680, 699, 109 S.Ct. 2136, 104 L.Ed.2d 766 (1989) (noting the “free exercise inquiry asks whether government has placed a substantial burden” on the free exercise of religion (citing *Yoder* and other pre-*Smith* decisions)). Therefore, the cases that RFRA expressly adopted and restored—*Sherbert*, *Yoder*, and federal court rulings prior to *Smith*—also control the “substantial burden” inquiry.

It is to those decisions we now turn.

## B.

In *Sherbert*, a Seventh-day Adventist was fired by her South Carolina employer because she refused to work on Saturdays, her faith’s day of rest. *Sherbert*, 374 U.S. at 399, 83 S.Ct. 1790. *Sherbert* filed a claim for unemployment compensation benefits with the South Carolina Employment Security Commission, which denied her claim, finding she had failed to accept work without good cause. *Id.* at 399–401,

83 S.Ct. 1790. The Supreme Court held South Carolina could not, under the Free Exercise Clause, condition unemployment compensation so as to deny benefits to *Sherbert* because of the exercise of her faith. Such a condition unconstitutionally forced *Sherbert* “to choose between following the precepts of her religion and forfeiting benefits, on the one hand, and abandoning one of the precepts of her religion in order to accept work, on the other hand.” *Id.* at 404, 83 S.Ct. 1790.<sup>11</sup>

In *Yoder*, defendants, who were members of the Amish religion, were convicted of violating a Wisconsin law that required their children to attend school until the children reached the age of sixteen, under the threat of criminal sanctions for the parents. *Yoder*, 406 U.S. at 207–08, 92 S.Ct. 1526. The defendants sincerely believed their children’s attendance in high school was “contrary to the Amish religion and way of life.” *Id.* at 209, 92 S.Ct. 1526. The Supreme Court reversed the defendants’ convictions, holding the application of the compulsory school-attendance law to the defendants “unduly burden[ed]” the exercise of their religion, in violation of the Free Exercise Clause. *Id.* at 207, 220, 92 S.Ct. 1526. According to the Court, the Wisconsin law “affirmatively compel[led] the defendants], under threat of criminal sanction, to perform acts undeniably at odds with fundamental tenets of their religious beliefs.” *Id.* at 218, 92 S.Ct. 1526.

[6] The Supreme Court’s decisions in *Sherbert* and *Yoder*, relied upon and incorporated by Congress into RFRA, lead to the following conclusion: Under RFRA, a

11. As the Supreme Court later elaborated: Where the state conditions receipt of an important benefit upon conduct proscribed by a religious faith, or where it denies such a benefit because of conduct mandated by religious belief, thereby putting substantial pressure on an adherent to modify his behavior and to violate his beliefs, a burden

upon religion exists. While the compulsion may be indirect, the infringement upon free exercise is nonetheless substantial.

*Thomas v. Review Bd. of Ind. Employment Sec. Div.*, 450 U.S. 707, 717–18, 101 S.Ct. 1425, 67 L.Ed.2d 624 (1981) (emphasis added) (discussing *Sherbert*).

“substantial burden” is imposed only when individuals are forced to choose between following the tenets of their religion and receiving a governmental benefit (*Sherbert*) or coerced to act contrary to their religious beliefs by the threat of civil or criminal sanctions (*Yoder*). Any burden imposed on the exercise of religion short of that described by *Sherbert* and *Yoder* is not a “substantial burden” within the meaning of RFRA, and does not require the application of the compelling interest test set forth in those two cases.

Applying *Sherbert* and *Yoder*, there is no “substantial burden” on the Plaintiffs’ exercise of religion in this case. The use of recycled wastewater on a ski area that covers one percent of the Peaks does not force the Plaintiffs to choose between following the tenets of their religion and receiving a governmental benefit, as in *Sherbert*. The use of recycled wastewater to make artificial snow also does not coerce the Plaintiffs to act contrary to their reli-

gion under the threat of civil or criminal sanctions, as in *Yoder*. The Plaintiffs are not fined or penalized in any way for practicing their religion on the Peaks or on the Snowbowl. Quite the contrary: the Forest Service “has guaranteed that religious practitioners would still have access to the Snowbowl” and the rest of the Peaks for religious purposes. *Navajo Nation*, 408 F.Supp.2d at 905.

The only effect of the proposed upgrades is on the Plaintiffs’ subjective, emotional religious experience. That is, the presence of recycled wastewater on the Peaks is offensive to the Plaintiffs’ religious sensibilities. To plaintiffs, it will spiritually desecrate a sacred mountain and will decrease the spiritual fulfillment they get from practicing their religion on the mountain. Nevertheless, under Supreme Court precedent, the diminishment of spiritual fulfillment—serious though it may be—is not a “substantial burden” on the free exercise of religion.<sup>12</sup>

12. The dissent’s assertion that we misunderstand the “nature of religious belief and practice” is misplaced. See Dissent at 1096. One need not study the writings of Sir Francis Bacon, *id.* at 1080–81, or William James, *id.* at 1096, to understand “religious exercise invariably, and centrally, involves a ‘subjective spiritual experience.’” *Id.* at 1096. We agree with the dissent that spiritual fulfillment is a central part of religious exercise. We also note that the Indians’ conception of their lives as intertwined with particular mountains, rivers, and trees, which are divine parts of their being, is very well explained in the dissent. Nevertheless, the question in this case is not whether a subjective spiritual experience constitutes an “exercise of religion” under RFRA. That question is undisputed: The Indians’ religious activities on the Peaks, including the spiritual fulfillment they derive from such religious activities, are an “exercise of religion.”

Rather, the sole question is whether a government action that affects only subjective spiritual fulfillment “substantially burdens” the exercise of religion. For all of the rich complexity that describes the profound inte-

gration of man and mountain into one, the burden of the recycled wastewater can only be expressed by the Plaintiffs as damaged spiritual feelings. Under Supreme Court precedent, government action that diminishes subjective spiritual fulfillment does not “substantially burden” religion.

Indeed, the Supreme Court in *Yoder* drew the same distinction between objective and subjective effect on religious exercise that the dissent criticizes us for drawing today: “Nor is the impact of the compulsory-attendance law confined to grave interference with important Amish religious tenets from a *subjective* point of view. It carries with it precisely the kind of *objective* danger to the free exercise of religion that the First Amendment was designed to prevent.” *Yoder*, 406 U.S. at 218, 92 S.Ct. 1526 (emphasis added). Contrary to the dissent’s assertions, in *Yoder*, it was not the effect of the high school’s secular education on the children’s subjective religious sensibilities that constituted the undue burden on the free exercise of religion. Rather, the undue burden was the penalty of criminal sanctions on the parents for refusing to enroll their children in such school. See *Lyng*, 485 U.S. at 457, 108 S.Ct. 1319 (“[T]here is noth-

The Supreme Court’s decision in *Lyng v. Northwest Indian Cemetery Protective Ass’n*, 485 U.S. 439, 108 S.Ct. 1319, 99 L.Ed.2d 534 (1988), is on point. In *Lyng*, Indian tribes challenged the Forest Service’s approval of plans to construct a logging road in the Chimney Rock area of the Six Rivers National Forest in California. *Id.* at 442, 108 S.Ct. 1319. The tribes contended the construction would interfere with their free exercise of religion by disturbing a sacred area. *Id.* at 442–43, 108 S.Ct. 1319. The area was an “integral and indispensable part” of the tribes’ religious practices, and a Forest Service study concluded the construction “would cause serious and irreparable damage to the sacred areas.” *Id.* at 442, 108 S.Ct. 1319 (cita-

tions and internal quotation marks omitted).

The Supreme Court rejected the Indian tribes’ Free Exercise Clause challenge.<sup>13</sup> The Court held the government plan, which would “diminish the sacredness” of the land to Indians and “interfere significantly” with their ability to practice their religion, did not impose a burden “heavy enough” to violate the Free Exercise Clause. *Id.* at 447–49, 108 S.Ct. 1319.<sup>14</sup> The plaintiffs were not “coerced by the Government’s action into violating their religious beliefs” (as in *Yoder*) nor did the “governmental action penalize religious activity by denying [the plaintiffs] an equal share of the rights, benefits, and privileges

ing whatsoever in the *Yoder* opinion to support the proposition that the ‘impact’ on the Amish religion would have been constitutionally problematic if the statute at issue had not been coercive in nature.’); *Yoder*, 406 U.S. at 218, 92 S.Ct. 1526 (“The impact of the compulsory-attendance law on respondents’ practice of the Amish religion is not only severe, but inescapable, for the Wisconsin law affirmatively compels them, under threat of criminal sanction, to perform acts undeniably at odds with fundamental tenets of their religious beliefs.”). Likewise, in *Sherbert*, the protected interest was the receipt of unemployment benefits and not, as the dissent contends, the right to take religious rest on Saturday. *See Sherbert*, 374 U.S. at 410, 83 S.Ct. 1790 (“This holding . . . reaffirms a principle that . . . no State may exclude . . . the members of any . . . faith, because of their faith, or lack of it, from receiving the benefits of public welfare legislation.” (citations and internal quotation marks omitted)). The *Sherbert* Court certainly did not hold public employers were required not to work their Seventh-day Adventist employees on Saturdays, or not to fire them if they refused to work on Saturdays. Hence, the protected interest was not a mandatory day off, but the money from unemployment benefits that voluntarily taking the day off would otherwise forfeit.

courts to look to pre-*Smith* Free Exercise Clause cases, which include *Lyng*, to interpret RFRA. *See* 42 U.S.C. § 2000bb(a)(5) (“[T]he compelling interest test as set forth in . . . Federal court rulings [prior to *Smith*] is a workable test for striking sensible balances between religious liberty and competing prior governmental interests.”).

13. That *Lyng* was a Free Exercise Clause, not RFRA, challenge is of no material consequence. Congress expressly instructed the

14. Our dissenting colleague is therefore incorrect in his assertion that “*Lyng* did not hold that the road at issue would cause no ‘substantial burden’ on religious exercise.” *See* Dissent at 1089–90. Although *Lyng* did not use the precise phrase “substantial burden,” it squarely held the government plan did not impose a “burden . . . heavy enough” on religious exercise to trigger the compelling interest test: “It is undisputed that the Indian respondents’ beliefs are sincere and that the Government’s proposed actions will have severe adverse effects on the practice of their religion. Those respondents contend that the burden on their religious practices is heavy enough to violate the Free Exercise Clause unless the Government can demonstrate a compelling need [in its project.] We disagree.” *Lyng*, 485 U.S. at 447, 108 S.Ct. 1319. Thus, *Lyng* declined to require the government to show a compelling interest because the burden on the exercise of the Indians’ religion was not “heavy enough”—not, as the dissent asserts, despite the presence of a substantial burden on the exercise of their religion. *See* Dissent at 1089–90.

enjoyed by other citizens" (as in *Sherbert*). See *id.* at 449, 108 S.Ct. 1319.

The *Lyng* Court, with language equally applicable to this case, further stated:

The Government does not dispute, and we have no reason to doubt, that the logging and road-building projects at issue in this case could have devastating effects on traditional Indian religious practices.

\* \* \*

Even if we assume that . . . the [logging] road will "virtually destroy the . . . Indians' ability to practice their religion," the Constitution simply does not provide a principle that could justify upholding [the plaintiffs'] legal claims. However much we might wish that it were otherwise, government simply could not operate if it were required to satisfy every citizen's religious needs and desires. A broad range of government activities—from social welfare programs to foreign aid to conservation projects—will always be considered essential to the spiritual well-being of some citizens, often on the basis of sincerely held religious beliefs. Others will find the very same activities deeply offensive, and perhaps incompatible with their own search for spiritual fulfillment and with the tenets of their religion.

\* \* \*

No disrespect for these practices is implied when one notes that such beliefs could easily require *de facto* beneficial ownership of some rather spacious tracts of public property.

\* \* \*

The Constitution does not permit government to discriminate against religions that treat particular physical sites as sacred, and a law prohibiting the Indian respondents from visiting the

Chimney Rock area would raise a different set of constitutional questions. *Whatever rights the Indians may have to the use of the area, however, those rights do not divest the Government of its right to use what is, after all, its land.*

*Id.* at 451–53, 108 S.Ct. 1319 (citation omitted) (last emphasis added).

Like the Indians in *Lyng*, the Plaintiffs here challenge a government-sanctioned project, conducted on the government's own land, on the basis that the project will diminish their spiritual fulfillment. Even were we to assume, as did the Supreme Court in *Lyng*, that the government action in this case will "virtually destroy the . . . Indians' ability to practice their religion," there is nothing to distinguish the road-building project in *Lyng* from the use of recycled wastewater on the Peaks. We simply cannot uphold the Plaintiffs' claims of interference with their faith and, at the same time, remain faithful to *Lyng's* dictates.

According to the Plaintiffs, *Lyng* is not controlling in this RFRA case because the *Lyng* Court refused to apply the *Sherbert* test that was expressly adopted in RFRA. Hopi Br. at 40. In support, the Plaintiffs cite the Supreme Court's statement in *Smith* that *Lyng* "declined to apply *Sherbert* analysis to the Government's logging and road construction activities on lands used for religious purposes by several Native American Tribes." *Smith*, 494 U.S. at 883, 110 S.Ct. 1595. This contention is unpersuasive.

"The *Sherbert* analysis" to which the Supreme Court referred in the quoted sentence from *Smith* is the *Sherbert* "compelling interest" test. See *id.* (noting that in recent cases, including *Lyng*, the Court had upheld the application of a valid and neutral law "regardless of whether it was necessary to effectuate a compelling interest" under *Sherbert*). But the *Sherbert*

compelling interest test is triggered only when there is a cognizable burden on the free exercise of religion. *Lyng* declined to apply the compelling interest test from *Sherbert*, not because *Lyng* purported to overrule or reject *Sherbert's* analysis, but because the burden on the exercise of religion that was present in *Sherbert* was missing in *Lyng*.

The *Lyng* Court held the government's road-building project in that case, unlike in *Sherbert*, did not deny the Plaintiffs "an equal share of the rights, benefits, and privileges enjoyed by other citizens." *Lyng*, 485 U.S. at 449, 108 S.Ct. 1319. In *Sherbert*, the plaintiff could not get unemployment compensation, available to all other South Carolinians. In *Lyng*, all park users, including the Indians, could use the new road and the lands to which it led. Because the government action did not "burden" the exercise of the Indians' religion, the *Lyng* Court had no occasion to require the government to present a compelling interest for its road-building. Thus, *Lyng* is consistent with the *Sherbert* standard codified in RFRA and forecloses the Plaintiffs' RFRA claims in this case.

Finally, the Supreme Court's pre-*Smith* decision in *Bowen v. Roy*, 476 U.S. 693, 106 S.Ct. 2147, 90 L.Ed.2d 735 (1986), is also on point. In *Bowen*, the parents of an American Indian child brought a Free Exercise Clause challenge to the statutory requirement to obtain a Social Security Number for their daughter in order to receive certain welfare benefits. *Id.* at 695-96, 106 S.Ct. 2147. The plaintiffs believed the government's use of a Social Security Number would "'rob the spirit' of [their] daughter and prevent her from attaining greater spiritual power." *Id.* at 696, 106 S.Ct. 2147. The *Bowen* Court

rejected the plaintiffs' Free Exercise Clause claims and stated:

Never to our knowledge has the Court interpreted the First Amendment to require the Government *itself* to behave in ways that the individual believes will further his or her spiritual development or that of his or her family. The Free Exercise Clause simply cannot be understood to require the Government to conduct its own internal affairs in ways that comport with the religious beliefs of particular citizens. Just as the Government may not insist that [the plaintiffs] engage in any set form of religious observance, so [the plaintiffs] may not demand that the Government join in their chosen religious practices by refraining from using a number to identify their daughter. "[T]he Free Exercise Clause is written in terms of what the government cannot do to the individual, not in terms of what the individual can extract from the government."

*Id.* at 699-700, 106 S.Ct. 2147 (quoting *Sherbert*, 374 U.S. at 412, 83 S.Ct. 1790 (Douglas, J., concurring)) (emphasis in original).

The plaintiffs in *Bowen* could not force the government to alter its internal management procedures to identify their daughter by her name, even though they believed the use of a Social Security Number would prevent her from attaining greater spiritual power. It necessarily follows that the Plaintiffs in this case, despite their sincere belief that the use of recycled wastewater on the Peaks will spiritually desecrate a sacred mountain, cannot dictate the decisions that the government makes in managing "what is, after all, *its* land." See *Lyng*, 485 U.S. at 453, 108 S.Ct. 1319 (emphasis in original).<sup>15</sup>

15. Our circuit's RFRA jurisprudence is consistent with the Supreme Court's pre-*Smith* precedent examined in this section. In *Guam v. Guerrero*, 290 F.3d 1210 (9th Cir.2002), we

held that a Guam statute criminalizing the importation of marijuana did not substantially burden the practice of Rastafarianism under RFRA, even though "marijuana use is sacra-

## C.

For six principal reasons, the Plaintiffs and the dissent would have us depart from the Supreme Court's pre-*Smith* jurisprudence in interpreting RFRA. We decline to do so and will address each of their contentions in turn.

First, the dissent asserts our interpretation of "substantial burden" is inconsistent with the dictionary definition of that term. Dissent at 1086–87. According to the dissent, "[b]ecause Congress did not define 'substantial burden,' either directly or by reference to pre-*Smith* case law, we should define . . . that term according to its ordinary meaning." *Id.* at 1088.

[7] But here, Congress expressly referred to and restored a body of Supreme Court case law that defines what constitutes a substantial burden on the exercise

mental in the practice of that religion." *Id.* at 1212–13, 1222–23. After noting "RFRA re-establishes the *Sherbert* standard," we defined "substantial burden" as "'substantial pressure on an adherent to modify his behavior and to violate his beliefs,' including when, if enforced, it 'results in the choice to the individual of either abandoning his religious principle or facing criminal prosecution.'" *Id.* at 1218, 1222 (citation omitted) (quoting *Thomas*, 450 U.S. at 718, 101 S.Ct. 1425; *Braunfeld*, 366 U.S. at 605, 81 S.Ct. 1144). Applying this test, we held that the Guam statute did not substantially burden Guerrero's free exercise rights, because Rastafarianism does not require the importation, as distinguished from simple possession, of marijuana. *Id.* at 1223.

The dissent contends that our substantial burden standard is inconsistent with *Mockaitis v. Harcleroad*, 104 F.3d 1522 (9th Cir. 1997). In *Mockaitis*, this court held that state prison officials substantially burden a Catholic priest's religious exercise under RFRA, when the officials intrude into the Sacrament of Penance by recording a confession from an inmate to a priest. *Id.* at 1530–31. *Mockaitis* cannot serve as precedent here for two reasons. First, its holding has been invalidated by the Supreme Court's decision in *City of Boerne*, where the Court found RFRA uncon-

stitutional as applied to the States and their subdivisions. See *City of Boerne*, 521 U.S. at 532, 536, 117 S.Ct. 2157. Second, we find *Mockaitis* unhelpful in formulating the substantial burden test. *Mockaitis* did not define substantial burden, let alone analyze the substantial burden standard under the *Sherbert/Yoder* framework restored in RFRA, nor did the decision attempt to explain why such framework should not apply to define substantial burden.

16. The dissent would limit the significance of Congress's citation of *Sherbert* and *Yoder* strictly to the content of what constitutes a compelling interest, not also when that test should be applied. But both *Sherbert* and *Yoder* use the same compelling interest test. If that is all Congress intended by the citation of the two cases, its citation of *Yoder* was redundant and superfluous. We "must interpret statutes as a whole, giving effect to each word and making every effort not to interpret a provision in a manner that renders other provisions of the same statute inconsistent, meaningless or superfluous." *Boise Cascade Corp. v. EPA*, 942 F.2d 1427, 1432 (9th Cir. 1991). Hence, we apply the two separate and distinct substantial burden standards in *Sherbert* and *Yoder* to determine when the compelling interest test is invoked.

Clause. The dissent would have us ignore this Supreme Court precedent and, instead, invent a new definition for “substantial burden” by reference to a dictionary. Dissent at 1086–87. This we cannot do. Rather, we must presume Congress meant to incorporate into RFRA the definition of “substantial burden” used by the Supreme Court.

Second, the dissent asserts that our definition of “substantial burden” is “restrictive” and cannot be found in *Sherbert*, *Yoder*, or any other pre-*Smith* case. Dissent at 1088.<sup>17</sup> The dissent contends it is “clear that RFRA protects against burdens that, while imposed by a different mechanism than those in *Sherbert* and *Yoder*, are also ‘substantial.’” *Id.* at 1090.

For this purportedly “clear” proposition, the dissent cites no authority. That is, the dissent cannot point to a single Supreme Court case where the Court found a substantial burden on the free exercise of religion outside the *Sherbert/Yoder* framework. The reason is simple: There is

none. In the pre-*Smith* cases adopted in RFRA, the Supreme Court has found a substantial burden on the exercise of religion *only* when the burden fell within the *Sherbert/Yoder* framework. See *Sherbert*, 374 U.S. at 403–06, 83 S.Ct. 1790; *Yoder*, 406 U.S. at 207, 220, 92 S.Ct. 1526; *Thomas*, 450 U.S. at 717–18, 101 S.Ct. 1425 (applying *Sherbert*); *Hobbie v. Unemployment Appeals Comm’n of Fla.*, 480 U.S. 136, 140–45, 107 S.Ct. 1046, 94 L.Ed.2d 190 (1987) (applying *Sherbert*); *Frazee v. Ill. Dep’t. of Employment Sec.*, 489 U.S. 829, 832–35, 109 S.Ct. 1514, 103 L.Ed.2d 914 (1989) (applying *Sherbert*). Because Congress expressly restored pre-*Smith* cases in RFRA, we cannot conclude RFRA’s “substantial burden” standard expands beyond the pre-*Smith* cases to cover government actions never recognized by the Supreme Court to constitute a substantial burden on religious exercise.<sup>18</sup>

Third, the Plaintiffs assert RFRA’s compelling interest test includes a “least restrictive means” requirement, which “was not used in the pre-*Smith* jurisprudence

17. Relatedly, the dissent states “*Sherbert* and *Yoder* used the word ‘burden,’ but nowhere defined, or even used, the phrase ‘substantial burden.’” Dissent at 1088–89. The dissent is correct that neither *Sherbert* nor *Yoder* used the precise term “substantial burden.” *Sherbert* held that a “burden” on the free exercise of religion requires the government to show a compelling interest, *Sherbert*, 374 U.S. at 403, 83 S.Ct. 1790, and *Yoder* held that an “undue burden[]” on the free exercise of religion does the same, *Yoder*, 406 U.S. at 220, 92 S.Ct. 1526. For our purposes, however, this distinction is immaterial. Later Supreme Court cases have cited *Yoder* and other pre-*Smith* decisions for the proposition that only a “substantial burden” on the free exercise of religion triggers the compelling interest test. See *Hernandez*, 490 U.S. at 699, 109 S.Ct. 2136 (noting the “free exercise inquiry asks whether government has placed a substantial burden” on the exercise of religion “and, if so, whether a compelling governmental interest justifies the burden” (citing *Yoder* and other pre-*Smith* decisions)); see also *Jim-*

*my Swaggart Ministries v. Bd. of Equalization of Cal.*, 493 U.S. 378, 384–85, 110 S.Ct. 688, 107 L.Ed.2d 796 (1990). Where the Supreme Court has equated the content of “substantial burden” to “burden” and “undue burden,” we must do the same.

18. For the same reason, the dissent is incorrect in its assertion that “[h]ad Congress wished to establish the standard employed by the majority, it could easily have stated that ‘Government shall not, through the imposition of a penalty or denial of a benefit, substantially burden a person’s exercise of religion.’” See Dissent at 1087 (emphasis in original). The addition of the italicized text would have been superfluous, because the cases Congress restored in RFRA recognize a substantial burden on the exercise of religion only when individuals are forced to choose between following the tenets of their religion and receiving a governmental benefit (*Sherbert*) or coerced to act contrary to their religious beliefs by the threat of civil or criminal sanctions (*Yoder*).

RFRA purported to codify.’” Hopi Br. at 31 (quoting *City of Boerne*, 521 U.S. at 535, 117 S.Ct. 2157); *see also* Dissent at 1084–85. The Plaintiffs note that, whereas the government must establish only a compelling interest to withstand a Free Exercise Clause challenge, the government must establish both a compelling interest *and* the least restrictive means to withstand a RFRA challenge. That is true enough, but it puts the cart before the horse. The additional statutory requirement of a least restrictive means is triggered only by a finding that a substantial burden exists; that is the sole and threshold issue in this case. Absent a substantial burden, the government need not establish a compelling interest, much less prove it has adopted the least restrictive means.

Fourth, the Plaintiffs contend RFRA goes beyond the constitutional language that “forbids the ‘prohibiting’ of the free exercise of religion and uses the broader verb ‘burden’: a government may burden religion only on the terms set out by the new statute.” Hopi Br. at 31–32 (quoting *United States v. Bauer*, 84 F.3d 1549, 1558 (9th Cir.1996)); *see also* Dissent at 1084. This contention ignores the Supreme Court’s repeated practice of concluding a government action “prohibits” the free exercise of religion by determining whether the action places a “burden” on the exercise of religion.<sup>19</sup> Thus, the difference in the language of the Free Exercise Clause

(“prohibit”) and the language of RFRA (“burden”) does not affect what constitutes a “burden” on the exercise of religion, under the very cases cited by RFRA as embodying the congressionally desired rule of decision.

Fifth, the Plaintiffs assert Congress expanded RFRA’s definition of “exercise of religion” with the enactment of the Religious Land Use and Institutionalized Persons Act of 2000 (“RLUIPA”), 42 U.S.C. §§ 2000cc *et seq.* Navajo Br. at 29; *see also* Dissent at 1084–85. Prior to RLUIPA’s enactment, “exercise of religion” under RFRA meant “the exercise of religion under the First Amendment to the Constitution.” 42 U.S.C. § 2000bb–2(4) (1994). The Free Exercise Clause of the First Amendment protects only “the observation of a *central* religious belief or practice.” *Hernandez*, 490 U.S. at 699, 109 S.Ct. 2136 (emphasis added).<sup>20</sup> RLUIPA, however, amended RFRA’s definition of “exercise of religion” to include “any exercise of religion, whether or not compelled by, or central to, a system of religious belief.” 42 U.S.C. § 2000bb–2(4); 42 U.S.C. § 2000cc–5(7)(A).

The Plaintiffs’ assertion conflates two distinct questions under RFRA: (1) what constitutes an “exercise of religion” and (2) what amounts to a “substantial burden” on the exercise of that religion. The first question, that the Plaintiffs’ activities

19. *See Yoder*, 406 U.S. at 220, 92 S.Ct. 1526 (“A regulation neutral on its face may, in its application, nonetheless offend the constitutional requirement for governmental neutrality if it unduly *burdens* the free exercise of religion.” (emphasis added)); *Sherbert*, 374 U.S. at 403, 83 S.Ct. 1790 (“We turn first to the question whether the disqualification for benefits imposes any *burden* on the free exercise of appellant’s religion.” (emphasis added)).

20. Nevertheless, the *Hernandez* Court also cautioned: “It is not within the judicial ken to

question the centrality of particular beliefs or practices to a faith.” *Hernandez*, 490 U.S. at 699, 109 S.Ct. 2136; *see also Smith*, 494 U.S. at 887, 110 S.Ct. 1595 (“What principle of law or logic can be brought to bear to contradict a believer’s assertion that a particular act is ‘central’ to his personal faith?”). In light of the Supreme Court’s disapproval of “the centrality test,” we have held the sincerity of a religious belief, not its centrality to a faith, determines whether the Free Exercise Clause applies. *Shakur v. Schriro*, 514 F.3d 878, 884–85 (9th Cir.2008).

are an “exercise of religion,” is undisputed in this case. Of course, that question has no bearing on the second, “substantial burden,” question. RFRA’s amended definition of “exercise of religion” merely expands the scope of what may not be substantially burdened from “central tenets” of a religion to “any exercise of religion.” It does not change what level or kind of interference constitutes a “substantial burden” upon such religious exercise.

Finally, the dissent attempts to justify its expansive interpretation of RFRA on the basis that RFRA applies “in all cases” where the free exercise of religion is burdened, whereas pre-*Smith* jurisprudence excluded entire classes of cases from scrutiny under the compelling interest test, e.g., prison and military regulations. Dissent at 1085. But no one disputes that RFRA applies here; it is not an issue. That RFRA applies to classes of cases in which the First Amendment’s compelling interest test is inapplicable is irrelevant. This observation does not define what constitutes a “substantial burden” and, therefore, does not speak to the threshold question whether a “substantial burden” exists.

In sum, Congress’s statutory command in RFRA to restore the Supreme Court’s pre-*Smith* jurisprudence is crystal clear, and neither the dissent nor the Plaintiffs have offered any valid reason for departing from that jurisprudence in interpreting RFRA.

**D.**

[8] In support of their RFRA claims, the Plaintiffs rely on two of our RLUIPA decisions. For two reasons, RLUIPA is

inapplicable to this case. First, RLUIPA, by its terms, prohibits only state and local governments from applying regulations that govern land use or institutionalized persons to impose a “substantial burden” on the exercise of religion. See 42 U.S.C. §§ 2000cc; 2000cc–1; 2000cc–5(4)(A). Subject to two exceptions not relevant here,<sup>21</sup> RLUIPA does not apply to a federal government action, which is the only issue in this case. See *id.* § 2000cc–5(4). Second, even for state and local governments, RLUIPA applies only to government land-use regulations of private land—such as zoning laws—not to the government’s management of its own land. See *id.* § 2000cc–5(5).<sup>22</sup> Nonetheless, even were we to assume the same “substantial burden” standard applies in RLUIPA and RFRA actions, the two RLUIPA cases cited by the Plaintiffs do not support their RFRA claims.<sup>23</sup>

First, in *Warsoldier v. Woodford*, 418 F.3d 989 (9th Cir.2005), an American Indian inmate brought a RLUIPA challenge against a prison policy requiring all male inmates to maintain their hair no longer than three inches. *Id.* at 991–92. Warsoldier refused to comply with the policy because of his “sincere religious belief that he may cut his hair only upon the death of a loved one,” and was punished by confinement to his cell, the imposition of additional duty hours, and revocation of certain privileges. *Id.* at 991–92. We held the prison policy imposed a substantial burden on Warsoldier’s exercise of his religion because it coerced him to violate his religious beliefs under the threat of punishment. *Id.* at 995–96.

21. Sections 2000cc–2(b) (burden of persuasion) and 2000cc–3 (rules of construction) apply also to the federal government. See 42 U.S.C. § 2000cc–5(4)(B).

22. RLUIPA defines a “land use regulation” as “a zoning or landmarking law . . . that limits or restricts a claimant’s use or development

of land . . . , if the claimant has an ownership, leasehold, easement, servitude, or other property interest in the regulated land.” 42 U.S.C. § 2000cc–5(5) (emphasis added).

23. Because RLUIPA is inapplicable to this case, we express no opinion as to the standards to be applied in RLUIPA actions.

*Warsoldier* is a straightforward application of the Supreme Court's decisions in *Sherbert* and *Yoder*. As in *Sherbert* and *Yoder*, *Warsoldier* was coerced to act contrary to his religious beliefs by the threat of sanctions (i.e., confinement to his cell and the imposition of additional duty hours), and forced to choose between following the tenets of his religion and receiving a governmental benefit (i.e., by the revocation of certain privileges in prison). In contrast, and as analyzed above, the Plaintiffs in this case cannot show the use of recycled wastewater coerces them to violate their religious beliefs under the threat of sanctions, or conditions a government benefit upon conduct that would violate their religious beliefs.

Second, the Plaintiffs rely on our statement in *San Jose Christian College v. City of Morgan Hill*, 360 F.3d 1024 (9th Cir. 2004), that, under RLUIPA, a "substantial burden" on a religious exercise must be "a significantly great restriction or onus upon

such exercise." *Id.* at 1034. The Plaintiffs contend the use of recycled wastewater on the Peaks imposes a "significantly great restriction or onus" on the exercise of their religion.

*San Jose Christian College's* statement of the "substantial burden" test does not support the Plaintiffs' RFRA claims in this case. That "substantial burden" means a "significantly great restriction or onus" says nothing about what kind or level of restriction is "significantly great."<sup>24</sup> Instead, the "substantial burden" question must be answered by reference to the Supreme Court's pre-*Smith* jurisprudence, including *Sherbert* and *Yoder*, that RFRA expressly adopted. Under that precedent, the Plaintiffs have failed to show a "substantial burden" on the exercise of their religion, and thus failed to establish a prima facie RFRA claim. Accordingly, we affirm the district court's entry of judgment for the Defendants on the RFRA claim.<sup>25</sup>

24. The RLUIPA case cited by the dissent, *Shakur*, 514 F.3d 878, is not to the contrary. Dissent at 1090, 1093–94. In *Shakur*, we held that a triable issue of fact existed as to whether prison officials' denial of Halal meat to Shakur, a Muslim inmate, imposed a "substantial burden" on his religious exercise. *Shakur*, 514 F.3d at 888–89. The prison offered Kosher meat meals to Jewish inmates, but denied Halal meat meals to Shakur. *Id.* at 883, 891. The alternative, vegetarian diet exacerbated Shakur's hiatal hernia and caused excessive gas that "interfere[d] with the ritual purity required for his Islamic worship." *Id.* at 888 (emphasis added). Contrary to the dissent's assertions, Dissent at 1093–94, both meal choices provided to Shakur in prison were "unacceptable" to his religion—the non-Halal meat meals were forbidden by his religion and the Halal vegetarian meals interfered with the ritual purity required for his religious activities. *Shakur*, 514 F.3d at 889 (internal quotation marks omitted). Like the Seventh-day Adventist in *Sherbert*, who could obtain unemployment benefits only by working on Saturdays and thereby violating her religious tenets, Shakur

could have a meal in prison and avoid starvation only if he violated his religious beliefs. Relying on *Sherbert* and *Thomas*, we held that there was a triable issue of fact as to whether the prison policy imposed a substantial burden on Shakur's religious exercise, because the policy conditioned a governmental benefit to which Shakur was otherwise entitled—a meal in prison—upon conduct that would violate Shakur's religious beliefs. *Id.* Thus, *Shakur* is a straightforward application of the *Sherbert* test and is consistent with the substantial burden standard we adopt today.

25. As a last resort, the dissent invokes provocative soundbites, accusing us of "effectively read[ing] American Indians out of RFRA." Dissent at 1013–14. The dissent contends "the strength of the Indians' argument in this case could be seen more easily by the majority if another religion were at issue." *Id.* at 1097. In support, the dissent notes the use of artificial snow on the Peaks is no different than the government "permitt[ing] only" baptismal water contaminated with recycled wastewater for Christians or "permitt[ing]

#### IV. National Environmental Policy Act of 1969

[9–11] Plaintiffs contend the district court erred in granting summary judgment to the Defendants on five claims under the National Environmental Policy Act of 1969 (“NEPA”), 42 U.S.C. §§ 4321 *et seq.* We adopt the parts of the original three-judge panel opinion affirming the district court’s grant of summary judgment to the Defendants on the following four NEPA claims: (1) the Final Environmental Impact Statement (“FEIS”) failed to consider a reasonable range of alternatives to the use of recycled wastewater; (2) the FEIS failed to discuss and consider the scientific viewpoint of Dr. Paul Torrence; (3) the FEIS failed adequately to consider the environmental impact of diverting the recycled wastewater from Flagstaff’s regional aquifer; and (4) the FEIS failed adequately to consider the social and cultural impacts of the Snowbowl upgrades on the Hopi people. *See Navajo Nation*, 479 F.3d at 1054–59.

The remaining NEPA claim, which is raised only by the Navajo Plaintiffs, is that the FEIS failed adequately to consider the risks posed by human ingestion of artificial

only” non-Kosher food for Orthodox Jews. *Id.* at 1097.

Putting aside the Equal Protection Clause violation that may arise from a law targeting only Christians or only Jews, the dissent’s examples are clearly distinguishable. When a law “permits only” recycled wastewater to carry out baptisms or “permits only” non-Kosher food for Orthodox Jews, the government compels religious adherents to engage in activities repugnant to their religious beliefs under the penalty of sanctions. Such government compulsion is specifically prohibited by the Supreme Court’s decision in *Yoder*. A law permitting Indians to use only recycled wastewater in their religious or healing ceremonies would likewise constitute a substantial burden on their religious exercise. But there is no such law in this case. When the government allows the use of recycled wastewater on a ski area, it does not compel

snow. The Navajo Plaintiffs’ complaint did not include this NEPA claim or the factual allegations upon which the claim rests. The Navajo Plaintiffs raised this claim for the first time in their motion for summary judgment. In their opposition to the Navajo Plaintiffs’ summary judgment motion, the Defendants contended the Navajo Plaintiffs had failed to raise this NEPA claim in their complaint. In response, the Navajo Plaintiffs moved to amend their complaint to add a distinct and new NEPA cause of action claiming for the first time that the FEIS failed to consider the risks posed by human ingestion of artificial snow. The district court denied the Navajo Plaintiffs’ motion to amend and did not address this NEPA claim on the merits. *Navajo Nation*, 408 F.Supp.2d at 908. The Navajo Plaintiffs failed to appeal the district court’s denial of their motion to amend, and therefore, the district court’s denial of said motion is not before us.

Further, on this appeal, the Navajo Plaintiffs do not explain why their complaint is otherwise sufficient to state this NEPA claim—despite the Defendants’ assertions that the Navajo Plaintiffs failed to plead this NEPA claim.<sup>26</sup> Indeed, the Na-

the Plaintiffs to act contrary to their religious tenets. The Plaintiffs remain free to use natural water in their religious or healing ceremonies and otherwise practice their religion using whatever resources they may choose.

26. The dissent quotes a sentence from the Navajo Plaintiffs’ reply brief that cursorily states this NEPA claim was “ ‘properly pled’ ” in the district court. Dissent at 1110 (quoting Navajo Reply Br. at 23). Nevertheless, the Navajo Plaintiffs’ reply brief does not state what words in the complaint are sufficient to plead this NEPA claim, nor does the brief cite any case or rule that makes it so. It is well-established that a bare assertion in an appellate brief, with no supporting argument, is insufficient to preserve a claim on appeal. *See Dennis v. BEH-1, LLC*, 520 F.3d 1066, 1069 n. 1 (9th Cir.2008). The dissent’s advocacy of why the Navajo Plaintiffs’ complaint satisfies the notice pleading requirements of

vajo Plaintiffs concede “the specific allegations at issue were not included” in their complaint. Navajo Reply Br. at 23–24. Rather, the Navajo Plaintiffs assert this NEPA claim was adequately presented to the district court because the claim “was briefed at summary judgment by all parties and presented at oral argument [to the district court].” *Id.* at 24. Nevertheless, our precedents make clear that where, as here, the complaint does not include the necessary factual allegations to state a claim, raising such claim in a summary judgment motion is insufficient to present the claim to the district court. *See, e.g., Wasco Prods., Inc. v. Southwall Techs., Inc.*, 435 F.3d 989, 992 (9th Cir.2006) (“‘Simply put, summary judgment is not a procedural second chance to flesh out inadequate pleadings.’”); *Pickern v. Pier 1 Imports (U.S.), Inc.*, 457 F.3d 963, 968–69 (9th Cir.2006) (holding that the complaint did not satisfy the notice pleading requirements of Federal Rule of Civil Procedure 8(a) because the complaint “gave the [defendants] no notice of the specific factual allegations presented for the first time in [the plaintiffs] opposition to summary judgment”).<sup>27</sup> Because the Navajo Plaintiffs failed sufficiently to present this NEPA claim to the district court and also failed to appeal the district court’s denial of their motion to amend the complaint to add this NEPA claim, the claim is waived on appeal. *See O’Guinn v. Lovelock Corr. Ctr.*, 502 F.3d 1056, 1063 n. 3 (9th Cir. 2007).

Federal Rule of Civil Procedure 8(a) is the dissent’s own invention and disregards the rule that we do not manufacture arguments for an appellant. *See id.*

27. The dissent notes that the Navajo Plaintiffs raised the issue of human ingestion of artificial snow during the preparation of the FEIS and in the administrative appeal. Dissent at

Accordingly, we affirm the district court’s grant of summary judgment to the Defendants on all NEPA claims.

## V. National Historic Preservation Act

[12] Finally, the Plaintiffs contend the district court erred in granting summary judgment to the Defendants on their claim under the National Historic Preservation Act (“NHPA”), 16 U.S.C. §§ 470 *et seq.* We adopt the part of the original three-judge panel opinion affirming the district court’s grant of summary judgment to the Defendants on the NHPA claim. *See Navajo Nation*, 479 F.3d at 1059–60.

## VI. Conclusion

We affirm the district court’s entry of judgment in favor of the Defendants on the RFRA claim, and the district court’s grant of summary judgment to the Defendants on the NEPA and the NHPA claims.

### AFFIRMED.

WILLIAM A. FLETCHER, Circuit Judge, dissenting, joined by Judge PREGERSON and Judge FISHER:

The en banc majority today holds that using treated sewage effluent to make artificial snow on the most sacred mountain of southwestern Indian tribes does not violate the Religious Freedom Restoration Act (“RFRA”). It also holds that a supposed pleading mistake prevents the tribes from arguing under the National Environmental Policy Act (“NEPA”) that the Forest Service failed to consider the likelihood that children and others would ingest snow

1108–09. This, of course, is irrelevant to the question whether this claim was presented to the *district court*. A party may raise a claim at the administrative proceedings, but forego that claim on judicial review. Further, presenting a claim during the administrative proceedings does not put the defendants on notice that such claim will also be raised before the district court.

made from the effluent. I dissent from both holdings.

I. Religious Freedom Restoration Act

[D]ivers great learned men have been heretical, whilst they have sought to fly up to the secrets of the Deity by the waxen wings of the senses.

—Sir Francis Bacon, *Of the Proficiency and Advancement of Learning, Divine and Human* (Book I, 1605).

The majority holds that spraying 1.5 million gallons per day of treated sewage effluent on the most sacred mountain of southwestern Indian tribes does not “substantially burden” their “exercise of religion” in violation of RFRA. According to the majority, “no plants, springs, natural resources, shrines with religious significance, or religious ceremonies . . . would be physically affected” by the use of the treated sewage effluent. *Maj. op.* at 1063. According to the majority, the “sole effect” of the dumping of the treated sewage effluent is on the Indians’ “subjective spiritual experience.” *Id.* at 1063. The majority holds:

[T]he presence of the artificial snow on the Peaks is offensive to the Plaintiffs’ mental and emotional feelings about their religion and will decrease the spiritual fulfillment Plaintiffs get from practicing their religion on the mountain. Nevertheless, a government action that decreases the spirituality, the fervor, or the satisfaction with which a believer practices his religion is not what Congress has labeled a “substantial burden” . . . on the free exercise of religion. Where, as here, there is no showing the government has coerced the Plaintiffs to act contrary to their religious beliefs under the threat of sanctions, or conditioned a governmental benefit upon conduct that would violate the Plaintiffs’ religious beliefs, there is no “substantial burden” on the exercise of their religion.

*Id.* In so holding, the majority misstates the evidence below, misstates the law under RFRA, and misunderstands the very nature of religion.

A. Background

The San Francisco Peaks in northern Arizona have long-standing religious significance to numerous Indian tribes of the American Southwest. Humphrey’s Peak, Agassiz Peak, Doyle Peak, and Fremont Peak form a single large mountain commonly known as the San Francisco Peaks, or simply the Peaks. Humphrey’s Peak is the highest point in Arizona.

The Peaks lie within the 1.8 million acres of the Coconino National Forest. In 1984, Congress designated 18,960 acres of the Peaks as the Kachina Peaks Wilderness. The Forest Service has identified the Peaks as eligible for inclusion in the National Register of Historic Places and as a “traditional cultural property.” The Service has described the Peaks as “a landmark upon the horizon, as viewed from the traditional or ancestral lands of the Hopi, Zuni, Acoma, Navajo, Apache, Yavapai, Hualapai, Havasupai, and Paiute.”

The Forest Service has acknowledged that the Peaks are sacred to at least thirteen formally recognized Indian tribes, and that this religious significance is of centuries’ duration. There are differences among these tribes’ religious beliefs and practices associated with the Peaks, but there are important commonalities. As the Service has noted, many of the tribes share beliefs that water, soil, plants, and animals from the Peaks have spiritual and medicinal properties; that the Peaks and everything on them form an indivisible living entity; that the Peaks are home to deities and other spirit beings; that tribal members can communicate with higher powers through prayers and songs focused

on the Peaks; and that the tribes have a duty to protect the Peaks.

The Arizona Snowbowl is a ski area on Humphrey's Peak, the most sacred of the San Francisco Peaks. Organized skiing has existed at the Arizona Snowbowl since 1938. In 1977, the then-owner of the Snowbowl requested authorization to clear 120 acres of new ski runs and to do other development. In 1979, after preparing an Environmental Impact Statement, the Forest Service authorized the clearing of 50 of the 120 requested acres, the construction of a new lodge, and some additional development. An association of Navajo medicine men, the Hopi tribe, and two nearby ranch owners brought suit under, *inter alia*, the Free Exercise Clause of the First Amendment and NEPA. The D.C. Circuit upheld the Forest Service's decision. *Wilson v. Block*, 708 F.2d 735 (D.C.Cir.1983). In *Wilson*, the court applied only the First Amendment, for RFRA did not yet exist. The then-proposed expansion of the Snowbowl did not involve any use of treated sewage effluent.

Until now, the Snowbowl has always depended on natural snowfall. In dry years, the operating season is short, with few skiable days and few skiers. The driest year in recent memory was 2001–02, when there were 87 inches of snow, 4 skiable days, and 2,857 skiers. Another dry year was 1995–96, when there were 113 inches of snow, 25 skiable days, and 20,312 skiers. By contrast, in wet years, there are many skiable days and many skiers. For example, in 1991–92, there were 360 inches of snow, 134 skiable days, and 173,000 skiers; in 1992–93, there were 460 inches of snow, 130 skiable days, and 180,062 skiers; in 1997–98, there were 330 inches of snow, 115 skiable days, and 173,862 skiers; and in 2004–05, there were 460 inches of snow, 139 skiable days, and 191,317 skiers.

ASR, the current owner, purchased the Snowbowl in 1992 for \$4 million, with full

knowledge of weather conditions in northern Arizona. In September 2002, ASR submitted a development proposal to the Forest Service. In February 2005, the Forest Service issued a Final Environmental Impact Statement ("FEIS") and Record of Decision ("ROD"). The ROD approved the development alternative preferred by ASR, which included a proposal to make artificial snow using treated sewage effluent.

Under the alternative approved in the ROD, the City of Flagstaff would provide the Snowbowl with up to 1.5 million gallons per day of its treated sewage effluent—euphemistically called "reclaimed water"—from November through February. A 14.8-mile pipeline would be built between Flagstaff and the Snowbowl to carry the treated effluent. The Snowbowl would be the first ski resort in the nation to make artificial snow entirely from undiluted treated sewage effluent.

Before treatment, raw sewage consists of waste discharged into Flagstaff's sewers by households, businesses, hospitals, and industries. The FEIS describes the treatment performed by Flagstaff:

In the primary treatment stage, solids settle out as sludge. . . . Scum and odors are also removed. . . . Wastewater is then gravity-fed for secondary treatment through the aeration/denitrification process, where biological digestion of waste occurs . . . in which a two-stage anoxic/aerobic process removes nitrogen, suspended solids, and [digestible organic matter] from the wastewater. The secondary clarifiers remove the by-products generated by this biological process, recycle microorganisms back into the process from return activated sludge, and separate the solids from the waste system. The waste sludge is sent to [a different plant] for treatment. The water for reuse then passes through the

final sand and anthracite filters prior to disinfection by ultraviolet light radiation. . . . Water supplied for reuse is further treated with a hypochlorite solution to assure that residual disinfection is maintained. . . .

The effluent that emerges after treatment by Flagstaff satisfies the requirements of Arizona law for “reclaimed water.” However, as the FEIS explains, the treatment does not produce pure water:

Fecal coliform bacteria, which are used as an indicator of microbial pathogens, are typically found at concentrations ranging from 105 to 107 colony-forming units per 100 milliliters (CFU/100 ml) in untreated wastewater. Advanced wastewater treatment may remove as much as 99.9999+ percent of the fecal coliform bacteria; however, the resulting effluent has detectable levels of enteric bacteria, viruses, and protozoa, including *Cryptosporidium* and *Giardia*.

Under Arizona law, the treated sewage effluent must be free of “detectable fecal coliform organisms” in only “four of the last seven daily reclaimed water samples.” Ariz. Admin. Code § R18–11–303(B)(2)(a). The FEIS acknowledges that the treated sewage effluent also contains “many unidentified and unregulated residual organic contaminants.” Treated sewage effluent may be used for many things, including irrigation and flushing toilets, but the Arizona Department of Environmental Quality (“ADEQ”) requires that precautions be taken to avoid ingestion by humans.

Under the alternative approved in the ROD, treated sewage effluent would be sprayed on 205.3 acres of Humphrey’s Peak during the ski season. In November and December, the Snowbowl would use the effluent to build a base layer of artificial snow. The Snowbowl would then make more snow from the effluent depending on the amount of natural snowfall. The Snowbowl would also construct a res-

ervoir on the mountain with a surface area of 1.9 acres to hold treated sewage effluent. The stored effluent would allow snowmaking to continue after Flagstaff cuts off the supply at the end of February.

#### B. Religious Freedom Restoration Act

Under the Religious Freedom Restoration Act of 1993 (“RFRA”), the federal government may not “substantially burden a person’s exercise of religion even if the burden results from a rule of general applicability, except as provided in subsection (b).” 42 U.S.C. § 2000bb–1(a). “Exercise of religion” is defined to include “any exercise of religion, whether or not compelled by, or central to, a system of religious belief.” 42 U.S.C. §§ 2000bb–2(4), 2000cc–5(7)(A). Subsection (b) of § 2000bb–1 provides, “Government may substantially burden a person’s exercise of religion only if it demonstrates that application of the burden to the person—(1) is in furtherance of a compelling governmental interest; and (2) is the least restrictive means of furthering that compelling governmental interest.”

These provisions of RFRA were prompted by two Supreme Court decisions. RFRA was originally adopted in response to *Employment Division, Department of Human Resources of Oregon v. Smith*, 494 U.S. 872, 110 S.Ct. 1595, 108 L.Ed.2d 876 (1990). In *Smith*, an Oregon statute denied unemployment benefits to drug users, including Indians who used peyote in religious ceremonies. *Id.* at 890, 110 S.Ct. 1595. The Court held that the Free Exercise Clause of the First Amendment does not prohibit burdens on religious practices if they are imposed by laws of general applicability such as the Oregon statute. Characterizing its prior cases striking down generally applicable laws as “hybrid” decisions invoking multiple constitutional interests, the Court refused to subject fa-

cially neutral regulations to strict scrutiny when challenged solely under the First Amendment. *Id.* at 881–82, 885–86, 110 S.Ct. 1595. However, the Court acknowledged that although the Constitution does not require a “compelling government interest” test in such a case, Congress could impose one. *Id.* at 890, 110 S.Ct. 1595.

In RFRA, enacted three years later, Congress made formal findings that the Court’s decision in *Smith* “virtually eliminated the requirement that the government justify burdens on religious exercise imposed by laws neutral toward religion,” and that “the compelling interest test as set forth in prior Federal court rulings is a workable test for striking sensible balances between religious liberty and competing prior governmental interests.” Pub.L. No. 103–141, § 2(a), 107 Stat. 1488, 1488 (1993) (codified at 42 U.S.C. § 2000bb(a)). Congress declared that the purposes of RFRA were “to provide a claim or defense to persons whose religious exercise is substantially burdened by government” and “to restore the compelling interest test as set forth in *Sherbert v. Verner*, 374 U.S. 398, 83 S.Ct. 1790, 10 L.Ed.2d 965 (1963), and *Wisconsin v. Yoder*, 406 U.S. 205, 92 S.Ct. 1526, 32 L.Ed.2d 15 (1972), and to guarantee its application in all cases where free exercise of religion is substantially burdened.” *Id.* § 2(b), 107 Stat. at 1488 (codified at 42 U.S.C. § 2000bb(b)). In this initial version of RFRA, adopted in 1993, Congress defined “exercise of religion” as “exercise of religion under the First Amendment to the Constitution.” *Id.* § 5, 107 Stat. at 1489 (codified at 42 U.S.C. § 2000bb–2(4) (1994) (repealed)).

In 1997, in *City of Boerne v. Flores*, 521 U.S. 507, 117 S.Ct. 2157, 138 L.Ed.2d 624 (1997), the Supreme Court held RFRA unconstitutional as applied to state and local governments because it exceeded Congress’s authority under § 5 of the

Fourteenth Amendment. *Id.* at 529, 534–35, 117 S.Ct. 2157. The Court did not, however, invalidate RFRA as applied to the federal government. *See Guam v. Guerrero*, 290 F.3d 1210, 1220–21 (9th Cir. 2002). Three years later, in response to *City of Boerne*, Congress enacted the Religious Land Use and Institutionalized Persons Act of 2000 (“RLUIPA”). Pub.L. No. 106–274, 114 Stat. 803 (codified at 42 U.S.C. §§ 2000cc *et seq.*). RLUIPA replaced RFRA’s original First Amendment definition of “exercise of religion” with the broader statutory definition quoted above. RLUIPA §§ 7–8, 114 Stat. at 806–07. Under RFRA after its amendment by RLUIPA, “exercise of religion” is defined to include “any exercise of religion, whether or not compelled by, or central to, a system of religious belief.” 42 U.S.C. § 2000bb–2(4), 2000cc–5(7)(A).

In several ways, RFRA provides greater protection for religious practices than did the Supreme Court’s pre-*Smith* cases, which were based solely on the First Amendment. First, RFRA “goes beyond the constitutional language that forbids the ‘prohibiting’ of the free exercise of religion and uses the broader verb ‘burden.’” *United States v. Bauer*, 84 F.3d 1549, 1558 (9th Cir.1996) (as amended). *Cf.* U.S. Const. amend. 1 (“Congress shall make no law . . . prohibiting the free exercise [of religion].”); *Lyng v. Nw. Indian Cemetery Protective Ass’n*, 485 U.S. 439, 451, 108 S.Ct. 1319, 99 L.Ed.2d 534 (1988) (“The crucial word in the constitutional text is ‘prohibit’ . . .”).

Second, as the Supreme Court noted in *City of Boerne*, RFRA provides greater protection than did the First Amendment under the pre-*Smith* cases because “the Act imposes in every case a least restrictive means requirement—a requirement that was not used in the pre-*Smith* juris-

prudence RFRA purported to codify.” 521 U.S. at 535, 117 S.Ct. 2157.

Third, in passing RLUIPA in 2000, Congress amended RFRA’s definition of “exercise of religion.” Under the amended definition—“any exercise of religion, whether or not compelled by, or central to, a system of religious belief”—RFRA now protects a broader range of conduct than was protected under the Supreme Court’s interpretation of “exercise of religion” under the First Amendment. See *Guru Nanak Sikh Soc’y v. County of Sutter*, 456 F.3d 978, 995 n. 21 (9th Cir.2006) (noting same). After 2000, RFRA plaintiffs must still prove that the burden on their religious exercise is “substantial,” but the difficulty of showing a substantial burden is decreased because a broader range of religious exercise is now protected under RFRA. That is, some governmental actions were not previously considered burdens because they burdened non-protected religious exercise. Given the new broader definition of statutorily protected “exercise of religion,” those actions have now become burdens within the meaning of RFRA.

Finally, and perhaps most important, RFRA provides broader protection because it applies *Sherbert* and *Yoder*’s compelling interest test “in all cases” where the exercise of religion is substantially burdened. 42 U.S.C. § 2000bb(b). Prior to *Smith*, the Court had refused to apply the compelling interest analysis in various contexts, exempting entire classes of free exercise cases from such heightened scrutiny. See, e.g., *Lyng*, 485 U.S. at 454, 108 S.Ct. 1319; *O’Lone v. Estate of Shabazz*, 482 U.S. 342, 349, 107 S.Ct. 2400, 96 L.Ed.2d 282 (1987); *Goldman v. Weinberger*, 475 U.S. 503, 507–08, 106 S.Ct. 1310, 89 L.Ed.2d 478 (1986); see also

*Smith*, 494 U.S. at 883, 110 S.Ct. 1595 (“In recent years, we have abstained from applying the *Sherbert* test (outside the unemployment compensation field) at all.”). RFRA rejected the categorical barriers to strict scrutiny employed in those cases.

### C. The Majority’s Misstatements of the Law under RFRA

The majority misstates the law under RFRA in three ways. First, it concludes that a “substantial burden” on the “exercise of religion” under RFRA occurs only when the government “has coerced the Plaintiffs to act contrary to their religious beliefs under threat of sanctions, or conditioned a governmental benefit upon conduct that would violate the Plaintiffs’ religious beliefs.” Maj. op. at 1063. Second, it ignores the impact of RLUIPA, and cases interpreting RLUIPA, on the definition of a “substantial burden” on the “exercise of religion” in RFRA. Third, it treats as an open question whether RFRA applies to the federal government’s use of its own land. I discuss these misstatements in turn.

#### 1. Definition of “Substantial Burden”

Neither RFRA nor RLUIPA defines “substantial burden.”<sup>1</sup> RFRA states,

The purposes of [RFRA] are—

- (1) to restore the compelling interest test as set forth in *Sherbert v. Verner*, 374 U.S. 398, 83 S.Ct. 1790, 10 L.Ed.2d 965 (1963) and *Wisconsin v. Yoder*, 406 U.S. 205, 92 S.Ct. 1526, 32 L.Ed.2d 15 (1972) and to guarantee its application in all cases where free exercise of religion is substantially burdened; and

Because the distinction is not material, I use the terms interchangeably.

1. Although the majority opinion uses the noun phrase “substantial burden,” RFRA employs the verb phrase “substantially burden.”

(2) to provide a claim or defense to persons whose religious freedom is substantially burdened by government.

42 U.S.C. § 2000bb(b). The majority uses this statutory text to conclude that the purpose of RFRA was to “restore” a de facto “substantial burden” test supposedly employed in *Sherbert* and *Yoder*. In the hands of the majority, that test is extremely restrictive, allowing a finding of “substantial burden” only in those cases where the burden is imposed by the same mechanisms as in those two cases. In the majority’s words, “Where . . . there is no showing the government has coerced the Plaintiffs to act contrary to their religious beliefs under threat of sanctions, or conditioned a governmental benefit upon conduct that would violate the Plaintiffs’ religious beliefs, there is no ‘substantial burden’ on the exercise of their religion.” Maj. op. at 1063.

For six reasons, the majority is wrong in looking to *Sherbert* and *Yoder* for an exhaustive definition of what constitutes a “substantial burden.” First, the majority’s approach is inconsistent with the plain meaning of the phrase “substantial burden.” Second, RFRA does not incorporate any pre-RFRA definition of “substantial burden.” Third, even if RFRA did incorporate a pre-RFRA definition of “substantial burden,” *Sherbert*, *Yoder*, and other pre-RFRA Supreme Court cases did not use the term in the restrictive manner employed by the majority. That is, the cases on which the majority relies did not state that interferences with the exercise of religion constituted a “substantial burden” only when imposed through the two mechanisms used in *Sherbert* and *Yoder*. Fourth, the purpose of RFRA was to expand rather than to contract protection for the exercise of religion. If a disruption of religious practices can qualify as a “substantial burden” under RFRA only when it is imposed by the same mechanisms as in *Sherbert* and *Yoder*, RFRA would permit

interferences with religion that it was surely intended to prevent. Fifth, the majority’s approach overrules fourteen years of contrary circuit precedent. Sixth, the majority’s approach is inconsistent with our cases applying RLUIPA. The Supreme Court has instructed us that RLUIPA employs the same analytic framework and standard as RFRA. I consider these reasons in turn.

a. Substantial Burden on the Exercise of Religion

The majority contends that the phrase “substantial burden” refers only to burdens that are created by two mechanisms—the imposition of a penalty, or the denial of a government benefit. But the phrase “substantial burden” has a plain and ordinary meaning that does not depend on the presence of a penalty or deprivation of benefit. A “burden” is “[s]omething that hinders or oppresses.” Black’s Law Dictionary (8th ed.2004). A burden is “substantial” if it is “[c]onsiderable in importance, value, degree, amount, or extent.” American Heritage Dictionary (4th ed.2000). In RFRA, the phrase “substantial burden” modifies the phrase “exercise of religion.” Thus, RFRA prohibits government action that “hinders or oppresses” the exercise of religion “to a considerable degree.” See also *San Jose Christian College v. City of Morgan Hill*, 360 F.3d 1024, 1034 (9th Cir.2004) (using dictionary definitions to define “substantial burden” under RLUIPA and concluding that “for a land use regulation to impose a ‘substantial burden’ it must be ‘oppressive’ to a ‘significantly great’ extent.”).

The text of RFRA does not describe a particular *mechanism* by which religion cannot be burdened. Rather, RFRA prohibits government action with a particular *effect* on religious exercise. This prohibition is categorical: “Government shall not

substantially burden a person’s exercise of religion . . . .” 42 U.S.C. § 2000bb–1(a). Had Congress wished to establish the standard employed by the majority, it could easily have stated that “Government shall not, *through the imposition of a penalty or denial of a benefit*, substantially burden a person’s exercise of religion . . . .” It did not do so. The majority is correct that such text would have been unnecessary if RFRA had incorporated previous Supreme Court case law that defined the phrase “substantial burden” as a term of art referring only to the imposition of a penalty or denial of a benefit. Maj. op. at 1074. However, as explained below, Congress did not “restore” any technical definition of “substantial burden” found in pre-RFRA case law, let alone “restore” the definition the majority now reads into RFRA.

b. “Restoring” *Sherbert* and *Yoder*

The text of RFRA explicitly states that the purpose of the statute is “to restore the *compelling interest test* as set forth in [*Sherbert* and *Yoder*].” 42 U.S.C. § 2000bb(b) (emphasis added). The text refers separately to “substantially burden” and the “exercise of religion,” but it says nothing about “restoring” the definition of these terms as used in *Sherbert* and *Yoder*.

In the years after *Sherbert* and *Yoder*, the Supreme Court applied the “compelling interest test” to fewer and fewer Free Exercise claims under the First Amendment. For example, in *Goldman*, 475 U.S. at 505, 507–08, 106 S.Ct. 1310, the Court conceded that a military regulation banning civilian “headgear” implicated the First Amendment rights of an Orthodox Jew who sought to wear a yarmulke, but then upheld the regulation after minimal scrutiny due to the “great deference [owed] the professional judgment of military authorities concerning the relative importance of a particular military interest.” In *O’Lone*, 482 U.S. at 349, 107 S.Ct. 2400,

the Court refused to require that prison regulations be justified by a compelling interest, instead demanding only that they be “reasonably related to legitimate penological interests.” See also *Bowen v. Roy*, 476 U.S. 693, 707, 106 S.Ct. 2147, 90 L.Ed.2d 735 (1986) (Burger, J., for plurality) (compelling interest test not applicable in enforcing “facially neutral and uniformly applicable requirement for the administration of welfare programs”); *Lynn*, 485 U.S. at 454, 108 S.Ct. 1319 (compelling interest test not applicable where government interferes with religious exercise through “the use of its own land”).

In other cases, the Court purported to apply the compelling interest test, but in fact applied a watered-down version of the scrutiny employed in *Sherbert* and *Yoder*. Rather than demanding, as it had in *Sherbert* and *Yoder*, that the particular governmental interest at stake be compelling, the Court accepted extremely general definitions of the government’s interest. For example, in *United States v. Lee*, 455 U.S. 252, 102 S.Ct. 1051, 71 L.Ed.2d 127 (1982), the Court balanced an individual’s interest in a religious exemption from social security taxes against the “broad public interest in maintaining a sound tax system.” *Id.* at 260, 102 S.Ct. 1051. Likewise, the plurality in *Roy* balanced an individual’s objection to the provision of a social security number against the government’s general interest in “preventing fraud in [government] benefits programs.” 476 U.S. at 709, 106 S.Ct. 2147; see also David B. Tillotson, *Free Exercise in the 1980s: A Rollback of Protections*, 24 U.S.F. L.Rev. 505, 520 (1990) (“The Court has either defined the Government’s interest so broadly that no individual’s interest could possibly outweigh it or, more recently, has . . . simply refused to weigh individual challenges to uniformly applicable and neutral statutes against any government interest, notwithstanding *Sherbert*.”).

*Smith*, in which the Court refused to apply the compelling governmental interest test to a generally applicable law burdening the exercise of religion, was the last straw. In direct response, Congress enacted RFRA, directing the federal courts to “restore” the “compelling interest test” that had been applied in *Sherbert* and *Yoder* “in all cases where free exercise of religion is substantially burdened.” 42 U.S.C. § 2000bb(b). That is, by restoring the “compelling interest test,” Congress restored the application of strict scrutiny, as applied in *Sherbert* and *Yoder*, to all government actions substantially burdening religion, and rejected the restrictive approach to free exercise claims taken in *Lyng*, *Roy*, *Goldman*, *O’Lone*, and *Lee*. But this directive does not specify what government actions substantially burden religion, thereby triggering the compelling interest test. RFRA did not “restore” any definition of “substantial burden.” Because Congress did not define “substantial burden,” either directly or by reference to pre-*Smith* case law, we should define (and in fact have defined) that term according to its ordinary meaning.

c. “Substantial Burden” Test Not Used in *Sherbert*, *Yoder*, and Other Pre-RFRA Cases To Rule Out Certain Burdens

According to the majority, pre-RFRA cases used the term “burden” or “substantial burden” to refer exclusively to burdens on religion imposed by only two particular types of government action. According to the majority, a “substantial burden” under RFRA can only be caused by government action that either “coerce[s] an individual] to act contrary to their religious beliefs under threat of sanctions, or condition[s] a governmental benefit upon conduct that would violate [an individual’s] religious beliefs.” Maj. op. at 1063. This restrictive definition of “substantial burden” cannot

be found in *Sherbert*, *Yoder*, or any other case prior to the passage of RFRA.

In *Sherbert*, 374 U.S. 398, 83 S.Ct. 1790, 10 L.Ed.2d 965, the Court held that a Seventh-day Adventist could not be denied unemployment benefits based on her refusal to work on Saturdays. Without using the phrase “substantial burden,” the Court concluded that a requirement that the plaintiff work on Saturdays, on pain of being fired if she refused, “force[d] her to choose between following the precepts of her religion and forfeiting benefits, on the one hand, and abandoning one of the precepts of her religion in order to accept work, on the other hand.” *Id.* at 404, 83 S.Ct. 1790. The Court compared such an imposition to a governmental fine: “Governmental imposition of such a choice puts the same kind of burden upon the free exercise of religion as would a fine imposed against appellant for her Saturday worship.” *Id.* The Court therefore mandated that the requirement be justified by a “compelling state interest.” *Id.* at 406–09, 83 S.Ct. 1790.

In *Yoder*, 406 U.S. 205, 92 S.Ct. 1526, 32 L.Ed.2d 15, the Court held that Amish children could not be required to attend school up to the age of sixteen, on penalty of criminal sanctions against their parents if they did not attend. Without using the phrase “substantial burden,” the Court concluded that a requirement that children attend school, on pain of criminal punishment of their parents if they did not, “would gravely endanger if not destroy the free exercise of respondents’ religious beliefs.” *Id.* at 219, 92 S.Ct. 1526. The Court therefore required, as it had in *Sherbert*, that the requirement be justified by a “compelling state interest.” *Id.* at 221–29, 92 S.Ct. 1526.

Neither *Sherbert* nor *Yoder* used the majority’s substantial burden test as the trigger for the application of the compel-

ling interest test. The Court in *Sherbert* and *Yoder* used the word “burden,” but nowhere defined, or even used, the phrase “substantial burden.” After holding that the exercise of religion was burdened in each case, the Court simply did not opine on what other impositions on free exercise would, or would not, constitute a burden. That is, *Sherbert* and *Yoder* held that certain interferences with religious exercise trigger the compelling interest test. But neither case suggested that religious exercise can be “burdened,” or “substantially burdened,” *only* by the two types of interference considered in those cases. The phrase “substantial burden” is a creation of later cases which sometimes use *Sherbert* or *Yoder* as part of a string citation. See, e.g., *Hernandez v. Commissioner of Internal Revenue*, 490 U.S. 680, 699, 109 S.Ct. 2136, 104 L.Ed.2d 766 (1989). Neither *Sherbert* nor *Yoder*, nor any of the later cases, uses the restrictive definition of “substantial burden” invented by the majority today.

Nor do other pre-RFRA cases supply the majority’s restrictive definition of “substantial burden.” The majority relies heavily on *Lyng*, 485 U.S. 439, 108 S.Ct. 1319, 99 L.Ed.2d 534, which relies in turn on *Roy*, 476 U.S. 693, 106 S.Ct. 2147, 90 L.Ed.2d 735. In *Lyng*, tribal members challenged the construction of a proposed road on government land in the Chimney Rock area of the Six Rivers National Forest as infringing their rights under the Free Exercise Clause of the First Amendment. 485 U.S. at 442–42, 108 S.Ct. 1319. The Court began its analysis by reiterating the holding of *Roy* that “[t]he Free Exercise Clause simply cannot be understood to require the Government to conduct its own internal affairs in ways that comport with the religious beliefs of particular citizens.” 485 U.S. at 448, 108 S.Ct. 1319 (quoting *Roy*, 476 U.S. at 699–700, 106 S.Ct. 2147). The Court then reasoned:

In both [*Lyng* and *Roy* ], the challenged Government action would *interfere significantly* with private persons’ ability to pursue spiritual fulfillment according to their own religious beliefs. In neither case, however, would the affected individuals be *coerced* by the Government’s action into violating their religious beliefs; nor would either governmental action *penalize* religious activity by denying any person an equal share of the rights, benefits, and privileges enjoyed by other citizens.

*Id.* at 449, 108 S.Ct. 1319 (emphases added). The Court concluded that only “coercion” of the sort found in *Sherbert* and *Yoder* would trigger strict scrutiny because, “[t]he crucial word in the constitutional text is ‘prohibit.’” *Id.* at 451, 108 S.Ct. 1319.

Justice Brennan dissented from the majority’s refusal to apply heightened scrutiny, emphasizing that the First Amendment “is directed against any form of governmental action that frustrates or inhibits religious practice.” *Id.* at 459, 108 S.Ct. 1319 (Brennan J., dissenting). In response, the *Lyng* majority conceded that the proposed road would have “severe adverse effects on the practice of [plaintiffs’] religion.” *Id.* at 447, 108 S.Ct. 1319. But the Court went out of its way to reject Justice Brennan’s contention that the First Amendment is directed at governmental action that frustrates or inhibits religious practice. It responded, “The Constitution . . . says no such thing. Rather, it states: ‘Congress shall make no law . . . *prohibiting* the free exercise [of religion].’” *Id.* at 456–57, 108 S.Ct. 1319 (quoting *id.* at 459, 108 S.Ct. 1319; U.S. Const. amend. I) (emphasis and alterations in original).

*Lyng* did not hold that the road at issue would cause no “substantial burden” on religious exercise. The Court in *Lyng* never used the phrase “substantial bur-

den.” Rather, *Lyng* held that government action that did not coerce religious practices or attach a penalty to religious belief was insufficient to trigger the compelling interest test *despite* the presence of a significant burden on religion. The Court explicitly recognized this in *Smith* when it wrote, “In [*Lyng*], we declined to apply *Sherbert* analysis to the Government’s logging and road construction activities on lands used for religious purposes by several Native American Tribes, even though it was undisputed that the activities ‘could have devastating effects on traditional Indian religious practices.’” *Smith*, 494 U.S. at 883, 110 S.Ct. 1595 (quoting *Lyng*, 485 U.S. at 451, 108 S.Ct. 1319) (emphasis added).

The majority’s attempt to read *Lyng* into RFRA is not just flawed. It is perverse. In refusing to apply the compelling interest test to the “severe adverse effects on the practice of [plaintiffs’] religion” in *Lyng*, the Court reasoned that the protections of the First Amendment “cannot depend on measuring the effects of a governmental action on a religious objector’s spiritual development.” 485 U.S. at 447, 451, 108 S.Ct. 1319. The Court directly incorporated this reasoning into *Smith*. See 494 U.S. at 885, 110 S.Ct. 1595. Congress then rejected this very reasoning when it restored the application of strict scrutiny “in all cases where free exercise of religion is substantially burdened.” 42 U.S.C. § 2000bb(b).

In sum, it is clear that the interferences with the free exercise of religion that existed in *Sherbert* and *Yoder* qualify, to use the terminology of RFRA, as a “substantial burden.” But the text, purpose, and enactment history of RFRA make equally clear that RFRA protects against burdens that, while imposed by a different mechanism than those in *Sherbert* and *Yoder*, are also “substantial.”

#### d. Purpose of RFRA

The express purpose of RFRA was to reject the restrictive approach to the Free Exercise Clause that culminated in *Smith* and to restore the application of strict judicial scrutiny “in all cases where free exercise of religion is substantially burdened.” 42 U.S.C. § 2000bb(b). The majority’s approach is fundamentally at odds with this purpose.

As should be clear, RFRA creates a legally protected interest in *the exercise of religion*. The protected interest in *Sherbert* was the right to take religious rest on Saturday, not the right to receive unemployment insurance. The protected interest in *Yoder* was the right to avoid secular indoctrination, not, as the majority contends, the right to avoid criminal punishment. See Maj. Op. at 1070–71 n. 12.

Such interests in religious exercise can be severely burdened by government actions that do not deny a benefit or impose a penalty. For example, a court would surely hold that the government had imposed a “substantial burden” on the “exercise of religion” if it purchased by eminent domain every Catholic church in the country. Similarly, a court would surely hold that the Forest Service had imposed a “substantial burden” on the Indians’ “exercise of religion” if it paved over the entirety of the San Francisco Peaks. We have already held that prison officials substantially burden religious exercise if they record the confessions of Catholic inmates, or refuse to provide Halal meat meals to a Muslim prisoner. See *Mockaitis v. Harclerod*, 104 F.3d 1522, 1531 (9th Cir.1997) (“A substantial burden is imposed on . . . free exercise of religion . . . by the intrusion into the Sacrament of Penance by officials of the state.”); *Shakur v. Schriro*, 514 F.3d 878, 888–89 (9th Cir.2008) (holding that failure of prison officials to provide Muslim prisoner with Halal or Kosher

meat diet could constitute substantial burden on religious exercise under RLUIPA); *see also Lovelace v. Lee*, 472 F.3d 174, 198–99 (4th Cir.2006) (holding that prisoner’s right to religious diet under RLUIPA is clearly established for purposes of qualified immunity).

However, the majority’s restrictive definition of “substantial burden” places such injuries entirely outside the coverage of RFRA because they are imposed through different mechanisms than those employed in *Sherbert* and *Yoder*. The majority cannot plausibly justify this result by arguing that the complete destruction of a religious shrine or place of worship, violation of a sacrament, or denial of a religious diet are less “substantial” restrictions on religious exercise than those caused by the denial of unemployment benefits. Rather, the majority refuses to apply strict scrutiny to these substantial injuries because, in its view, “a government that presides over a nation with as many religions as the United States of America [could not] function were it required to do so.” *See* Maj. op. at 1064.

This proposition was explicitly rejected by RFRA, which directs courts to apply the compelling governmental interest test “in all cases” where there is a “substantial burden” on the “exercise of religion.” *See* RFRA § 2000bb(a)(5) (stating that “the compelling interest test . . . is a workable test for striking sensible balances between religious liberty and competing prior governmental interests”). It has also been explicitly rejected by the Supreme Court. *See Gonzales v. O Centro Espirita Beneficente Uniao do Vegetal*, 546 U.S. 418, 430, 126 S.Ct. 1211, 163 L.Ed.2d 1017 (2006) (rejecting the government’s argument that the Controlled Substances Act “cannot function . . . if subjected to judicial exemptions” because “RFRA, and the strict scrutiny test it adopted, contemplate an inquiry more focused than the Government’s

categorical approach”); *id.* at 1215 (“Here the Government’s uniformity argument rests not so much on the particular statutory program at issue as on slippery slope concerns that could be invoked in response to any RFRA claim . . .”). The majority’s approach thus places beyond judicial scrutiny many burdens on religious exercise that RFRA was intended to prevent, and does so based on “slippery slope” arguments that the Supreme Court has instructed us to reject.

e. This Circuit’s RFRA Precedents

As I have described above, the majority’s narrow definition of “substantial burden” conflicts with RFRA’s text and purpose. The majority’s approach also conflicts with our prior application of RFRA in this circuit.

We first addressed the definition of “substantial burden” under RFRA in *Bryant v. Gomez*, 46 F.3d 948 (9th Cir. 1995). We stated that a “substantial burden” exists where:

[A] governmental [action] burdens the adherent’s practice of his or her religion . . . by preventing him or her from engaging in [religious] conduct *or having a religious experience*. . . . This interference must be more than an inconvenience; the burden must be substantial.

*Id.* at 949 (*quoting Graham v. C.I.R.*, 822 F.2d 844, 850–51 (9th Cir.1987)) (second, third, and fifth alterations in *Bryant*) (emphasis added). Since *Bryant*, we have repeatedly refused to adopt the conclusion of the majority that “a ‘substantial burden’ is imposed only when individuals are forced to choose between following the tenets of their religion and receiving a governmental benefit . . . or coerced to act contrary to their religious beliefs by the threat of civil or criminal sanctions.” Maj. op. at 1053–54. *See, e.g., Worldwide Church of God v. Philadelphia Church of God, Inc.*, 227

F.3d 1110, 1121 (9th Cir.2000) (substantial burden where government “prevent[s] [plaintiff] from engaging in [religious] conduct or having a religious experience” and is “more than an inconvenience”) (quoting *Goehring v. Brophy*, 94 F.3d 1294, 1299 (9th Cir.1996); and *Bryant*, 46 F.3d at 949); *Stefanow v. McFadden*, 103 F.3d 1466, 1471 (9th Cir.1996) (same). We have noted that “[a] statute burdens the free exercise of religion if it ‘put[s] substantial pressure on an adherent to modify his behavior and to violate his beliefs,’ *including* when, if enforced, it ‘results in the choice to the individual of either abandoning his religious principle or facing criminal prosecution.’” *Guam v. Guerrero*, 290 F.3d 1210, 1222 (9th Cir.2002) (emphasis added) (quoting *Thomas v. Review Bd. of Ind. Employment Sec. Div.*, 450 U.S. 707, 718, 101 S.Ct. 1425, 67 L.Ed.2d 624 (1981); and *Braunfeld v. Brown*, 366 U.S. 599, 605, 81 S.Ct. 1144, 6 L.Ed.2d 563 (1961)). However, nothing in our opinions suggests that the government can substantially burden religion *only* by applying a penalty or withholding a benefit based on religion.

In fact, we have held precisely the opposite. In *Mockaitis*, a district attorney for Lane County, Oregon, with the assistance of officials at the Lane County Jail, recorded the confession of a detained murder suspect to a Catholic priest. 104 F.3d at 1524–26. The prisoner and the priest learned of the taping only after it occurred. *Id.* at 1526. Although the prisoner did not seek suppression of the tape, the priest, together with the Archbishop of Portland, sought an injunction under RFRA barring future taping. *Id.* at 1526–1527. We concluded the initial taping violated RFRA and held that an injunction was warranted because,

A *substantial burden* is imposed on [the Archbishop’s] free exercise of religion as the responsible head of the archdiocese of Portland by the intrusion into the Sacrament of Penance by officials of the

state, an intrusion defended in this case by an assistant attorney-general of the state as not contrary to any law. Archbishop George has justifiable grounds for fearing that without a declaratory judgment and an injunction in this case the administration of the Sacrament of Penance for which he is responsible in his archdiocese will be made odious in jails by the intrusion of law enforcement officers.

*Id.* at 1531 (emphasis added). *Mockaitis* was not only correctly decided. It is also flatly inconsistent with the majority opinion.

The majority does not dispute that *Mockaitis* is inconsistent with its approach today, but instead argues that *Mockaitis* “cannot serve as precedent” for two reasons. Maj. op. at 1073–74 n.15. First, the Majority notes that *City of Boerne*, 521 U.S. at 532, 117 S.Ct. 2157, overruled our application of RFRA to a state subdivision in *Mockaitis*. But the federalism holding of *City of Boerne*, 521 U.S. at 532, 117 S.Ct. 2157, was entirely unrelated to our definition of “substantial burden.” We do not normally discard our prior view of the law simply because it was expressed in a case that is overruled on unrelated grounds. To the contrary, this circuit has cited cases that have been “overruled on other grounds” in 1,508 opinions. *Mockaitis* continues to demonstrate that we have previously refused to adopt the majority’s restrictive definition of “substantial burden.”

Second, the majority finds *Mockaitis* “unhelpful” because it “did not define substantial burden, let alone analyze the substantial burden standard under the *Sherbert/Yoder* framework restored in RFRA, [or] attempt to explain why such framework should not apply to define substantial burden.” Maj. op. at 1074 n. 15. As I have explained above, RFRA did not em-

ploy the term “substantial burden” as a term of art limiting the application of RFRA to burdens caused by the precise mechanisms at issue in *Sherbert* and *Yoder*. In rejecting this argument, the majority dismisses *Mockaitis* precisely because it proves my point. That is, because *Mockaitis* does not treat “substantial burden” as a term of art limited to burdens caused by the precise mechanisms at issue in *Sherbert* and *Yoder*, the majority must perforce reject it. The conflict between *Mockaitis* and the majority’s approach today reflects the novelty of today’s opinion, not any shortcomings of *Mockaitis*.

Notably absent from the majority’s opinion is any explanation of why the result reached in *Mockaitis* is incorrect. Under the majority’s approach, it is clear that governmental eavesdropping on a prisoner’s confession to his priest would not impose a substantial burden on the prisoner or priest under RFRA. This cannot be the law.

f. This Circuit’s RLUIPA Precedents

Our cases interpreting the definition of “substantial burden” under RLUIPA have applied a similar definition to the definition employed in *Bryant*, 46 F.3d at 949. In applying RLUIPA, we have stated that “for a land use regulation to impose a ‘substantial burden,’ it must be ‘oppressive’ to a ‘significantly great’ extent. That is, a ‘substantial burden’ on ‘religious exercise’ must impose a significantly great restriction or onus upon such exercise.” *Warsoldier v. Woodford*, 418 F.3d 989, 995 (9th Cir.2005) (quoting *San Jose Christian College*, 360 F.3d at 1034). In other words, we have defined “substantial burden” according to the *effect* of a government action on religious exercise rather than particular mechanisms by which this effect is achieved.

Moreover, we recently held that a substantial burden could exist under RLUIPA

in a case that involved no imposition of a penalty or deprivation of a benefit. In *Shakur*, 514 F.3d 878, a Muslim inmate brought a RLUIPA challenge alleging that the Arizona Department of Corrections substantially burdened his exercise of religion by refusing to provide him with a Halal or Kosher meat diet. *Id.* at 888–89. The imposition on Shakur was in fact relatively mild because the prison provided him with a vegetarian diet as an alternative to the ordinary meat diet. *Id.* at 888, 891. Nonetheless, we found that Shakur had asserted a cognizable substantial burden under RLUIPA when he alleged that the vegetarian diet he was forced to eat for lack of Halal meat gave him indigestion, thereby disrupting his religious practices. *Id.* at 888. Because the Arizona Department of Corrections had not imposed any penalty or withheld any benefit from Shakur based on his exercise of religion, *Shakur* is, like *Mockaitis*, flatly inconsistent with the majority opinion.

In attempting to distinguish *Shakur*, the majority again refuses to accept the implications of its own rule. The majority claims that *Shakur* is a “straightforward application of the *Sherbert* test” because “the policy conditioned a governmental benefit to which Shakur was otherwise entitled—a meal in prison—upon conduct that would violate Shakur’s religious beliefs.” Maj. op. at 1078 n. 24. However, like *Mockaitis*, *Shakur* applied the ordinary meaning of the phrase “substantial burden,” which is inconsistent with the majority’s newly minted “*Sherbert* test.” In *Sherbert*, a Seventh-day Adventist was denied unemployment benefits after she was fired for refusing to work on Saturdays because, according to the state, she had “fail[ed], without good cause, to accept suitable work when offered.” 374 U.S. at 399–400, 83 S.Ct. 1790 (internal quotation marks omitted). In other words, the plaintiff in *Sherbert* was denied a govern-

ment benefit, to which she was otherwise entitled, because of her religious observance.

Contrary to the majority's assertions, the inmate in *Shakur* was not denied any government benefit to which he was otherwise entitled because of his religious observance. Shakur had a legal interest in *some* meal in prison, but he was never denied this interest as a consequence of his religious observance. Eating the vegetarian meals provided by the prison was permitted by Shakur's religion. Shakur had no legal interest in Halal meat meals, except to the extent the government's failure to provide them interfered with his subjective religious experience. Nonetheless, we held that the failure of the prison to provide Halal meat meals could constitute a substantial burden on Shakur's religious exercise because the vegetarian meals allegedly "exacerbate[d] [Shakur's] hiatal hernia and cause[d] excessive gas that interfere[d] with the ritual purity required for [Shakur's] Islamic worship." *Id.* at 889. That is, although the government had in no way penalized Shakur's exercise of his religion by denying a benefit to which he was otherwise entitled, we held that RFRA may impose an affirmative duty on prison officials to provide Halal meat meals where the failure to do so harms the inmate's sense of "ritual purity." *Id.*

The provision of special meals is a government action that benefits an inmate. But this is true of virtually any religious accommodation. Thus, *Shakur* can only be explained as consistent with the majority's rule if the mere accommodation of religion is a governmental benefit. But such a broad rule cannot support the majority's conclusion in this case. Under such a definition, the Forest Service offers the Indians in this case a "government benefit" in the form of access to their sacred land and ritual materials. The For-

est Service's failure to offer spiritually pure sites and materials is the equivalent of prison officials failing to offer religiously pure meals. In short, in denying the Indians' claims, the majority contends that the phrase "substantial burden" applies only where the government imposes sanctions or "condition[s] a governmental benefit upon conduct that would violate the Plaintiffs' religious beliefs." The majority then abandons this definition in its attempts to distinguish *Shakur*, which did not involve the conditioning of government benefits on conduct that would violate religious beliefs. The need for such semantic contortions only highlights the degree to which the majority's rule is inconsistent with our prior case law and fails to capture the meaning of the term "substantial burden."

## 2. The Applicability of RLUIPA

The majority's second misstatement is that RLUIPA does not apply to suits brought under RFRA. It writes:

For two reasons, RLUIPA is inapplicable to this case. First, RLUIPA, by its terms, prohibits only state and local governments from applying regulations that govern land use or institutionalized persons to impose a "substantial burden" on the exercise of religion. . . . Subject to two exceptions not relevant here, RLUIPA does not apply to a federal government action, which is not at issue in this case. . . . Second, even for state and local governments, RLUIPA applies only to government land-use regulations of private land, not to the government's management of its own land.

Maj. op. at 1077. From this, the majority concludes that RLUIPA cases finding a "substantial burden" on the exercise of religion are irrelevant to RFRA cases.

It is true that much of RLUIPA applies specifically to state and local zoning decisions and to actions by prison officials.

But it is demonstrably *not* true that RLUIPA is “inapplicable to this case,” and that cases decided under RLUIPA may be disregarded in RFRA cases. Not only did RLUIPA amend the definition of “exercise of religion” contained in RFRA, RLUIPA also applies the same “substantial burden” test that is applied in RFRA cases.

Prior to the passage of RLUIPA in 2000, RFRA provided that “the term ‘exercise of religion’ means the exercise of religion under the First Amendment to the Constitution.” Pub.L. No. 103–141, § 5, 107 Stat. at 1489 (codified at 42 U.S.C. § 2000bb–2(4) (1994) (repealed)). RLUIPA changed the definition of “exercise of religion” in RFRA. RLUIPA §§ 7–8, 114 Stat. at 806–07. As a result of RLUIPA, 42 U.S.C. § 2000bb–2 now provides, “*As used in this chapter— . . . (4) the term ‘exercise of religion’ means religious exercise, as defined in section 2000cc–5 of this title.*” (emphasis added). The “chapter” to which 2000bb–2 refers is Chapter 21B of Title 42. Chapter 21B is the codification of the Religious Freedom Restoration Act. Section 2000cc–5, to which § 2000bb–2 refers, provides, “The term ‘religious exercise’ includes any exercise of religion, whether or not compelled by, or central to, a system of religious belief.”

RFRA and RLUIPA not only share the same definition of “exercise of religion,” they also share the same analytic framework and terminology. Under both statutes, the imposition of a “substantial burden” on a person’s “exercise of religion” may be justified only by a compelling governmental interest and a showing that such interest is furthered by the least restrictive means. *See* 42 U.S.C. § 2000bb–1(b) (RFRA); 42 U.S.C. § 2000cc–1(a)(1–2) (RLUIPA). The Supreme Court has explicitly stated that “the Religious Land Use and Institutionalized Persons Act of 2000 . . . allows federal and state prisoners to seek religious accommodation *pursuant*

*to the same standard* as set forth in RFRA[.]” *O Centro*, 546 U.S. at 436, 126 S.Ct. 1211 (emphasis added). Because RFRA and RLUIPA cases share the same analytic framework and terminology and are, in the words of the Court in *O Centro*, governed by the “same standard,” RLUIPA cases are necessarily applicable to RFRA cases.

### 3. Applicability of RFRA to Federal Land

Finally, the majority misstates the law when it treats as an open question whether RFRA applies to federal land. The majority writes:

The Defendants do not contend that RFRA is inapplicable to the government’s use and management of its own land, which is at issue in this case. Because this issue was not raised or briefed by the parties, we have no occasion to consider it. Therefore, we assume, without deciding, that RFRA applies to the government’s use and management of its land[.]

Maj. op. at 1067 n. 9.

It is hardly an open question whether RFRA applies to federal land. For good reason, none of the defendants argued that RFRA is inapplicable to actions on federal land. There is nothing in the text of RFRA that says, or even suggests, that such a carve-out from RFRA exists. No case has ever so held, or even suggested, that RFRA is inapplicable to federal land.

The majority opinion uses silence of the briefs in this case as an excuse to treat the applicability of RFRA to federal land as an open question. However, the majority ignores the following exchange with the government’s attorney during oral argument before the en banc panel. In that exchange, the government explicitly stated that RFRA applies to federal land:

Question [by a member of the en banc panel]: Is it your position that the substantial burden test is simply never triggered when the government is using its own land? That it's simply outside the coverage of RFRA if the government is using its own land?

Answer [by the government's attorney]: No, your honor, that is not our position . . .

Question: So, the use of government land has the potential under RFRA to impose a substantial burden?

Answer: It is possible that certain activities on certain government land can still substantially burden religious activities.

Question: And would then violate RFRA if there were no compelling state interest?

Answer: Correct. Yes.

[En banc argument at 35:06.]

#### D. Misunderstanding of Religious Belief and Practice

In addition to misstating the law under RFRA, the majority misunderstands the nature of religious belief and practice. The majority concludes that spraying up to 1.5 million gallons of treated sewage effluent per day on Humphrey's Peak, the most sacred of the San Francisco Peaks, does not impose a "substantial burden" on the Indians' "exercise of religion." In so concluding, the majority emphasizes the lack of physical harm. According to the majority, "[T]here are no plants, springs, natural resources, shrines with religious significance, nor any religious ceremonies that would be physically affected" by using treated sewage effluent to make artificial snow. In the majority's view, the "sole effect" of using treated sewage effluent on Humphrey's Peak is on the Indians' "subjective spiritual experience." *Maj. op.* at 1063.

The majority's emphasis on physical harm ignores the nature of religious belief

and exercise, as well as the nature of the inquiry mandated by RFRA. The majority characterizes the Indians' religious belief and exercise as merely a "subjective spiritual experience." Though I would not choose precisely those words, they come close to describing what the majority thinks it is *not* describing—a genuine religious belief and exercise. Contrary to what the majority writes, and appears to think, religious exercise invariably, and centrally, involves a "subjective spiritual experience."

Religious belief concerns the human spirit and religious faith, not physical harm and scientific fact. Religious exercise sometimes involves physical things, but the physical or scientific character of these things is secondary to their spiritual and religious meaning. The centerpiece of religious belief and exercise is the "subjective" and the "spiritual." As William James wrote, religion may be defined as "the feelings, acts, and experiences of individual men [and women] in their solitude, so far as they apprehend themselves to stand in relation to whatever they may consider the divine." WILLIAM JAMES, *THE VARIETIES OF RELIGIOUS EXPERIENCE: A STUDY IN HUMAN NATURE* 31–32 (1929).

The majority's misunderstanding of the nature of religious belief and exercise as merely "subjective" is an excuse for refusing to accept the Indians' religion as worthy of protection under RFRA. According to undisputed evidence in the record, and the finding of the district court, the Indians in this case are sincere in their religious beliefs. The record makes clear that their religious beliefs and practice do not merely require the continued existence of certain plants and shrines. They require that these plants and shrines be spiritually pure, undesecrated by treated sewage effluent.

Perhaps the strength of the Indians' argument in this case could be seen more easily by the majority if another religion were at issue. For example, I do not think that the majority would accept that the burden on a Christian's exercise of religion would be insubstantial if the government permitted only treated sewage effluent for use as baptismal water, based on an argument that no physical harm would result and any adverse effect would merely be on the Christian's "subjective spiritual experience." Nor do I think the majority would accept such an argument for an orthodox Jew if the government permitted only non-Kosher food.

#### E. Proper Application of RFRA

Applying our precedents, which properly reject the majority's restrictive approach, I would hold that the Indians have shown a substantial burden on the exercise of their religion under RFRA. I also believe that the Forest Service has failed to show that approval of the Snowbowl expansion was the least restrictive means to further a compelling governmental interest.

##### 1. "Substantial Burden" on the "Exercise of Religion"

RFRA defines "exercise of religion" as "any exercise of religion, whether or not compelled by, or central to, a system of religious belief." 42 U.S.C. §§ 2000bb-2(4), 2000cc-5(7)(A). Under our prior case law, a "substantial burden" on the "exercise of religion" exists where government action prevents an individual "from engaging in [religious] conduct or having a religious experience" and the interference is "more than an inconvenience." *Bryant*, 46 F.3d at 949.

##### a. The Indians' "Sacred" Land and their "Exercise of Religion"

The Appellees do not dispute the sincerity of the Indians' testimony concerning their religious beliefs and practices, and

the district court wrote that it was not "challenging the honest religious beliefs of any witness." The majority concedes that the Indians are sincere. It writes, "The district court found the Plaintiffs' beliefs to be sincere; there is no basis to challenge that finding." Maj. op. at 1063.

The majority seeks to undermine the importance of the district court's finding, and its own concession, by contending that the Indians consider virtually everything sacred. It writes:

In the Coconino National Forest alone, there are approximately a dozen mountains recognized as sacred by American Indian tribes. The district court found the tribes hold other landscapes to be sacred as well, such as canyons and canyon systems, rivers and river drainages, lakes, discrete mesas and buttes, rock formations, shrines, gathering areas, pilgrimage routes, and prehistoric sites. Within the Southwestern Region forest lands alone, there are between 40,000 and 50,000 prehistoric sites. The district court also found the Navajo and the Hualapai Plaintiffs consider the entire Colorado River to be sacred. New sacred areas are continuously being recognized by the Plaintiffs.

Maj. op. at 1066 n. 7 (citations omitted).

The majority implies that if we hold, based on the sincerity of the Indians' religious belief, that there has been a substantial burden in this case, there is no stopping place. That is, since virtually everything is sacred, virtually any governmental action affecting the Indians' "sacred" land will be a substantial burden under RFRA.

The majority's implication rests upon an inadequate review of the record. The district court conducted a two-week trial devoted solely to the Indians' RFRA claim. The trial record demonstrates that the word "sacred" is a broad and undifferenti-

ated term. That term does not capture the various degrees in which the Indians hold land to be sacred. For example, Vincent Randall, an Apache legislator, historian, and cultural teacher, responded to a question regarding mountains that were “sacred sites” as follows:

That’s your term “sacred.” That’s not my term. I talked about holy mountains this morning. I talked about God’s mountains . . . Sacred to you is not the other terms. There are other places of honor and respect. You’re looking at everything as being sacred. There is not—there is honor and respect, just as much as the Twin Towers is a place of honor and respect. Gettysburg. Yes, there are places like that in Apache land, *but there are four holy mountains. Holy mountains.*

Trial tr. 722–23 (emphasis added).

Dianna Uqualla, subchief of the Havasupai, again explained that there are different degrees of “sacred”: The whole reservation is sacred to us, *but the mountains are more sacred.* They are like our—if you go to a church there would be like our tabernacle, that would be our altars. That’s the—that’s the difference like being in Fort Defiance or Window Rock versus going to each of the sacred mountains. The San Francisco Peaks would be like our tabernacle, our altar to the west.

SER 1253 (emphasis added).

Many White Mountain Apache, Navajo, and Havasupai members refer to all land that is owned, or was ever owned, by their tribe as sacred. For example, Ramon Riley, Cultural Resource Director for the White Mountain Apache, testified that the entire Apache reservation is “sacred.” Trial tr. at 625, 647–51. Uqualla testified to the same effect with respect to Havasupai land. SER 1253.

But while there are many mountains within White Mountain Apache, Navajo,

and Havasupai historic territory, only a few of these mountains are “holy” or particularly “sacred.” For the White Mountain Apache, there are four holy mountains. They are the San Francisco Peaks, Mt. Graham, Mt. Baldy, and Red Mountain/Four Peaks. Trial tr. at 639–43. For the Navajo, there are also four holy mountains. They are the San Francisco Peaks, the Blanca Peak, Mt. Taylor, and the Hesperous Mountains. Trial tr. at 739.

The Indians allow different uses on sacred land depending on the degree of sacredness. For example, Mount Baldy is one of the White Mountain Apache’s holy mountains. Though they consider all of their reservation land “sacred” in the sense in which that term is used by the majority, Mount Baldy is not merely sacred. It is holy. The record is clear that the Apache do not permit camping, fishing, or hunting on the portion of Mount Baldy under their control, even though they permit such activities elsewhere on their reservation.

#### b. Substantial Burden on the Indians’ Exercise of Religion

The record in this case makes clear that the San Francisco Peaks are particularly sacred to the surrounding Indian tribes. Humphrey’s Peak is the most sacred, or holy, of the Peaks. I accept as sincere the Indians’ testimony about their religious beliefs and practices, and I accept as sincere their testimony that the Peaks, and in particular Humphrey’s Peak, are not merely sacred but holy mountains.

In the discussion that follows, I focus on the evidence presented by the Hopi and Navajo, and to a lesser extent on the Hualapai and Havasupai. I first describe the Indians’ religious practices, and then discuss the effect the Snowbowl expansion would have on these practices.

i. The Indians' Religious Practices

(1) The Hopi

Hopi religious beliefs and practices center on the San Francisco Peaks. As stated by the district court, "The Peaks are where the Hopi direct their prayers and thoughts, a point in the physical world that defines the Hopi universe and serves as the home of the Kachinas, who bring water, snow and life to the Hopi people." 408 F.Supp.2d at 894. The Hopi have been making pilgrimages to the Peaks since at least 1540, when they first encountered Europeans, and probably long before that.

The Hopi believe that when they emerged into this world, the clans journeyed to the Peaks (or *Nuvatukyaovi*, the "high place of snow") to receive instructions from a spiritual presence, *Ma'saw*. At the Peaks, they entered a spiritual covenant with *Ma'saw* to take care of the land, and then migrated down to the Hopi villages. The Hopi re-enact their emergence from the Peaks annually, and Hopi practitioners look to the Peaks in their daily songs and prayers as a place of tranquility, sanctity, and purity.

The Peaks are also the primary home of the powerful spiritual beings called *Katsinam* (Hopi plural of *Katsina*, or Kachina in English). Hundreds of specific *Katsinam* personify the spirits of plants, animals, people, tribes, and forces of nature. The *Katsinam* are the spirits of Hopi ancestors, and the Hopi believe that when they die, their spirits will join the *Katsinam* on the Peaks. As spiritual teachers of "the Hopi way," the *Katsinam* teach children and remind adults of the moral principles by which they must live. These principles are embodied in traditional songs given by the *Katsinam* to the Hopi and sung by the Hopi in their everyday lives. One Hopi practitioner compared these songs to sermons, which children understand simplistically but which adults

come to understand more profoundly. Many of these songs focus on the Peaks.

*Katsinam* serve as intermediaries between the Hopi and the higher powers, carrying prayers from the Hopi villages to the Peaks on an annual cycle. From July through January, the *Katsinam* live on the Peaks. In sixteen days of ceremonies and prayers at the winter solstice, the Hopi pray and prepare for the *Katsinam's* visits to the villages. In February or March, the *Katsinam* begin to arrive, and the Hopi celebrate with nightly dances at which the *Katsinam* appear in costume and perform. The *Katsinam* stay while the Hopi plant their corn and it germinates. Then, in July, the Hopi mark the *Katsinam's* departure for the Peaks.

The Hopi believe that pleasing the *Katsinam* on the Peaks is crucial to their livelihood. Appearing in the form of clouds, the *Katsinam* are responsible for bringing rain to the Hopi villages from the Peaks. The *Katsinam* must be treated with respect, lest they refuse to bring the rains from the Peaks to nourish the corn crop. In preparation for the *Katsinam's* arrival, prayer sticks and feathers are delivered to every member of the village, which they then deposit in traditional locations, praying for the spiritual purity necessary to receive the *Katsinam*. The *Katsinam* will not arrive until the peoples' hearts are in the right place, a state they attempt to reach through prayers directed at the spirits on the Peaks.

The Hopi have at least fourteen shrines on the Peaks. Every year, religious leaders select members of each of the approximately forty congregations, or *kiva*, among the twelve Hopi villages to make a pilgrimage to the Peaks. They gather from the Peaks both water for their ceremonies and boughs of Douglas fir worn by the *Katsinam* in their visits to the villages.

## (2) The Navajo

The Peaks are also of fundamental importance to the religious beliefs and practices of the Navajo. The district court found, “[T]he Peaks are considered . . . to be the ‘Mother of the Navajo People,’ their essence and their home. The whole of the Peaks is the holiest of shrines in the Navajo way of life.” 408 F.Supp.2d at 889. Considering the mountain “like family,” the Navajo greet the Peaks daily with prayer songs, of which there are more than one hundred relating to the four mountains sacred to the Navajo. Witnesses described the Peaks as “our leader” and “very much an integral part of our life, our daily lives.”

The Navajo creation story revolves around the Peaks. The mother of humanity, called the Changing Woman and compared by one witness to the Virgin Mary, resided on the Peaks and went through puberty there, an event which the people celebrated as a gift of new life. Following this celebration, called the *kinaalda*, the Changing Woman gave birth to twins, from whom the Navajo are descended. The Navajo believe that the Changing Woman’s *kinaalda* gave them life, generation after generation. Young women today still celebrate their own *kinaalda* with a ceremony one witness compared to a Christian confirmation or a Jewish bat mitzvah. The ceremony sometimes involves water especially collected from the Peaks because of the Peaks’ religious significance.

The Peaks are represented in the Navajo medicine bundles found in nearly every Navajo household. The medicine bundles are composed of stones, shells, herbs, and soil from each of four sacred mountains. One Navajo practitioner called the medicine bundles “our Bible,” because they have “embedded” within them “the unwritten way of life for us, our songs, our ceremonies.” The practitioner traced

their origin to the Changing Woman: When her twins wanted to find their father, the Changing Woman instructed them to offer prayers to the Peaks and conduct ceremonies with medicine bundles. The Navajo believe that the medicine bundles are conduits for prayers; by praying to the Peaks with a medicine bundle containing soil from the Peaks, the prayer will be communicated to the mountain.

As their name suggests, medicine bundles are also used in Navajo healing ceremonies, as is medicine made with plants collected from the Peaks. Appellant Norris Nez, a Navajo medicine man, testified that “like the western doctor has his black bag with needles and other medicine, this bundle has in there the things to apply medicine to a patient.” Explaining why he loves the mountain as his mother, he testified, “She is holding medicine and things to make us well and healthy. We suckle from her and get well when we consider her our Mother.” Nez testified that he collects many different plants from the Peaks to make medicine.

The Peaks play a role in every Navajo religious ceremony. The medicine bundle is placed to the west, facing the Peaks. In the Blessingway ceremony, called by one witness “the backbone of our ceremony” because it is performed at the conclusion of all ceremonies, the Navajo pray to the Peaks by name.

The purity of nature, including the Peaks, plays an important part in Navajo beliefs. Among other things, it affects how a medicine bundle—described by one witness as “a living basket”—is made. The making of a medicine bundle is preceded by a four-day purification process for the medicine man and the keeper of the bundle. By Navajo tradition, the medicine bundle should be made with leather from a buck that is ritually suffocated; the skin cannot be pierced by a weapon. Med-

icine bundles are “rejuvenated” every few years, by replacing the ingredients with others gathered on pilgrimages to the Peaks and three other sacred mountains.

The Navajo believe their role on earth is to take care of the land. They refer to themselves as *nochoka dine*, which one witness translated as “people of the earth” or “people put on the surface of the earth to take care of the lands.” They believe that the Creator put them between four sacred mountains of which the westernmost is the Peaks, or *Do’ok’oos-liid* (“shining on top,” referring to its snow), and that the Creator instructed them never to leave this homeland. Although the whole reservation is sacred to the Navajo, the mountains are the most sacred part. As noted previously, one witness drew an analogy to a church, with the area within the mountains as the part of the church where the people sit, and the Peaks as “our altar to the west.”

As in Hopi religious practice, the Peaks are so sacred in Navajo beliefs that, according to Joe Shirley, Jr., President of the Navajo Nation, a person “cannot just voluntarily go up on this mountain at any time. It’s—it’s the holiest of shrines in our way of life. You have to sacrifice. You have to sing certain songs before you even dwell for a little bit to gather herbs, to do offerings.” After the requisite preparation, the Navajo go on pilgrimages to the Peaks to collect plants for ceremonial and medicinal use.

### (3) The Hualapai

The Peaks figure centrally in the beliefs of the Hualapai. The Hualapai creation story takes place on the Peaks. The Hualapai believe that at one time the world was deluged by water, and the Hualapai put a young girl on a log so that she could survive. She landed on the Peaks, alone, and washed in the water. In the water, she conceived a son, who was a man born

of water. She washed again, and conceived another son. These were the twin warriors, or war gods, from whom the Hualapai are today descended. Later, one of the twins became ill, and the other collected plants and water from the Peaks, thereby healing his brother. From this story comes the Hualapai belief that the mountain and its water and plants are sacred and have medicinal properties. One witness called the story of the deluge, the twins, and their mother “our Bible story” and drew a comparison to Noah’s Ark. As in Biblical parables and stories, Hualapai songs and stories about the twins are infused with moral principles.

Hualapai spiritual leaders travel to the Peaks to deliver prayers. Like the Hopi and the Navajo, the Hualapai believe that the Peaks are so sacred that one has to prepare oneself spiritually to visit. A spiritual leader testified that he prays to the Peaks every day and fasts before visiting to perform the prayer feather ceremony. In the prayer feather ceremony, a troubled family prays into an eagle feather for days, and the spiritual leader delivers it to the Peaks; the spirit of the eagle then carries the prayer up the mountain and to the Creator.

The Hualapai collect water from the Peaks. Hualapai religious ceremonies revolve around water, and they believe water from the Peaks is sacred. In their sweat lodge purification ceremony, the Hualapai add sacred water from the Peaks to other water, and pour it onto heated rocks to make steam. In a healing ceremony, people seeking treatment drink from the water used to produce the steam and are cleansed by brushing the water on their bodies with feathers. At the conclusion of the healing ceremony, the other people present also drink the water. A Hualapai tribal member who conducts healing ceremonies testified that water from the Peaks

is used to treat illnesses of "high parts" of the body like the eyes, sinuses, mouth, throat, and brain, including tumors, meningitis, forgetfulness, and sleepwalking. He testified that the Peaks are the only place to collect water with those medicinal properties, and that he travels monthly to the Peaks to collect it from Indian Springs, which is lower on the mountain and to the west of the Snowbowl. The water there has particular significance to the Hualapai because the tribe's archaeological sites are nearby.

In another Hualapai religious ceremony, when a baby has a difficult birth, a Hualapai spiritual leader brings a portion of the placenta to the Peaks so that the child will be strong like the twins and their mother in the Hualapai creation story. The Hualapai also grind up ponderosa pine needles from the Peaks in sacred water from the Peaks to aid women in childbirth.

A Hualapai religious law forbids mixing the living and the dead. In testimony in the district court, a spiritual leader gave the example of washing a baby or planting corn immediately after taking part in a death ceremony. Mixing the two will cause a condition that was translated into English as "the ghost sickness." The leader testified that purification after "touching death" depends on the intensity of the encounter. If he had just touched the dead person's clothes or belongings, he might be purified in four days, but if he touched a body, it would require a month.

#### (4) The Havasupai

The Peaks are similarly central to the beliefs of the Havasupai, as the Forest Service acknowledged in the FEIS:

The Hualapai and the Havasupai perceive the world as flat, marked in the center by the San Francisco Peaks, which were visible from all parts of the Havasupai territory except inside the Grand Canyon. The commanding pres-

ence of the Peaks probably accounts for the Peaks being central to the Havasupai beliefs and traditions, even though the Peaks themselves are on the edge of their territory.

The Chairman of the Havasupai testified that the Peaks are the most sacred religious site of the Havasupai: "That is where life began." The Havasupai believe that when the earth was submerged in water, the tribe's "grandmother" floated on a log and landed and lived on the Peaks, where she survived on water from the Peaks' springs and founded the tribe.

Water is central to the religious practices of the Havasupai. Although they do not travel to the Peaks to collect water, Havasupai tribal members testified that they believe the water in the Havasu creek that they use in their sweat lodges comes ultimately from the Peaks, to which they pray daily. They believe that spring water is a living, life-giving, pure substance, and they do not use tap water in their religious practices. They perform sweat lodge ceremonies, praying and singing as they use the spring water to make steam; they believe that the steam is the breath of their ancestors, and that by taking it into themselves they are purified, cleansed, and healed. They give water to the dead to take with them on their journey, and they use it to make medicines. The Havasupai also gather rocks from the Peaks to use for making steam.

#### ii. The Burden Imposed by the Proposed Snowbowl Expansion

Under the proposed expansion of the Snowbowl, up to 1.5 million gallons per day of treated sewage effluent would be sprayed on Humphrey's Peak from November through February. Depending on weather conditions, substantially more than 100 million gallons of effluent could

be deposited over the course of the winter ski season.

The Indians claim that the use of treated sewage effluent to make artificial snow on the Peaks would substantially burden their exercise of religion. Because the Indians' religious beliefs and practices are not uniform, the precise burdens on religious exercise vary among the Appellants. Nevertheless, the burdens fall roughly into two categories: (1) the inability to perform a particular religious ceremony, because the ceremony requires collecting natural resources from the Peaks that would be too contaminated—physically, spiritually, or both—for sacramental use; and (2) the inability to maintain daily and annual religious practices comprising an entire way of life, because the practices require belief in the mountain's purity or a spiritual connection to the mountain that would be undermined by the contamination.

The first burden—the inability to perform religious ceremonies because of contaminated resources—has been acknowledged and described at length by the Forest Service. The FEIS summarizes: “Snowmaking and expansion of facilities, especially the use of reclaimed water, would contaminate the natural resources needed to perform the required ceremonies that have been, and continue to be, the basis for the cultural identity for many of these tribes.” Further, “the use of reclaimed water is believed by the tribes to be impure and would have an irretrievable impact on the use of the soil, plants, and animals for medicinal and ceremonial purposes throughout the entire Peaks, as the whole mountain is regarded as a single, living entity.”

Three Navajo practitioners' testimony at trial echoed the Forest Service's assessment in describing how the proposed action would prevent them from performing various ceremonies. Larry Foster, a Navajo practitioner who is training to become

a medicine man, testified that “once water is tainted and if water comes from mortuaries or hospitals, for Navajo there's no words to say that that water can be reclaimed.” He further testified that he objected to the current use of the Peaks as a ski area, but that using treated sewage effluent to make artificial snow on the Peaks would be “far more serious.” He explained, “I can live with a scar as a human being. But if something is injected into my body that is foreign, a foreign object—and reclaimed water, in my opinion, could be water that's reclaimed through sewage, wastewater, comes from mortuaries, hospitals, there could be disease in the waters—and that would be like injecting me and my mother, my grandmother, the Peaks, with impurities, foreign matter that's not natural.”

Foster testified that if treated sewage effluent were used on the Peaks he would no longer be able to go on the pilgrimages to the Peaks that are necessary to rejuvenate the medicine bundles, which are, in turn, a part of every Navajo healing ceremony. He explained:

Your Honor, our way of life, our culture we live in—we live in the blessingway, in harmony. We try to walk in harmony, be in harmony with all of nature. And we go to all of the sacred mountains for protection. We go on a pilgrimage similar to Muslims going to Mecca. And we do this with so much love, commitment and respect. And if one mountain—and more in particularly with the San Francisco Peaks—which is our bundle mountain, or sacred, bundle mountain, were to be poisoned or given foreign materials that were not pure, it would create an imbalance—there would not be a place among the sacred mountains. We would not be able to go there to obtain herbs or medicines to do our ceremonies, because that mountain would then become impure. It would not be pure anymore.

And it would be a devastation for our people.

Appellant Navajo medicine man Norris Nez testified that the proposed action would prevent him from practicing as a medicine man. He told the district court that the presence of treated sewage effluent would “ruin” his medicine, which he makes from plants collected from the Peaks. He also testified that he would be unable to perform the fundamental Blessingway ceremony, because “all [medicine] bundles will be affected and we will have nothing to use eventually.”

Foster, Nez, and Navajo practitioner Steven Begay testified that because they believe the mountain is an indivisible living entity, the entire mountain would be contaminated even if the millions of gallons of treated sewage effluent are put onto only one area of the Peaks. According to Foster, Nez, and Begay, there would be contamination even on those parts of the Peaks where the effluent would not come into physical contact with particular plants or ceremonial areas. To them, the contamination is not literal in the sense that a scientist would use the term. Rather, the contamination represents the poisoning of a living being. In Foster’s words, “[I]f someone were to get a prick or whatever from a contaminated needle, it doesn’t matter what the percentage is, your whole body would then become contaminated. And that’s what would happen to the mountain.” In Nez’s words, “All of it is holy. It is like a body. It is like our body. Every part of it is holy and sacred.” In Begay’s words, “All things that occur on the mountain are a part of the mountain, and so they will have connection to it. We don’t separate the mountain.”

The Hualapai also presented evidence that the proposed action would prevent them from performing particular religious ceremonies. Frank Mapatis, a Hualapai practitioner and spiritual leader who visits

the Peaks approximately once a month to collect water for ceremonies and plants for medicine, testified that the use of treated sewage effluent would prevent him from performing Hualapai sweat lodge and healing ceremonies with the sacred water from the Peaks. Mapatis testified that he believes that the treated sewage effluent would seep into the ground and into the spring below the Snowbowl where he collects his sacred water, so that the spring water would be “contaminated” by having been “touched with death.” Because contact between the living and the dead induces “ghost sickness,” which involves hallucinations, using water touched with death in healing ceremonies “would be like malpractice.” Further, Mapatis would become powerless to perform the healing ceremony for ghost sickness itself, because that ceremony requires water from the Peaks, the only medicine for illnesses of the upper body and head, like hallucinations.

The second burden the proposed action would impose—undermining the Indians’ religious faith, practices, and way of life by desecrating the Peaks’ purity—is also shown in the record. The Hopi presented evidence that the presence of treated sewage effluent on the Peaks would fundamentally undermine all of their religious practices because their way of life, or “beliefway,” is largely based on the idea that the Peaks are a pure source of their rains and the home of the *Katsinam*.

Leigh Kuwanwisiwma, a Hopi religious practitioner and the director of the tribe’s Cultural Preservation Office, explained the connection between contaminating the Peaks and undermining the Hopi religion:

The spiritual covenant that the Hopi clans entered into with the Caretaker I refer to as Ma’saw, the spiritual person and the other d[ei]ties that reside—and the Katsina that reside in the Peaks

started out with the mountains being in their purest form. They didn't have any real intrusion by humanity.

The purity of the spirits, as best we can acknowledge the spiritual domain, we feel were content in receiving the Hopi clans. So when you begin to intrude on that in a manner that is really disrespectful to the Peaks and to the spiritual home of the Katsina, it affects the Hopi people. It affects the Hopi people, because as clans left and embarked on their migrations and later coming to the Hopi villages, we experienced still a mountain and peaks that were in their purest form as a place of worship to go to, to visit, to place our offerings, the tranquility, the sanctity that we left a long time ago was still there.

Antone Honanie, a Hopi practitioner, testified that he would have difficulty preparing for religious ceremonies, because treated sewage effluent is "something you can't get out of your mind when you're sitting there praying" to the mountain, "a place where everything is supposed to be pure." Emory Sekaquaptewa, a Hopi tribal member and research anthropologist, testified that the desecration of the mountain would cause *Katsinam* dance ceremonies to lose their religious value. They would "simply be a performance for performance[']s sake" rather than "a religious effort": "Hopi people are raised in this belief that the mountains are a revered place. And even though they begin with kind of a fantasy notion, this continues to grow into a more deeper spiritual sense of the mountain. So that any thing that interrupts this perception, as they hold it, would tend to undermine the—the integrity in which they hold the mountain."

Summarizing the Hopi's testimony, the district court wrote:

The individual Hopi's practice of the Hopi way permeates every part and ev-

ery day of the individual's life from birth to death. . . . The Hopi Plaintiffs testified that the proposed upgrades to the Snowbowl have affected and will continue to negatively affect the way they think about the Peaks, the Kachina and themselves when preparing for any religious activity involving the Peaks and the Kachina—from daily morning prayers to the regular calendar of religious dances that occur throughout the year. . . . The Hopi Plaintiffs also testified that this negative effect on the practitioners' frames of mind due to the continued and increased desecration of the home of the Kachinas will undermine the Hopi faith and the Hopi way. According to the Hopi, the Snowbowl upgrades will undermine the Hopi faith in daily ceremonies and undermine the Hopi faith in their Kachina ceremonies as well as their faith in the blessings of life that they depend on the Kachina to bring.

408 F.Supp.2d at 894–95.

The Havasupai presented evidence that the presence of treated sewage effluent on the Peaks would, by contaminating the Peaks, undermine their sweat lodge purification ceremonies and could lead to the end of the ceremonies. Rex Tilousi, Chairman of the Havasupai, testified that Havasupai religious stories teach that the water in Havasu Creek, which they use for their sweat ceremonies, flows from the Peaks, where the Havasupai believe life began. Although none of the three Havasupai witnesses stated that they would be completely unable to perform the sweat lodge ceremonies as a consequence of the impurity introduced by the treated sewage effluent, Roland Manakaja, a traditional practitioner, testified that the impurity would disrupt the ceremony:

If I was to take the water to sprinkle the rocks to bring the breath of our

ancestors—we believe the steam is the breath of our ancestors. And the rocks placed in the west signify where our ancestors go, the deceased. . . . Once the steam rises, like it does on the Peaks, the fog or the steam that comes off is creation. And once the steam comes off and it comes into our being, it purifies and cleanses us and we go to the level of trance. . . . It's going to impact mentally my spirituality. Every time I think about sprinkling that water on the rocks, I'm going to always think about this sewer that they're using to recharge the aquifer.

He further testified that he was “concerned” that the water’s perceived impurity might cause the sweat lodge ceremony to die out altogether, if tribal members fear “breathing the organisms or the chemicals that may come off the steam.”

The record supports the conclusion that the proposed use of treated sewage effluent on the San Francisco Peaks would impose a burden on the religious exercise of all four tribes discussed above—the Navajo, the Hopi, the Hualapai, and the Havasupai. However, on the record before us, that burden falls most heavily on the Navajo and the Hopi. The Forest Service itself wrote in the FEIS that the Peaks are the most sacred place of both the Navajo and the Hopi; that those tribes’ religions have revolved around the Peaks for centuries; that their religious practices require pure natural resources from the Peaks; and that, because their religious beliefs dictate that the mountain be viewed as a whole living being, the treated sewage effluent would in their view contaminate the natural resources throughout the Peaks. Navajo Appellants presented evidence in the district court that, were the proposed action to go forward, contamination by the treated sewage effluent would prevent practitioners from making or rejuvenating medicine bundles, from making medicine, and from performing the Bless-

ingway and healing ceremonies. Hopi Appellants presented evidence that, were the proposed action to go forward, contamination by the effluent would fundamentally undermine their entire system of belief and the associated practices of song, worship, and prayer, that depend on the purity of the Peaks, which is the source of rain and their livelihoods and the home of the *Katsinam* spirits.

In light of this showing, it is self-evident that the Snowbowl expansion prevents the Navajo and Hopi “from engaging in [religious] conduct or having a religious experience” and that this interference is “more than an inconvenience.” *Bryant*, 46 F.3d at 949. The burden imposed on the religious practices of the Navajo and Hopi is certainly as substantial as the intrusion on confession deemed a “substantial burden” in *Mockaitis*, 104 F.3d at 1531, and the denial of a Halal or Kosher meat diet deemed a “substantial burden” in *Shakur*, 514 F.3d at 888–89. Thus, under RFRA, the Forest Service’s approval of the Snowbowl expansion may only survive if it furthers a compelling governmental interest by the least restrictive means.

c. “Compelling Governmental Interest” and “Least Restrictive Means”

The majority refuses to hold that spraying treated sewage effluent on Humphrey’s Peak imposes a “substantial burden” on the Indians’ “exercise of religion.” It therefore does not reach the question whether the burden can be justified by a compelling interest and is the least restrictive means of furthering that purpose. Because I would hold that the Snowbowl expansion does constitute a substantial burden on the Indians’ religious exercise, I also address this second step of the RFRA analysis.

“Requiring a State to demonstrate a compelling interest and show that it has

adopted the least restrictive means of achieving that interest is the most demanding test known to constitutional law.” *City of Boerne*, 521 U.S. at 534, 117 S.Ct. 2157. In applying this standard, we do not accept a generalized assertion of a compelling interest, but instead require “a case-by-case determination of the question, sensitive to the facts of each particular claim.” *O Centro*, 546 U.S. at 431, 126 S.Ct. 1211 (quoting *Smith*, 494 U.S. at 899, 110 S.Ct. 1595 (O’Connor, J., concurring in the judgment)).

The Forest Service and the Snowbowl have argued that approving the use of treated sewage effluent to make artificial snow serves several compelling governmental interests. The district court characterized those interests as: (1) “selecting the alternative that best achieves [the Forest Service’s] multiple-use mandate under the National Forest Management Act,” which includes “managing the public land for recreational uses such as skiing”; (2) protecting public safety by “authorizing upgrades at Snowbowl to ensure that users of the National Forest ski area have a safe experience”; and (3) complying with the Establishment Clause. 408 F.Supp.2d at 906. I would hold that none of these interests is compelling.

First, the Forest Service’s interests in managing the forest for multiple uses, including recreational skiing, are, in the words of the Court in *O Centro*, “broadly formulated interests justifying the general applicability of government mandates” and are therefore insufficient on their own to meet RFRA’s compelling interest test. 546 U.S. at 431, 126 S.Ct. 1211. Appellees have argued that approving the proposed action serves the more particularized compelling interest in providing skiing at the Snowbowl, because the use of artificial snow will allow a more “reliable and consistent operating season” at one of the only two major ski areas in Arizona. I do not

believe that authorizing the use of artificial snow at an already functioning commercial ski area in order to expand and improve its facilities, as well as to extend its ski season in dry years, is a governmental interest “of the highest order.” *Yoder*, 406 U.S. at 215, 92 S.Ct. 1526.

Second, while the Forest Service undoubtedly has a general interest in ensuring public safety on federal lands, there has been no showing that approving the proposed action advances that interest by the least restrictive means. Appellees have provided no specific evidence that skiing at the Snowbowl in its current state is unsafe.

Third, approving the proposed action does not serve a compelling governmental interest in avoiding conflict with the Establishment Clause. The Forest Service has not suggested that avoiding a conflict with the Establishment Clause is a compelling interest served by the proposed action. Only the Snowbowl has made that argument. The argument is not convincing. The Supreme Court has repeatedly held that the Constitution “affirmatively mandates accommodation, not merely tolerance, of all religions, and forbids hostility toward any.” *Lynch v. Donnelly*, 465 U.S. 668, 673, 104 S.Ct. 1355, 79 L.Ed.2d 604 (1984). “Anything less would require the ‘callous indifference’ we have said was never intended by the Establishment Clause.” *Id.* (citations omitted); see also *Hobbie v. Unemp. App. Comm’n of Fla.*, 480 U.S. 136, 144–45, 107 S.Ct. 1046, 94 L.Ed.2d 190 (1987) (“This Court has long recognized that the government may (and sometimes must) accommodate religious practices and that it may do so without violating the Establishment Clause.”). Refusing to allow a commercial ski resort in a national forest to spray treated sewage effluent on the Indians’ most sacred mountain is an accommodation that falls far

short of the sort of advancement of religion that gives rise to an Establishment Clause violation.

#### F. Conclusion

I would therefore hold that the proposed expansion of the Arizona Snowbowl, which would entail spraying up to 1.5 million gallons per day of treated sewage effluent on the holiest of the San Francisco Peaks, violates RFRA. The expansion would impose a “substantial burden” on the Indians’ “exercise of religion” and is not justified by a “compelling government interest.”

### II. National Environmental Policy Act

#### A. Pleading under Rule 8(a)

The majority concludes that Appellants failed properly to plead a violation of NEPA in their complaint. The violation in question is an alleged failure by the Forest Service to analyze the risks posed by human ingestion of artificial snow made with treated sewage effluent. Because of the asserted pleading mistake, the majority declines to reach the merits of the claimed violation.

Under Federal Rule of Civil Procedure 8(a), a proper complaint need only contain “a short and plain statement of the claim showing that the pleader is entitled to relief.” Rule 8(a), adopted in 1938, replaced the old “code pleading” regime under which plaintiffs had been required to plead detailed factual allegations in the complaint, on pain of having their complaints dismissed on demurrer. Under the more relaxed “notice pleading” requirement of Rule 8(a), a plaintiff is not required to plead detailed facts. Under Rule 8(a), a plaintiff is required only to “advise the other party of the event being sued upon, . . . provide some guidance in a subsequent proceeding as to what was decided for purposes of res judicata and collateral estoppel, and . . . indicate whether the case should be tried to the court or to

a jury. No more is demanded of the pleadings than this.” 5 Charles Alan Wright & Arthur R. Miller, *Federal Practice & Procedure* § 1202 (2008).

Appellants’ complaint in the district court, while general, was sufficient to provide notice that they were asserting NEPA violations based on the Forest Service’s failure to consider the health risks presented by the Snowbowl expansion. The Navajo Nation and the Havasupai Tribe both alleged in their complaints that the Forest Service violated NEPA by “fail[ing] to take a ‘hard look’ at the impacts of introducing reclaimed waste water to the ecosystem.” [SER 1184; 1200]. In particular, they alleged, “The FEIS fails to adequately address the effects of soil disturbance, and the persistent pollutants in reclaimed water.” *Id.*

In another context, generalized allegations such as these might be insufficient to alert defendants that a specific health risk, such as the ingestion of artificial snow, was included in general statements referring to “the impacts of introducing reclaimed waste water to the ecosystem” and “persistent pollutants in reclaimed water.” In the context of this case, however, Appellants’ allegations were sufficient to put defendants on notice of the nature of their NEPA claim.

First, even before the complaint was filed, the Forest Service was well aware of the dispute about whether the FEIS adequately addressed the risk of children and others ingesting artificial snow made from treated sewage effluent. For example, in October 2002, before the draft EIS was published, the Service wrote what it called a “strategic talking point” addressing the risk posed by the ingestion of the artificial snow. The “talking point” began with the question: “Will my kids get sick if they eat artificial snow made from treated wastewater?” It continued with a scripted answer:

“[T]his question is really one that will be thoroughly answered in the NEPA analysis process.” Appellants repeatedly made clear to the Forest Service, both in comments on the draft EIS and in administrative appeals, that this risk needed to be addressed as part of the NEPA process.

Second, Appellants raised the issue of ingestion of artificial snow in their motion for summary judgment, specifically addressing several pages to the following argument: “The FEIS Does Not Contain a ‘Reasonably Thorough Discussion of the Significant Aspects of the Probable Environmental Consequences’ of the Project—The FEIS Ignores (In Part) the Possibility of Children Eating Snow Made from Reclaimed Water.” [Plaintiffs’ Motion for Summary Judgment at 20–23]. The Forest Service and the Snowbowl both objected that this argument was not adequately alleged in the complaint. But they showed no prejudice arising out of the alleged lack of notice, and they addressed the merits of the issue in their opposition to the motion. [Defendant’s Response In Opposition to All Plaintiffs’ Motions for Summary Judgment at 16–17; Arizona Snowbowl Resort LP’s Opposition to Plaintiffs’ Motions for Summary Judgment at 5–6].

Third, Appellants had raised the issue of ingestion of artificial snow in their administrative appeal, and the Forest Service had no need to develop additional evidence, through discovery or otherwise, in order to address the issue in the district court.

The majority objects to this analysis on two grounds. First, it contends that because Appellants have not appealed the district court’s denial of their motion to amend their complaint, they cannot now contend that their complaint was adequate. Maj. op. at 1079–80 & n. 26. That is not the law. If a complaint is adequate under Rule 8(a), there is no need to amend it. It is well established that if a plaintiff be-

lieves that a complaint satisfies Rule 8(a), he or she may stand on the complaint and appeal a dismissal to the court of appeals. See *WMX Technologies, Inc. v. Miller*, 80 F.3d 1315, 1318 (9th Cir.1996) (citing *Carson Harbor Village Ltd. v. City of Carson*, 37 F.3d 468, 471 n. 3 (9th Cir.1994) (quoting *McGuckin v. Smith*, 974 F.2d 1050, 1053 (9th Cir.1992))). A plaintiff may move to amend a complaint that, in the view of the district court, is inadequate under Rule 8(a). But making such a motion is not an admission, for purposes of appeal, that the district court is correct in viewing the complaint as inadequate. Nor, having made such a motion, is the plaintiff required to appeal the district court’s denial of that motion in order to assert that the initial complaint was adequate. See, e.g., *Quinn v. Owen Federal Bank FSB*, 470 F.3d 1240, 1247 n. 2 (8th Cir.2006).

Second, the majority contends that the Navajo Appellants “do not explain why their complaint is otherwise sufficient to state this NEPA claim—despite the Defendants’ assertion that the Navajo Plaintiffs failed to plead this NEPA claim.” Maj. op. at 1079. The majority is wrong. The Navajo Appellants clearly “explain” why their complaint was sufficient. Part III.B of their brief in this court is headed: “The FEIS Ignores the Possibility of Children Eating Snow Made from Reclaimed Water.” Part III.B.3 of their brief is headed: “This Issue Was Properly Raised and Considered by the Lower Court.” [Reply brief, at 19] The first paragraph of Part III.B.3 reads:

Defendants assert that Plaintiffs did not raise this issue in their comments on the DEIS, in their administrative appeal, *or in their Complaint*. As a result, according to defendants, Plaintiffs are precluded from raising this argument on appeal.

*This misstates the facts of the case and applicable law.*

[*Id.*] (Emphasis added).

The Navajo Appellants explain in their brief that the issue of children eating snow made from effluent was raised during the preparation of the FEIS. They explain that defendants were therefore already well aware of this issue when it was raised in the district court. They explain, further, in their brief in this court: “Plaintiffs properly pled violations of NEPA in their Complaint, even though the specific allegations at issue were not included therein. The issue [of the FEIS’s failure to analyze the risk of children ingesting snow made from treated effluent] was briefed at summary judgment by all parties and presented at oral argument. The lower court heard the argument . . . and issued a decision on this claim resulting in this appeal.” *Id.* at 23–4.

Under notice pleading, a plaintiff need not make specific allegations in the complaint, so long as the complaint is sufficient to put defendant on notice of the nature of plaintiff’s claim. As the Navajo Appellants make clear, the defendants in the district court were well aware of the nature of plaintiffs’ claim that the FEIS failed to analyze the risk of children eating snow made from the effluent. This is sufficient to satisfy the notice pleading requirement of Rule 8(a).

I would therefore reach the merits of Appellants’ claim that the Forest Service failed to study adequately the risks posed by human ingestion of artificial snow made with treated sewage effluent.

#### B. Merits

“NEPA ‘does not mandate particular results,’ but ‘simply provides the necessary process’ to ensure that federal agencies take a ‘hard look’ at the environmental consequences of their actions.” *Muckleshoot Indian Tribe v. U.S. Forest Serv.*,

177 F.3d 800, 814 (9th Cir.1999) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350, 109 S.Ct. 1835, 104 L.Ed.2d 351 (1989)). Regulations require that an EIS discuss environmental impacts “in proportion to their significance.” 40 C.F.R. § 1502.2(b). For impacts discussed only briefly, there should be “enough discussion to show why more study is not warranted.” *Id.*

We employ a “‘rule of reason [standard] to determine whether the [EIS] contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences.’” *Ctr. for Biological Diversity v. U.S. Forest Serv.*, 349 F.3d 1157, 1166 (9th Cir.2003) (first alteration in original) (quoting *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1071 (9th Cir.2002)). In reviewing an EIS, a court must not substitute its judgment for that of the agency, but rather must uphold the agency decision as long as the agency has “considered the relevant factors and articulated a rational connection between the facts found and the choice made.” *Selkirk Conservation Alliance v. Forsgren*, 336 F.3d 944, 953–54 (9th Cir.2003) (quoting *Wash. Crab Producers, Inc. v. Mosbacher*, 924 F.2d 1438, 1441 (9th Cir.1990)).

The treated sewage effluent proposed for use in making artificial snow at the Snowbowl meets the standards of the ADEQ for what Arizona calls “A+ reclaimed water.” The ADEQ permits use of A+ reclaimed water for snowmaking, but it has specifically disapproved human ingestion of such water. Arizona law requires users of reclaimed water to “place and maintain signage at locations [where the water is used] so the public is informed that reclaimed water is in use and that no one should drink from the system.” Ariz. Admin. Code § R18–9–704(H) (2005). Human consumption, “full-immersion water activity with a potential of ingestion,” and

“evaporative cooling or misting” are all prohibited. *Id.* § R18–9–704(G)(2). Irrigation users must employ “application methods that reasonably preclude human contact,” including preventing “contact with drinking fountains, water coolers, or eating areas,” and preventing the treated effluent from “standing on open access areas during normal periods of use.” *Id.* § R18–9–704(F).

The FEIS does not contain a reasonably thorough discussion of the risks posed by possible human ingestion of artificial snow made from treated sewage effluent, and it does not articulate why such discussion is unnecessary.

The main body of the FEIS addresses the health implications of using treated sewage effluent in subchapter 3H, “Watershed Resources.” Much of the subchapter’s analysis focuses on the “hydrogeologic setting” and on the effect of the artificial snow once it has melted. The part of the subchapter describing the treated sewage effluent acknowledges that its risks to human health are not well known because it contains unregulated contaminants in amounts not ordinarily found in drinking water, including prescription drugs and chemicals from personal care products. The subchapter contains tables listing the amounts of various organic and inorganic chemical constituents that have been measured in the treated sewage effluent. One table compares the level of contaminants in Flagstaff’s treated sewage effluent to the level permitted under national drinking water standards. The table shows that Flagstaff simply does not test for the presence of the following contaminants regulated by the national standards: Acrylamide, Dalapon, Di(2-ethylhexyl) adipate, Dinoseb, Diquat, Endothall, Epichlorohydrin, Ethylene dibromide, Lindane, Oxamyl (Vydate), Picloram, Simazine, and Aluminum. The table also shows that Flagstaff does not measure the following

contaminants with sufficient precision to determine whether they are present at levels that exceed the national standards: Nitrate, Benzo (a) pyrene (PAHs), Pentachlorophenol, and Polychlorinated biphenyls (PCBs). However, the FEIS does not go on to discuss either the health risks resulting from ingestion of the treated sewage effluent or the likelihood that humans—either adults or children—will in fact ingest the artificial snow.

Instead, the environmental impact analysis in subchapter 3H, the only part of the FEIS to discuss the characteristics of treated sewage effluent, addresses only the impact on the watersheds and aquifers. That analysis assesses the treated sewage effluent’s impact after it has filtered through the ground, a process the FEIS estimates may result in “an order of magnitude decrease in concentration of solutes.” Thus, although the subchapter reasonably discusses the human health risks to downgradient users, it does not address the risks entailed in humans’ direct exposure to, and possible ingestion of, undiluted treated sewage effluent that has not yet filtered through the ground.

Only two statements in the FEIS could possibly be mistaken for an analysis of the risk that children would ingest the artificial snow. The first follows three combined questions by a commenter: (1) whether signs would be posted to warn that “reclaimed water” has been used to make the artificial snow; (2) how much exposure to the snow would be sufficient to make a person ill; and (3) how long it would take to see adverse effects on plants and animals downstream. The response to these questions is four sentences long. It states that signs would be posted, but it does not say how numerous or how large the signs would be. It then summarizes the treatment the sewage would undergo. The final sentence asserts: “In terms of

microbiological and chemical water quality, the proposed use of reclaimed water for snowmaking represents a low risk of acute or chronic adverse environmental impact to plants, wildlife, and humans.”

This response does not answer the specific and highly relevant question: How much direct exposure to the artificial snow is safe? Nor does the response provide any analysis of the extent of the likely “exposure,” including the likelihood that children or adults would accidentally or intentionally ingest the snow made from non-potable treated sewage effluent.

Another statement appears on the last page of responses to comments in the FEIS. The questions and response are:

[Question:] In areas where reclaimed water is presently used, there are signs posted to warn against consumption of the water. Will these signs be posted at the Snowbowl? If so, how will that keep children from putting snow in there [sic] mouths or accidentally consuming the snow in the case of a wreck?

[Answer:] There will be signs posted at Snowbowl informing visitors of the use of reclaimed water as a snowmaking water source. Much like areas of Flagstaff where reclaimed water is used, it is the responsibility of the visitor or the minor’s guardian to avoid consuming snow made with reclaimed water. It is important to note that machine-produced snow would be mixed and therefore diluted with natural snow decreasing the percentage of machine-produced snow within the snowpack. Because ADEQ approved the use of reclaimed water, it is assumed different types of incidental contact that could potentially occur from use of class A reclaimed water for snowmaking were fully considered.

There are several problems with this response. First, the response does not assess the risk that children will eat the artificial snow. Stating that it is the par-

ents’ responsibility to prevent their children from doing so neither responds to the question whether signs would prevent children from eating snow nor addresses whether ingesting artificial snow would be harmful. Second, the Forest Service’s assumption that the ADEQ’s approval means the snow must be safe for ingestion is inconsistent with that same agency’s regulations, which are designed to prevent human ingestion. Third, the assumption that the ADEQ actually analyzed the risk of skiers ingesting the treated sewage effluent snow is not supported by any evidence in the FEIS (or elsewhere in the administrative record). Finally, the Forest Service’s answer is misleading in stating that the treated sewage effluent will be “diluted.” The artificial snow would itself be made entirely from treated sewage effluent and would only be “mixed and therefore diluted” with natural snow insofar as the artificial snow intermingles with a layer of natural snow. During a dry winter, there may be little or no natural snow with which to “dilute” the treated sewage effluent.

Appellees have also contended that the FEIS “sets forth relevant mitigation measures” to “the possibility that someone may ingest snow.” Although Appellees have not specified the “relevant mitigation measures” to which they refer, the only mitigation measure mentioned in the FEIS is the requirement under Arizona law that the Snowbowl post signs “so the public is informed that reclaimed water is in use and that no one should drink from the system.” Ariz. Admin. Code § R18-9-704(H) (2005). This “mitigation measure” is not listed along with the fifty-five mitigation measures catalogued in a table in the FEIS. *Cf.* 40 C.F.R. § 1502.14(f) (requiring agencies to include “appropriate mitigation measures” in the EIS’s description of the proposal and its alternatives). The measure’s omission from the FEIS

table is hardly surprising, however, given that the FEIS does not address as an environmental impact the risk to human health from the possible ingestion of artificial snow made from treated sewage effluent.

Our role in reviewing the FEIS under the APA is not to second-guess a determination by the Forest Service about whether artificial snow made from treated sewage effluent would be ingested and, if so, whether such ingestion would threaten human health. We are charged, rather, with evaluating whether the FEIS contains “a reasonably thorough discussion of the significant aspects of the probable environmental consequences.” *Ctr. for Biological Diversity*, 349 F.3d at 1166 (quotation marks omitted). An agency preparing an EIS is required to take a “hard look” that “[a]t the least . . . encompasses a thorough investigation into the environmental impacts of an agency’s action and a candid acknowledgment of the risks that those impacts entail.” *Nat’l Audubon Soc’y v. Dep’t of the Navy*, 422 F.3d 174, 185 (4th Cir.2005) (citing *Robertson*, 490 U.S. 332, 350, 109 S.Ct. 1835, 104 L.Ed.2d 351 (1989) (stating that NEPA requires environmental costs to be “adequately identified and evaluated”). A proper NEPA analysis will “foster both informed decisionmaking and informed public participation.” *Churchill County v. Norton*, 276 F.3d 1060, 1071 (9th Cir.2001) (quoting *California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982)).

I do not believe that the Forest Service has provided a “reasonably thorough discussion” of any risks posed by human ingestion of artificial snow made from treated sewage effluent or articulated why such a discussion is unnecessary, has provided a “candid acknowledgment” of any such risks, and has provided an analysis that will “foster both informed decision-making and informed public participation.” I

would therefore hold that the FEIS does not satisfy NEPA with respect to the possible risks posed by human ingestion of the artificial snow.

### III. Conclusion

I would hold that Appellants have proved violations of both the Religious Freedom Restoration Act and the National Environmental Policy Act. Of the two, the RFRA violation is by far the more serious. A NEPA violation can almost always be cured, and certainly could be cured in this case. However, the RFRA violation resulting from the proposed development of the Snowbowl is not curable. Because of the majority’s decision today, there will be a permanent expansion of the Arizona Snowbowl. Up to 1.5 million gallons of treated sewage effluent per day will be sprayed on Humphrey’s Peak for the foreseeable future.

The San Francisco Peaks have been at the center of religious beliefs and practices of Indian tribes of the Southwest since time out of mind. Humphrey’s Peak, the holiest of the San Francisco Peaks, will from this time forward be desecrated and spiritually impure. In part, the majority justifies its holding on the ground that what it calls “public park land” is land that “belongs to everyone.” *Maj. op.* at 1063–64. There is a tragic irony in this justification. The United States government took this land from the Indians by force. The majority now uses that forcible deprivation as a justification for spraying treated sewage effluent on the holiest of the Indians’ holy mountains, and for refusing to recognize that this action constitutes a substantial burden on the Indians’ exercise of their religion.

RFRA was passed to protect the exercise of all religions, including the religions of American Indians. If Indians’ land-based exercise of religion is not protected

by RFRA in this case, I cannot imagine a case in which it will be. I am truly sorry that the majority has effectively read American Indians out of RFRA.



**KT & G CORP., Xcaliber International Limited, LLC, Plaintiffs–Appellants,**

v.

**ATTORNEY GENERAL OF the STATE OF OKLAHOMA, W.A. Drew Edmondson, in his official capacity as Attorney General, Defendant–Appellee.**

**Xcaliber International Limited, LLC, Plaintiff–Appellant,**

v.

**Stephen Six, Attorney General, in his official capacity as Attorney General, State of Kansas, Defendant–Appellee.**

**Nos. 05–5175, 05–5178.**

United States Court of Appeals,  
Tenth Circuit.

July 23, 2008.

**Background:** Tobacco manufacturers that did not participate in states' master settlement agreement (MSA) with other tobacco manufacturers brought actions alleging that Kansas's and Oklahoma's allocable share amendments, which reduced amount of escrow funds refunded to them each year pursuant to MSA, violated Sherman Act and federal constitution. The United States District Court for the Northern District of Oklahoma, *Claire V. Eagan, J.*, 2005 WL 5654220, and the United States District Court for the District of Kansas, 2006 WL 288705, dismissed complaints, and NPMs appealed. Appeals were consolidated.

**Holdings:** The Court of Appeals, Ebel, Circuit Judge, held that:

- (1) amendments did not constitute per se violations of Sherman Act;
- (2) amendments did not violate manufacturers' First Amendment rights;
- (3) amendments did not violate manufacturers' equal protection rights;
- (4) amendments did not violate manufacturers' procedural due process rights; and
- (5) amendments did not violate Commerce Clause.

Affirmed.

#### 1. States ⇌18.3

Congress has authority, in exercising its Article I powers, to preempt state law. U.S.C.A. Const. Art. 1, § 1 et seq.

#### 2. States ⇌18.5

Even if Congress has not occupied field, state law is nevertheless preempted to extent it actually conflicts with federal law, that is, when compliance with both state and federal law is impossible, or when state law stands as obstacle to accomplishment and execution of full purposes and objectives of Congress.

#### 3. Federal Courts ⇌776, 802

Court of Appeals reviews summary judgment decisions de novo, viewing record in light most favorable to parties opposing motion. Fed.Rules Civ.Proc.Rule 56(c), 28 U.S.C.A.

#### 4. Antitrust and Trade Regulation ⇌531

##### States ⇌18.84

Party may successfully enjoin enforcement of state statute as being preempted by federal antitrust laws only if statute on its face irreconcilably conflicts with federal antitrust policy. Sherman Act, § 1, 15 U.S.C.A. § 1.

# Appendix D

the Court of Appeals of Ohio, Lorain County, denied.



1

**James E. PIETRANGELO, II, petitioner, v. Robert M. GATES, Secretary of Defense, et al.**

**No. 08-824.**

June 8, 2009.

Case below, 528 F.3d 42.

Motion of petitioner to strike the brief of the Cook respondents denied. Motion of petitioner to seal Attachment A to the motion to strike granted. Motion of the Cook respondents to withdraw the brief filed January 26, 2009, granted. Petition for writ of certiorari to the United States Court of Appeals for the First Circuit denied.



2

**NAVAJO NATION, et al., petitioners, v. UNITED STATES FOREST SERVICE, et al.**

**No. 08-846.**

June 8, 2009.

Case below, 535 F.3d 1058.

Petition for writ of certiorari to the United States Court of Appeals for the Ninth Circuit denied.



3

**George DIX, petitioner, v. UNITED PARCEL SERVICE, INC.**

**No. 08-8142.**

June 8, 2009.

Case below, 279 Fed.Appx. 816.

Petition for writ of certiorari to the United States Court of Appeals for the Eleventh Circuit denied.



4

**Donal McLean SNYDER, et al., petitioners, v. UNITED STATES.**

**No. 08-894.**

June 8, 2009.

Case below, 296 Fed.Appx. 399.

Petition for writ of certiorari to the United States Court of Appeals for the Fifth Circuit denied.



5

**Robert Jared SMITH, aka J. Dog, petitioner, v. UNITED STATES.**

**No. 08-8197.**

June 8, 2009.

On petition for writ of certiorari to the United States Court of Appeals for the Fourth Circuit. Motion of petitioner for leave to proceed *in forma pauperis* and petition for writ of certiorari granted. Judgment vacated, and case remanded to the United States Court of Appeals for the Fourth Circuit for further consideration in

# Appendix E

**TITLE 42 - THE PUBLIC HEALTH AND WELFARE  
CHAPTER 21B - RELIGIOUS FREEDOM RESTORATION**

**§ 2000bb–1. Free exercise of religion protected**

**(a) In general**

Government shall not substantially burden a person’s exercise of religion even if the burden results from a rule of general applicability, except as provided in subsection (b) of this section.

**(b) Exception**

Government may substantially burden a person’s exercise of religion only if it demonstrates that application of the burden to the person—

- (1) is in furtherance of a compelling governmental interest; and
- (2) is the least restrictive means of furthering that compelling governmental interest.

**(c) Judicial relief**

A person whose religious exercise has been burdened in violation of this section may assert that violation as a claim or defense in a judicial proceeding and obtain appropriate relief against a government. Standing to assert a claim or defense under this section shall be governed by the general rules of standing under article III of the Constitution.

(Pub. L. 103–141, § 3, Nov. 16, 1993, 107 Stat. 1488.)

# Appendix F

**Direct Delivered  
Reclaimed Water Agreement**

Place of Use Jd. No. 28

This agreement ("Agreement") is made and entered into this 8<sup>th</sup> day of August, 2014, by and between the City of Flagstaff Utilities Director on behalf of the City of Flagstaff ("City"), and

<b>CUSTOMER/BUYER</b>	<b>Arizona Snowbowl Resort Limited Partnership ("Buyer")</b>
<b>ADDRESS:</b>	<b>P.O. Box 40, 14 miles NW of Flagstaff</b>
<b>CITY - STATE - ZIP:</b>	<b>Flagstaff, AZ 86002</b>

**WHEREAS**, Buyer is a current reclaimed water customer of the City, and Buyer desires to continue purchasing reclaimed water for purposes that do not require potable water quality under City, State, or Federal regulations; and

**WHEREAS**, the City has authority under A.R.S. §9-511(A), and Flagstaff City Code Section 7-02-001-0024 to enter into an agreement to sell reclaimed water to Buyer; and

**WHEREAS**, the City and Buyer entered into a Reclaimed Wastewater Agreement on March 20, 2002; and

**WHEREAS**, the City and Buyer entered into a First Amendment of the Reclaimed Wastewater Agreement on January 20, 2004 (the Reclaimed Wastewater Agreement and First Amendment thereto are hereinafter defined as "Original Agreement"); and

**WHEREAS**, the City owns and operates a treatment and delivery system (Rio de Flag Water Reclamation Plant ("WRP") and/or Wildcat Hill Wastewater Treatment Plant) which is capable of delivering to Buyer reclaimed water that meets quality standards applicable to snowmaking as set forth in Arizona Administrative Code, Title 18, Chapter 11. Article 3, Reclaimed Water Quality Standards; and

**WHEREAS**, the City owns and operates a public reclaimed water pipeline from the WRP to the City's Meter Vault within Thorpe Park; and

**WHEREAS**, Buyer has constructed, owns, operates, and maintains a private reclaimed water distribution system from the City's Meter Vault to the Buyer's property ("Buyer Reclaimed Water Facilities").

**NOW THEREFORE**, in consideration of the mutual covenants set forth herein, the City hereby agrees to sell and Buyer hereby agrees to purchase reclaimed water from the City, subject to the following terms and conditions

- 1. Termination and Replacement of Original Agreement.** The Original Agreement is hereby terminated and replaced in its entirety by this Agreement.
- 2. Place of Use.** Reclaimed water delivered by the City under this Agreement shall be stored and used by Buyer on the following described property ("the Property"), for the use described in paragraph 3 below:

<b>BUYER:</b>	Arizona Snowbowl Resort Limited Partnership
<b>ADDRESS:</b>	P.O. Box 40, 14 miles NW of Flagstaff
<b>CITY - STATE - ZIP:</b>	Flagstaff, AZ 86002
<b>PHONE:</b>	(928) 779-1951 xll2 or (928) 853-6064
<b>LOCAL CONTACT PERSON:</b> (for notice hereunder)	J.R. Murray
<b>E-MAIL ADDRESS:</b>	jrmurray@arizonasnowbowl.com

Arizona Snowbowl Resort Limited Partnership - Site 28		P.O. Box 40, 14 miles NW of Flagstaff	
<b>TOWNSHIP:</b> T22N T22N T23N T23N		<b>RANGE, SECTION:</b> R6E, SEC I R7E, SEC 5,6 R6E, SEC 36 R7E, SEC 31, 32	
<b>LONGITUDE:</b>	<b>LATITUDE:</b>	<b>APPROX ACRES:</b>	<b>TYPE OF REUSE:</b>
111° 42' 34"	N35° 19' 50"	206	Snowmaking

<b>CITY:</b>	City of Flagstaff
<b>ADDRESS:</b>	211 W. Aspen Ave.
<b>CITY - STATE - ZIP:</b>	Flagstaff, AZ 86001
<b>PHONE:</b>	(928) 213-2400
<b>LOCAL CONTACT PERSON:</b> (for notice hereunder)	Brad Hill
<b>E-MAIL ADDRESS:</b>	bhill@flagstaffaz.gov

3. **Intended Use/Quality Standards.** Buyer intends to use the reclaimed water delivered by the City for the purpose of snowmaking ("Intended Use"). If required, the Buyer is responsible for conducting all testing and analysis of the reclaimed water at the Point of Delivery (defined below) to ensure that it meets all applicable standards under City, State, and Federal law and is of adequate quality for Buyer's Intended Use. City is not obligated and shall not be required under this Agreement to meet standards higher than those imposed pursuant to City, State, or Federal requirements.

4. **Point of Delivery/Maintenance Obligations.** The City shall deliver the reclaimed water contemplated by this Agreement to the existing lower pump house located within Thorpe Park, 191 Thorpe Road, Flagstaff, Arizona ("Point of Delivery"). Buyer agrees that it shall accept, test (if required) and measure the reclaimed water at the Point of Delivery. The Point of Delivery consists of a vault, pit, meter, valves, and other appurtenances necessary to meter reclaimed water (collectively, the "Meter Vault"). The City shall be responsible for maintaining and operating the public reclaimed water system, up to and including the meter Vault. Buyer shall be responsible for maintaining and operating all mechanical items and associated equipment with the Buyer Reclaimed Water Facilities from the Meter Vault to the Property, including any and all areas where Buyer directly or indirectly uses reclaimed water (collectively the "Place of Use"). The Parties further agree that the City shall be responsible for meeting all applicable obligations for the reclaimed water while the reclaimed water is within the Meter Vault; and that the Buyer shall be responsible for meeting all applicable obligations from the point where the reclaimed water leaves the Meter Vault and enters the Buyer Reclaimed Water Facilities, and to any and all Places of Use.
5. **Reclaimed Water Delivery Schedule.** The Parties agree that the City shall deliver reclaimed water at the Point of Delivery during the months of November, December, January and February ("Seasonal Months"), at the following total maximum peak day rate of 1.5 million gallons. Upon approval of the Utilities Director, maximum peak day rate may be increased up to but not exceed 2.25 million gallons per day. The Parties further agree that the City shall not be obligated to deliver reclaimed water on an annualized basis in excess of 552 acre-feet/year. Buyer acknowledges that during the Seasonal Months, the City will incur certain costs in the provision of such reclaimed water, such associated costs in an amount calculated based on the City's provision of 138 acre-feet of reclaimed water per year (even if Buyer takes less than 138 acre-feet of water per year). Therefore, even in the event that Buyer takes less than 138 acre-feet of reclaimed water per year, in consideration for the City incurring associated costs, Buyer shall pay City for City's associated costs as calculated based on the City's provision of 138 acre-feet of reclaimed water per year. This amount shall be known as the "Annual Minimum Payment."
6. **Commodity and Monthly Rate.** After satisfaction of the Annual Minimum Payment, payable in three (3) equal payments in the months of December, January and February, the rate to be paid by Buyer for reclaimed water delivered by the City under this Agreement in excess of 138 acre feet shall be the standard rate that is applicable to Commercial, no main extension, outside city rates for reclaimed water at the time, date, and place of delivery, all as set forth in Title 7 of the Flagstaff City Code. Nothing herein shall excuse Buyer from payment of service or other charges, such as the base monthly service charge, as are applicable to the time, place, or manner of service and delivery.
7. **Costs to Buyer.** All cost and expense arising from or related to the use of reclaimed water by Buyer, including, but not limited to those associated with the construction, maintenance, and operation of the reclaimed water delivery system on the Property, shall be the sole responsibility and obligation of Buyer.
8. **Compliance with Regulations.** In connection with its duties and obligations under this Agreement, Buyer, at its sole cost and expense, shall comply with all Federal, State and local laws, regulations, ordinances, permits and standards that now exist, and as may be enacted in the future, including those that pertain to the use, handling and distribution of reclaimed water. Such laws, regulations, ordinances and standards may include, but not be limited to, requirements and restrictions governing use of reclaimed water; limits on reclaimed water contact with residents, guests, invitees, employees, members of the public, and adjoining properties; control of access to reclaimed water, its delivery system, and the area of storage and use; and warning signs on Buyer's reclaimed water delivery system, and in the area of on-site storage and use of reclaimed water on the Property. All deliveries

of reclaimed water by the City to the Point of Delivery shall be made in accordance with the City's ordinances, rules, and regulations.

**9. Buyer's Responsibilities.**

The Buyer shall comply with all applicable City, State, and Federal standards now or in the future, pertaining to the use of reclaimed water, including but not limited to:

a) The Buyer shall provide and install sufficient signage as required by State law for reclaimed water use. Such signs shall be prominently displayed at each reuse site. Said signs shall be placed at a minimum at all logical points of entry to each reuse site, at the entrance to all lakes and ponds at each reuse site, at all plumbing outlets, and at all hose bibs providing reclaimed water or other locations as required by the City's permits with ADEQ.

b) The Buyer shall prevent reclaimed water from standing on open access areas during normal periods of use.

c) The Buyer shall prevent reclaimed water from coming into contact with drinking fountains, water coolers, or eating areas.

d) The Buyer shall secure hose bibs discharging reclaimed water to prevent use by the public.

e) The Buyer shall take such other precautions as may be prudent to retain reclaimed water within the Place of Use.

**10. Continuation of Service.** Continuation of service after the expiration of this Agreement is within the City's sole discretion, and is subject to the City's inspection of Buyer's on-site reclaimed water storage and reuse system in order to verify the installation of proper backflow prevention equipment, signage, and any other applicable requirements for the storage and use of reclaimed water including all applicable City, State, and Federal requirements.

**11. Duration and Termination of Service.** The duration of this Agreement shall be twenty (20) years from August 8, 2014 to August 7, 2034.

**12. Potential Disruption of Service.** Buyer hereby agrees and acknowledges the possibility that the City may be required to permanently or temporarily terminate, in whole or in part, delivery of reclaimed water to the Buyer for any number of reasons, including, but not limited to emergency conditions, water quality or other regulatory issues, peak demands, insufficient water supply, or planned system maintenance. The City will use its best efforts to provide advance notice to Buyer of any permanent or temporary termination of reclaimed water delivery. Buyer shall be solely responsible for any damage that may be caused to Buyer-owned facilities by such permanent or temporary termination in the reclaimed water delivery. In the event of an emergency which requires the City to temporarily suspend or curtail delivery of reclaimed water to Buyer, Buyer understands and agrees that the City will turn off the Meter Valve at the Point of Delivery. In order to accommodate peak demand periods or planned maintenance of the public reclaimed water delivery system, the City shall provide Buyer with at least twenty-four (24) hour notice of the need to completely cease reclaimed water usage, or to reduce the volume of reclaimed water used at the Property. Upon receiving such notice, Buyer shall alter Buyer's reclaimed water usage in accordance with the City's request.

**13. Resale or Off-Site Use of Reclaimed Water Prohibited.** Buyer shall not, without the express

written permission of the City Manager, deliver, use, or resell reclaimed water, either directly or indirectly, off-Property or to any other person or entity, or use the reclaimed water for any purpose other than the Intended Use.

14. **Inspection.** Buyer acknowledges and agrees that, in order to verify compliance with this Agreement and with all applicable laws and regulations, the City, State, County or other agency with jurisdiction may inspect the Property being served with reclaimed water at any reasonable time.
15. **Successors and Assigns.** The Agreement shall be binding upon the successors and assigns of the City and the Buyer, and may be assigned or transferred by either Party with the prior consent of the other Party, which consent shall not be unreasonably withheld, conditioned or delayed. The Party seeking to assign or transfer shall give the other Party thirty days written notice of its intent to assign or transfer. If no response is made within the thirty day period, the lack of a response will be deemed to be consent to the assignment or transfer. The assigning or transferring Party shall be released from any and all liabilities and/or obligations and/or performance arising, accruing or occurring under this Agreement after the time of that assignment or transfer and the other Party shall look solely to the assignee or transferee with respect to any such liabilities and/or obligations and/or performance under this Agreement.
16. **Cancellation for Conflict of Interest.** This Agreement is subject to the cancellation provisions of A.R.S. §38-511.
17. **Insurance.** Buyer shall maintain during the term of this Agreement, and during any renewal term of this Agreement, general liability insurance in the minimum amount of Two Million Dollars (\$2,000,000.00) to cover any liability arising from the acts and omissions of Buyer, its officers, employees, or agents. The City shall be identified as an additional insured on any such policy. Buyer shall provide the City with a current certificate of insurance with respect to such coverage and conditions.
18. **Indemnification.** Buyer agrees to indemnify the City, and its past, present and future officers, officials, agents, representatives, employees, successors and assigns ("City Indemnitees") from all damages, losses, costs and expenses (including reasonable attorneys' fees and litigation expenses) regarding Buyer's use or handling of the reclaimed water purchased pursuant to this Agreement. This indemnity obligation begins following Buyer's acceptance of the water at the Point of Delivery. Buyer's indemnity obligation pursuant to this paragraph shall not include -any damages, losses, costs and expenses resulting from the City Indemnitees' own negligence (active or passive), failure to comply with any federal, state, or local law, statute, ordinance, rule, regulation or court decree, or breach of the City's obligations under this Agreement. The City Indemnitees agree to provide notice to Buyer of any formal legal action instituted in a federal or state court of law for which they seek indemnity no later than thirty (30) business days after City's receipt of the formal legal action instituted in a federal or state court of law.
19. **Excusable Non-Performance.** In the event of an act of God, natural catastrophe, war, civil insurrection, accident, act of governmental or judicial bodies other than the City, the failure of either Party to perform its obligation under this Agreement shall be excused for so long as the condition interfering with performance continues. The maintenance and operation of the City's sewage system and of the City's wastewater treatment plants shall be solely within the discretion of the City, and, in the event the City discontinues operation of its sewage treatment plant, or does not retain legal authority to provide reclaimed water or recovered reclaimed water, as the case may be, all obligations of either Party to perform under this Agreement shall terminate without prejudice to any claims or causes of action existing prior to such termination of this Agreement.

## 20. Default

- 20.1 Buyer's Default and City's Remedies.** The Buyer shall be in default under this Agreement if the Buyer: (i) fails to pay within ten (10) days of when due any sum or other payment required to be paid to the City by the Buyer under this Agreement; (ii) fails to perform or observe any other covenant, agreement or condition which the Buyer is required to perform or observe or breaches any other provision of this Agreement, and such failure or breach is not cured within thirty (30) days after delivery of written notice to the Buyer of such failure or breach; (iii) is named as a debtor in any voluntary or involuntary bankruptcy proceeding; (iv) places substantially all of the Buyer's assets in receivership or causes or allows substantially all of the Buyer's assets to be subject to attachment or other judiciary seizure; or (v) makes or suffers a general assignment for the benefit of creditors. In the event that the failure or breach cannot be cured within thirty (30) days, the Buyer shall cure such failure or breach expeditiously or shall be in default.
- 20.2 City's Default and Buyer's Remedies.** The City shall be in default under this Agreement if the City fails to perform or observe any covenant, agreement or condition which the City is required to perform or observe, or breaches any other provision of this Agreement, and such failure is not cured within thirty (30) days after delivery of written notice to the City of such failure. In the event that the failure or breach cannot be cured within thirty (30) days, the City shall cure such failure or breach expeditiously or shall be in default.
- 21. Entire Agreement.** This Agreement constitutes the entire agreement between the Parties pertaining to the subject matter of this Agreement, and all prior and contemporaneous agreements, representations, negotiations and understandings of the Parties, oral or written, are hereby superseded and replaced by this Agreement.
- 22. Governing Law.** This Agreement shall be governed by and construed under the laws of the State of Arizona, and venue for any action under this Agreement shall be Coconino County, Arizona.
- 23. Waiver.** Any waiver granted by either Party shall not be deemed effective except when specified in the waiver, in writing, and executed by the Party against whom enforcement of the waiver is sought. No waiver by any Party of a breach of any of the terms, covenants or conditions of this Agreement shall be construed or held to be a waiver of any other breach of this Agreement or any other term, covenant or condition contained in this Agreement.
- 24. No Third Party Beneficiaries.** The Parties acknowledge and agree that the terms, provisions and conditions of this Agreement are for the sole benefit of, and may be enforceable solely by, the Parties to this Agreement, and none of the terms, provisions, conditions and obligations of this Agreement are for the benefit of, or may be forced by, any person not a party to this Agreement.
- 25. Severability.** In the event that any phrase, clause, sentence, paragraph, section or other portion of this Agreement becomes illegal, invalid or against public policy for any reason, or is held by any court of competent jurisdiction to be illegal, invalid or against public policy, the remaining portions of this Agreement shall not be affected thereby and shall remain in force and effect to the fullest extent permitted by law.
- 26. Venue and Attorneys' Fees.** Except as otherwise agreed by the Parties, any litigation brought by either Party against the other to enforce the provisions of this Agreement must be filed in the Coconino County Superior Court. In the event any action at law or in equity is instituted between the

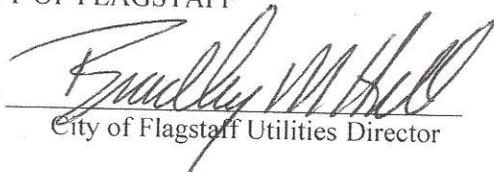
Parties in connection with this Agreement, the prevailing Party in the action will be entitled to its costs including reasonable attorneys' fees and court costs from the non-prevailing Party, as well as expenses incurred in connection with the prosecution or defense of such action.

27. **Modification of Agreement.** This Agreement may be amended at any time by written amendment executed by both Parties. No modification of this Agreement shall be deemed effective unless in writing and signed by the Parties.
28. **Dispute Resolution.** In the event that a dispute arises out of or relates to this Agreement and such dispute cannot be settled through negotiation, the Parties shall first attempt to resolve the dispute in good faith by mediation before resorting to litigation or some other dispute resolution procedure. Mediation shall be self-administered and conducted under the CPR Mediation Procedures established by the CPR Institute for Dispute Resolution, 366 Madison Avenue, New York, NY 10017, (212) 949-6490, www.cpradr.org, with the exception of the mediator selection provisions, unless other procedures are agreed upon by the Parties. Unless the Parties agree otherwise, the mediator(s) shall be selected from panels of mediators trained under the Alternative Dispute Resolution Program of the Coconino County Superior Court. Each Party shall bear its own costs in mediation. The Parties shall not be obligated to mediate if an indispensable Party is unwilling to join the mediation. This mediation provision shall not constitute a waiver of the Parties' right to initiate legal action if a dispute is not resolved through good faith negotiation or mediation.
29. **Authorization.** The Parties to this Agreement represent and warrant that the persons executing this Agreement have full authority to bind the respective Parties to all of the terms and provisions of this Agreement.
30. **Captions.** The captions used in this Agreement are for convenience only, are not a part of this Agreement and do not in any way limit or amplify this Agreement's terms and provisions.
31. **Construction of Agreement.** This Agreement has been arrived at by fair negotiation and shall not be construed against either Party.
32. **Counterparts.** This Agreement may be executed in multiple counterparts, each of which shall constitute an original, but all of which together shall constitute one and the same instrument. The signature pages from one or more counterparts may be removed from the counterparts and attached to a single instrument so that the signatures of all Parties may be physically attached to a single document.
33. **Notice.** Notice hereunder shall be hand-delivered or delivered by postage prepaid first class U.S. mail to the "Local Contact Person" listed under paragraph 2 above, and sent by email to the same person. Notice shall be effective upon actual receipt by the Local Contact Person.

APPROVED and EXECUTED this 8<sup>th</sup> day of August, 2014.

CITY OF FLAGSTAFF

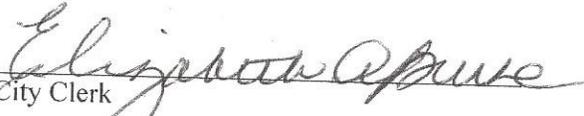
By:

  
City of Flagstaff Utilities Director

ARIZONA SNOWBOWL RESORT LIMITED PARTNERSHIP  
EGB Enterprises, Inc., General Partner

By:   
Eric G. Borowsky  
Its President

Attest:

  
City Clerk

Approved as to form:

  
City Attorney

# Appendix G



July 22, 2014

Brad Hill  
Utilities Director  
City of Flagstaff  
211 W. Aspen  
Flagstaff, AZ 86001

Dear Mr. Hill,

This letter shall serve as our request for a new twenty year Direct Delivered Reclaimed Water Agreement with the City of Flagstaff. The current agreement originated on March 20, 2002 for a term of twenty years. Arizona Snowbowl has fulfilled the obligations required by both the City of Flagstaff and ADEQ.

We request a new twenty year agreement for the following reasons: 1) financial lenders are expecting more certainty with respect to the term and renewal of the current water agreement, 2) ski area owners expect to invest substantial amounts of additional capital and they need the certainty of a longer agreement, 3) the new Agreement provides benefits to the City of Flagstaff, 4) the City of Flagstaff has recently approved a new water policy. It is in both parties interest to move forward utilizing the new policy strategies.

Please let me know if you need any additional information from the Arizona Snowbowl to allow the City of Flagstaff to issue a new twenty year Direct Delivered Reclaimed Water Agreement.

Thank you for your cooperation in this matter.

Sincerely,

J.R. Murray  
General Manager

# Appendix H



# Appendix I

**RECLAIMED WASTEWATER AGREEMENT**

THIS RECLAIMED WASTEWATER AGREEMENT ("Agreement") is made and entered into this 20<sup>th</sup> day of Mar, 2002, by and between the City of Flagstaff, Arizona ("City"), a municipal corporation of the State of Arizona, 211 West Aspen Avenue, Flagstaff, Arizona 86001, and Arizona Snowbowl Resort Limited Partnership, P.O. Box 40, Flagstaff, Arizona 86002 ("End User").

**RECITALS**

End User desires to purchase treated sewage effluent ("Reclaimed Wastewater") from the City of Flagstaff Wastewater Treatment Plant(s) to be used for snowmaking at the Arizona Snowbowl ski area situated outside the City of Flagstaff, in unincorporated Coconino County, Arizona.

The City desires to sell Reclaimed Wastewater to End User pursuant to the terms and conditions set forth below.

NOW, THEREFORE, in consideration of the mutual covenants contained in this Agreement, the Parties agree as follows:

**AGREEMENT**

**1. DEFINITIONS.**

**DIRECT REUSE** - Means the beneficial use of Reclaimed Wastewater for a purpose allowed by the Arizona Administrative Code, Title 18, Chapter 9, Article 7.

**EFFLUENT** - Means wastewater that has completed its passage through a wastewater treatment process.

**OPEN WATER CONVEYANCE** - Means any constructed waterway which is open to the elements, including canals and laterals that transport Reclaimed Wastewater from a sewage treatment facility to a Reclaimed Wastewater blending facility or from a sewage treatment facility or Reclaimed Wastewater blending facility to the point of land application or end use. An Open Water Conveyance does not include waters of the United States.

**PIPELINE CONVEYANCE** - Means any completely enclosed system of pipelines that transports Reclaimed Wastewater from a sewage treatment facility to a Reclaimed Wastewater blending facility or from a sewage treatment facility or Reclaimed Wastewater blending facility to the point of land application or end use.

**POINT OF DELIVERY** – Means a location designated by the City for measuring and transferring Reclaimed Wastewater to End User. The Point of Delivery may include a vault, pit, meter, valves, and other appurtenances necessary to measure and transfer Reclaimed Wastewater to End User.

**POTABLE WATER** – Means water that does not contain pollution, contamination, objectionable minerals, or infective agents and is considered suitable for drinking by humans.

**RECLAIMED WASTEWATER** – Means Effluent which meets the standards for the specific reuses contained in the Arizona Administrative Code, Title 18, Chapter 9, and which is produced at the City's wastewater treatment plants.

2. **PURCHASE AND SALE.** End User agrees to purchase from the City Reclaimed Wastewater produced at the City's wastewater treatment plants, which Reclaimed Wastewater is to be used for snowmaking purposes on ski areas as further described in this Agreement; and the City agrees to sell Reclaimed Wastewater to End User in accordance with the terms and conditions set forth below.

3. **REGULATIONS AND DELIVERIES.** All deliveries of Reclaimed Wastewater shall be made in accordance with the City's ordinances, rules and regulations. End User shall obtain any additional city, state or federal permits which may be required for the use of Reclaimed Wastewater for snowmaking purposes. As a courtesy and not as an obligation, the City shall endeavor to inform End User of any such permit requirements known to the City. End User shall use the Reclaimed Wastewater in accordance with all applicable federal laws, including, but not limited to, the regulations of the Environmental Protection Agency, and in accordance with all applicable laws of the State of Arizona, including, but not limited to, the rules and regulations of the Arizona Department of Environmental Quality ("ADEQ"). In the event any such laws, rules or regulations shall be amended in the future so as to make it impossible or infeasible for End User to use the Reclaimed Wastewater, End User, at its option, shall have the right to terminate this Agreement by giving thirty (30) days' prior notice in writing to the City. End User shall comply with all of the conditions of the City's Reclaimed Wastewater Reuse Permit issued by the State of Arizona to the City. In addition, End User shall strictly comply with all of the following requirements:

- a. All hose bibs discharging Reclaimed Wastewater shall be secured to prevent any use by the public.
- b. All pipe carrying Reclaimed Wastewater shall be color-coded, buried with colored tape or otherwise suitably marked to indicate nonpotable water.

- c. All snowmaking with Reclaimed Wastewater shall be conducted only at such times as to minimize contact with the public and to keep all snowmaking areas reasonably dry and free from standing or ponding water during normal usage.
- d. Provide and install sufficient signage reading "Snow made with Reclaimed Wastewater, do not eat the snow or drink melted snow" or similar warnings. Such signs shall be prominently displayed at each reuse site. Such signs shall be placed at all logical points of entry to each reuse site, at the entrance to all lakes and ponds at each reuse site, at all plumbing outlets and at all hose bibs providing Reclaimed Wastewater.
- e. No drinking water fountains, potable water hose bibs or private residences shall be exposed to the mist from snowmaking activities.

4. RECLAIMED WASTEWATER QUALITY. The City hereby agrees to provide Reclaimed Wastewater under this Agreement that meets the quality requirements of its Reclaimed Wastewater Reuse Permit issued by ADEQ to the City. The City represents that it is now in compliance, and shall attempt to remain in compliance, with all regulatory and health and water laws, rules and regulations applicable to wastewater discharge. End User acknowledges and agrees that the Reclaimed Wastewater supplied under this Agreement is not intended or offered for potable use. Reclaimed Wastewater delivered under this Agreement shall not be directly or indirectly utilized or transferred for any uses other than snowmaking on ski areas without the prior written consent of the City. End User shall not be obligated to accept delivery of or to pay for inadequately treated Reclaimed Wastewater which cannot, as received, be lawfully used for snowmaking on ski areas in accordance with the rules and regulations of ADEQ. End User assumes all risks and liabilities in connection with End User's use of Reclaimed Wastewater which, at the Point of Delivery, meets all of the quality requirements of the City's Reclaimed Wastewater Reuse Permit described above. End User agrees that its remedies against the City for any breach of this Agreement by the City are limited to End User's right of refusal to accept delivery of Reclaimed Wastewater.

5. RESPONSIBILITY FOR DAMAGE. The City shall not be liable for any damage to End User or its property arising out of or resulting from any curtailment, interruption or apportionment of the supply of Reclaimed Wastewater occasioned by repairs or maintenance of the City's sewerage system, or from any threatened or actual Reclaimed Wastewater shortage or any other causes beyond the City's control.

6. CONTRACT TERM. The term of this Agreement shall be for a period of five (5) years from the effective date as indicated above. End User may request renewal of this Agreement for three (3) additional five (5) year periods by notifying the City thereof, in writing, at least forty-five (45) days prior to the expiration of the current term of this Agreement, or any renewal term of this Agreement. The Parties' renewal of this Agreement shall be contingent upon End User fulfilling all of its obligations under this

Agreement, and upon the City's ability to renew the City's Reclaimed Wastewater Reuse Permit from ADEQ. The terms and conditions of any renewal term of this Agreement shall be subject to change upon mutual agreement between the Parties, if desired, and shall be subject to any city, state and federal laws, rules or regulations in effect at the time of renewal.

This Agreement is contingent upon End User obtaining all necessary federal and state environmental approvals to proceed with snowmaking with Reclaimed Wastewater at the designated ski area. This Agreement shall become null and void two years from the date of its execution by both Parties in the event that End User is unable to obtain all necessary federal and state environmental approvals for the subject snowmaking activity. In the event that End User has not obtained all necessary federal and state environmental approvals within two years from the date of execution of this Agreement, and the Parties hereto mutually agree that End User has made substantial progress toward obtaining said approvals by the end of said two year time period, the Parties may mutually agree to extend the time period for obtaining such final approvals for an additional two years from the expiration date of the initial two year period. The Parties' agreement to such an extension shall be in writing and shall be fully executed by the Parties as a formal amendment to this Agreement.

7. RECLAIMED WASTEWATER RATE. End User agrees to pay the City for the treatment and delivery of all Reclaimed Wastewater accepted by End User at the Point of Delivery. The rate shall be that rate established by the Flagstaff City Council and set forth in the City Code of Flagstaff, Arizona. For the term of this Agreement, and any renewal hereof, the rate shall not exceed, on a per gallon basis, seventy-five percent (75%) of the then current commodity rate charged by the City for the sale of potable water used on the applicable property. End User shall pay any applicable taxes, fees or surcharges that any regulatory agencies may impose on the use of Reclaimed Wastewater obtained by End User at the Point of Delivery.

8. DEFAULT. In the event that End User shall fail to make any payments under this Agreement when due or within ten (10) days thereafter, or fails to meet any other terms of this Agreement, the City may terminate this Agreement upon giving thirty (30) days' notice in writing to End User. In the event that End User shall make all payments in default within thirty (30) days of such notice, or shall promptly correct its failure to meet the terms of this Agreement as determined by the City, this Agreement shall remain in full force and effect. The City's right to terminate this Agreement as set forth above notwithstanding, in the event End User fails to make all payments in default or to fulfill any of the other terms of this Agreement, the City may immediately suspend delivery of Reclaimed Wastewater to End User until or unless any such defaults are adequately cured as determined by the City.

9. INSURANCE. End User shall maintain during the term of this Agreement, and during any renewal term of this Agreement, general liability insurance in the minimum amount of One Million Dollars (\$1,000,000.00) to cover any liability arising from the acts and omissions of End User, its officers, employees or agents. The City shall be named as an additional insured on any such policy, and the policy may not be cancelled without at least thirty (30) days' prior written notice to the City. Prior to the delivery of any Reclaimed Wastewater by the City under this Agreement, or any renewal term of this Agreement, End User shall provide the City with a current certificate of insurance with respect to such coverage and conditions. In the event that End User fails to provide such insurance coverage at any time during the term of this Agreement, or any renewal term of this Agreement, End User shall be considered in material breach hereof and the City may, after thirty (30) days' written notice to End User, suspend delivery of Reclaimed Wastewater to End User and terminate this Agreement unless such insurance coverage has been restored within said thirty (30) day notice period.

10. USE OF RECLAIMED WASTEWATER BY OTHERS. End User agrees that this Agreement shall not in any way restrict the right of the City to use Reclaimed Wastewater for any City operations or to sell Reclaimed Wastewater to other non-Party users.

11. AMOUNT OF EFFLUENT. The City's wastewater treatment plants shall endeavor to produce sufficient Reclaimed Wastewater to fairly meet the demands of all users thereof. Accordingly, the amount of Reclaimed Wastewater delivered to End User under this Agreement shall be limited to a maximum flow of 1.5 million gallons per day, and such delivery to End User for snowmaking purposes shall take place only during the months of November, December, January, and February. The City expressly reserves the right to sell Reclaimed Wastewater for irrigation and any other appropriate uses during the other months of the year and makes no commitment to End User for the sale of Reclaimed Wastewater during those months.

12. OPERATION, MAINTENANCE AND REPLACEMENT COSTS. The operation, maintenance and replacement costs of the Reclaimed Wastewater conveyance system located downstream from the Point of Delivery shall be the sole responsibility of End User.

13. POINT OF DELIVERY. The Point of Delivery shall be located at a metering site to be determined and mutually agreed upon by the Parties.

14. ACCEPTANCE AND TRANSMISSION OF RECLAIMED WASTEWATER. End User shall assume all costs of, and responsibility for, transportation of Reclaimed Wastewater by means of a conveyance system located downstream from the Point of Delivery. The Reclaimed Wastewater conveyance system located downstream from the Point of Delivery shall be entirely constructed, owned, operated and maintained by End User.

15. PIPELINE CONVEYANCES. Any Reclaimed Wastewater Pipeline Conveyance system or mechanical appurtenance constructed by End User shall meet all of the requirements of the Arizona Administrative Code, R18-9-602, and shall meet any other federal, state, or local requirements that are applicable, or may become applicable, after the effective date of this Agreement.

16. OPEN WATER CONVEYANCES. Any Reclaimed Wastewater Open Water Conveyance system constructed by End User shall meet all of the requirements of the Arizona Administrative Code, R18-9-603, and shall meet any other federal, state, or local requirements that are applicable, or may become applicable, after the effective date of this Agreement.

17. PROTECTION OF POTABLE WATER SYSTEM. End User shall comply with all state backflow prevention requirements for potable water systems for the protection of End User's private potable water system. In the event that potable water is also used for snowmaking purposes at the reuse site, a dye test shall be performed on the reuse system that demonstrates to the satisfaction of the Coconino County Health Department that no cross-connections with End User's potable water system exist. Said dye test shall be successfully performed by End User prior to the delivery of any Reclaimed Wastewater to the reuse site. Said dye test requirement shall not apply to reuse facilities specifically designed to use only Reclaimed Wastewater. A color-coding system shall be used on all new piping and outlets to prevent any accidental cross-connection between End User's potable and reuse water systems. The color code shall conform to all of the standards set forth by the Coconino County Health Department. In the event that a specific Coconino County color code for reuse plumbing does not exist, purple shall be used for all of End User's reuse plumbing.

18. LOCATION OF IMPROVEMENTS. Any future End User Reclaimed Wastewater conveyance line improvements and easements therefor located on City-owned property, shall be designed so as not to interfere with any present or future City operations, and End User's location of any such improvements shall be approved, in advance and in writing, by the City.

19. LIMITATIONS ON USE. End User shall use Reclaimed Wastewater in accordance with the terms and conditions of this Agreement and only within the geographical boundaries of the locations specified below. End User shall not resell Reclaimed Wastewater to any users thereof either within or outside of the geographical boundaries of the locations specified below. Nothing in this Agreement shall obligate End User to purchase or accept Reclaimed Wastewater from the City in the absence of End User's need for snowmaking activities, or in order to prevent End User from properly disposing of Reclaimed Wastewater through End User's drainage facilities. Nothing in this

Agreement shall require the diversion of Reclaimed Wastewater into End User's snowmaking system at such times or in such amount as to interfere with the proper operation and maintenance of such system or to endanger the facilities thereof. End User hereby identifies the specific reuse location subject to this Agreement as the following:

Arizona Snowbowl Resort

Said reuse location shall be shown on a Site Plan prepared by End User to be used as EXHIBIT 1, which exhibit shall be attached to the reuse permit amendment application submitted by the City to ADEQ. Said Site Plan shall identify all snowmaking Reclaimed Wastewater containment structures, stormwater flow paths, and potable water system protection equipment at End User's reuse location. Approval for any extensions of Reclaimed Wastewater pipelines and/or Reclaimed Wastewater uses for irrigation of areas other than those identified on the Site Plan shall be requested in writing by End User and incorporated into this Agreement by amendment along with an amended Site Plan.

**20. PROHIBITED ACTIVITIES.** The following activities are prohibited in accordance with Arizona Administrative Code, R18-9-704:

- A. Providing or using Reclaimed Wastewater for direct human consumption;
- B. Direct Reuse for swimming, wind surfing, water skiing, or other full-immersion water activities with a potential for ingestion;
- C. Direct Reuse for evaporative cooling or misting;
- D. Application of Reclaimed Wastewater to any area other than an approved reuse site;
- E. Allowing runoff of Reclaimed Wastewater or Reclaimed Wastewater mixed with stormwater from a direct reuse site, except for agricultural return flow that is directed onto an adjacent field or returned to an Open Water Conveyance.

**21. SUCCESSORS AND ASSIGNS.** This Agreement shall be binding upon the successors and assigns of the City and End User but shall not be assigned or transferred by End User without the prior written consent of the City. Any approved assignment or transfer of the rights and/or obligations of End User under this Agreement shall require the execution of a binding contract between End User and any approved assignee or transferee.

**22. EXCUSABLE NON-PERFORMANCE.** In the event of an act of God, natural catastrophe, war, civil insurrection, accident, act of governmental or judicial bodies other than the City, the failure of either Party to perform its obligation under this Agreement shall be excused for so long as the condition interfering with performance continues. The

maintenance and operation of the City's sewerage system and of the City's wastewater treatment plants shall be solely within the discretion of the City, and, in the event the City discontinues the sewage treatment plant operation, or does not retain legal authority to provide Reclaimed Wastewater, all obligations of either Party to perform under this Agreement shall terminate without prejudice to any claims or causes of action existing prior to such termination of this Agreement.

23. CANCELLATION FOR CONFLICT OF INTEREST. This Agreement may be terminated by the City or by End User on the basis of conflict of interest in accordance with Arizona Revised Statutes, Section 38-511.

24. FEES. The City agrees not to charge End User for building inspection, building permits or other fees in connection with End User's construction and installation of any pipes, structures or other appurtenances necessary to accept, distribute and dispose of any Reclaimed Wastewater under this Agreement.

25. DISPUTE RESOLUTION. In the event that a dispute arises out of or relates to this Agreement and such dispute cannot be settled through negotiation, the Parties shall first attempt to resolve the dispute in good faith by mediation before resorting to litigation or some other dispute resolution procedure. Mediation shall be self-administered and conducted under the CPR Mediation Procedures established by the CPR Institute for Dispute Resolution, 366 Madison Avenue, New York, NY 10017, (212) 949-6490, www.cpradr.org, with the exception of the mediator selection provisions, unless other procedures are agreed upon by the Parties. Unless the Parties agree otherwise, the mediator(s) shall be selected from panels of mediators trained under the Alternative Dispute Resolution Program of the Coconino County Superior Court. Each Party shall bear its own costs in mediation. The Parties shall not be obligated to mediate if an indispensable Party is unwilling to join the mediation. This mediation provision shall not constitute a waiver of the Parties' right to initiate legal action if a dispute is not resolved through good faith negotiation or mediation.

26. AUTHORIZATION. The Parties to this Agreement represent and warrant that the persons executing this Agreement have full authority to bind the respective Parties to all of the terms and provisions of this Agreement.

27. CAPTIONS. The captions used in this Agreement are for convenience only, are not a part of this Agreement and do not in any way limit or amplify this Agreement's terms and provisions.

28. CONSTRUCTION OF AGREEMENT. This Agreement has been arrived at by fair negotiation and shall not be construed against either Party.

29. COUNTERPARTS. This Agreement may be executed in multiple counterparts, each of which shall constitute an original, but all of which together shall constitute one and the same instrument. The signature pages from one or more counterparts may be removed from the counterparts and attached to a single instrument so that the signatures of all Parties may be physically attached to a single document.

30. ENTIRE AGREEMENT. This Agreement constitutes the entire agreement between the Parties pertaining to the subject matter of this Agreement, and all prior and contemporaneous agreements, representations, negotiations and understandings of the Parties, oral or written, are hereby superseded and merged into this Agreement, except as expressly provided elsewhere in this Agreement.

31. GOVERNING LAW. This Agreement shall be governed by and construed under the laws of the State of Arizona, and venue for any action under this Agreement shall be Coconino County, Arizona.

32. WAIVER. Any waiver granted by either Party shall not be deemed effective except when specified in the waiver, in writing, and executed by the Party against whom enforcement of the waiver is sought. No waiver by any Party of a breach of any of the terms, covenants or conditions of this Agreement shall be construed or held to be a waiver of any other breach of the same or any other term, covenant or condition contained in this Agreement.

33. NO THIRD PARTY BENEFICIARIES. The Parties acknowledge and agree that the terms, provisions and conditions of this Agreement are for the sole benefit of, and may be enforceable solely by, the Parties to this Agreement, and none of the terms, provisions, conditions and obligations of this Agreement are for the benefit of, or may be enforced by, any person not a Party to this Agreement.

34. SEVERABILITY. In the event that any phrase, clause, sentence, paragraph, section or other portion of this Agreement becomes illegal, invalid or against public policy for any reason, or is held by any court of competent jurisdiction to be illegal, invalid or against public policy, the remaining portions of this Agreement shall not be affected thereby and shall remain in force and effect to the fullest extent permitted by law.

35. MODIFICATION OF AGREEMENT. This Agreement may be amended at any time by written amendment executed by both Parties. No modification of this Agreement shall be deemed effective unless in writing and signed by the Parties.

# Appendix J

***City of Flagstaff***  
***Public Information***  
***Office***



**FOR IMMEDIATE RELEASE**

**Date: March 8, 2012**

**City of Flagstaff Administratively Renews Snowbowl Contract**

The city of Flagstaff Utilities Director has confirmed the administrative renewal of the reclaimed water agreement with Arizona Snowbowl. By way of history:

- A Reclaimed Water Agreement with the Arizona Snowbowl was approved in March of 2002 by the Flagstaff City Council for a period of five (5) years with renewals for three (3) additional five (5) year periods.
  - “Renewal of this agreement shall be contingent upon End User [Snowbowl] fulfilling all of its obligations under this agreement, and upon the City’s ability to renew the City’s Reclaimed Wastewater Reuse Permit from ADEQ” (March 2002 Agreement).
- In July of 2002, the Flagstaff City Council authorized the Utilities Director to approve, execute and enforce all Reclaimed Water Agreements.
- An additional amendment to the March 2002 Reclaimed Water Agreement with Snowbowl was approved on January 20, 2004 providing Snowbowl additional time to acquire their Forest Service approvals.
- The Agreement, as amended, was reviewed and renewed by the Utilities Director in November of 2006 for an additional five (5) year term to run from March 2007 through March 20, 2012.

By agreement, Arizona Snowbowl must submit a request for renewal 45 days prior to expiration. This was received on January 11, 2012.

As noted above, all agreements for reclaimed water are approved, executed and enforced by the Utilities Director. Under the agreement, the Utilities Director will review to ensure that Snowbowl continues to be in compliance and has met all of the obligations of the Agreement.

Those obligations require Snowbowl to obtain all relevant federal and state environmental approvals (such as the federal Environmental Impact Statement ), submit its request for renewal of the agreement in writing at least 45 days prior to the expiration of the current term, and fulfill all of its obligations under the agreement. The City must also renew its Reclaimed Wastewater

Reuse Permit (RWRP) from the Arizona Department of Environmental Quality every five (5) years. The city of Flagstaff has maintained its Type 3 Agent Reclaimed Water General Permit #R106143 with the ADEQ for the benefit of all reclaimed water users served by the City.

Having determined that all obligations have been met by Arizona Snowbowl and the City, the Utilities Director renewed the agreement for a period commencing March 20, 2012 through March 20, 2017. The agreement is subject to Utilities Director review in 2017 for a renewal until March 2022. At that point, the current agreement will expire and any new contract could be subject to City Council approval.

-End -



# City of Flagstaff

March 8, 2012

Mr. J. R. Murray  
General Manager  
Arizona Snowbowl  
P.O. Box 40  
Flagstaff, AZ 86002-0040

**RE: Reclaimed Wastewater Agreement Renewal to March 20, 2017**

Dear Mr. Murray,

The City of Flagstaff has received your letter requesting to renew the reclaimed wastewater agreement dated January 11, 2012. According to the City Attorney's Office & Utilities Division's records, all conditions specified in paragraph 6. CONTRACT TERM have been met. These include the following:

- a. The Arizona Snowbowl submitted a renewal request at least 45 days prior to the expiration of March 20, 2012;
- b. The Arizona Snowbowl has obtained all necessary federal and state environmental approvals to proceed with Reclaimed Wastewater at the designated ski area;
- c. The City of Flagstaff maintains its Type 3 Agent Reclaimed Water General Permit #R106143 with the Arizona Department of Environmental Quality; and
- d. Snowmaking is permissible as per A.A.C. R18-11-309 A. Table A.

Since the Arizona Snowbowl continues to fulfill all of its obligations under the Agreement and in accordance with City Code 7-02-001-0024, this letter shall serve as our understanding that the existing Agreement is renewed for five additional years until March 20, 2017.

Please feel free to contact me at (928) 213-2420 or [bhill@flagstaffaz.gov](mailto:bhill@flagstaffaz.gov) if you have any questions.

Sincerely,

Bradley M. Hill, R.G.  
Utilities Director

RECLAIMED WASTEWATER AGREEMENT

THIS RECLAIMED WASTEWATER AGREEMENT ("Agreement") is made and entered into this 20th day of Mar., 2002, by and between the City of Flagstaff, Arizona ("City"), a municipal corporation of the State of Arizona, 211 West Aspen Avenue, Flagstaff, Arizona 86001, and Arizona Snowbowl Resort Limited Partnership, P.O. Box 40, Flagstaff, Arizona 86002 ("End User").

RECITALS

End User desires to purchase treated sewage effluent ("Reclaimed Wastewater") from the City of Flagstaff Wastewater Treatment Plant(s) to be used for snowmaking at the Arizona Snowbowl ski area situated outside the City of Flagstaff, in unincorporated Coconino County, Arizona.

The City desires to sell Reclaimed Wastewater to End User pursuant to the terms and conditions set forth below.

NOW, THEREFORE, in consideration of the mutual covenants contained in this Agreement, the Parties agree as follows:

AGREEMENT

1. DEFINITIONS.

DIRECT REUSE - Means the beneficial use of Reclaimed Wastewater for a purpose allowed by the Arizona Administrative Code, Title 18, Chapter 9, Article 7.

EFFLUENT - Means wastewater that has completed its passage through a wastewater treatment process.

OPEN WATER CONVEYANCE - Means any constructed waterway which is open to the elements, including canals and laterals that transport Reclaimed Wastewater from a sewage treatment facility to a Reclaimed Wastewater blending facility or from a sewage treatment facility or Reclaimed Wastewater blending facility to the point of land application or end use. An Open Water Conveyance does not include waters of the United States.

PIPELINE CONVEYANCE - Means any completely enclosed system of pipelines that transports Reclaimed Wastewater from a sewage treatment facility to a Reclaimed Wastewater blending facility or from a sewage treatment facility or Reclaimed Wastewater blending facility to the point of land application or end use.

POINT OF DELIVERY – Means a location designated by the City for measuring and transferring Reclaimed Wastewater to End User. The Point of Delivery may include a vault, pit, meter, valves, and other appurtenances necessary to measure and transfer Reclaimed Wastewater to End User.

POTABLE WATER – Means water that does not contain pollution, contamination, objectionable minerals, or infective agents and is considered suitable for drinking by humans.

RECLAIMED WASTEWATER – Means Effluent which meets the standards for the specific reuses contained in the Arizona Administrative Code, Title 18, Chapter 9, and which is produced at the City's wastewater treatment plants.

2. PURCHASE AND SALE. End User agrees to purchase from the City Reclaimed Wastewater produced at the City's wastewater treatment plants, which Reclaimed Wastewater is to be used for snowmaking purposes on ski areas as further described in this Agreement; and the City agrees to sell Reclaimed Wastewater to End User in accordance with the terms and conditions set forth below.

3. REGULATIONS AND DELIVERIES. All deliveries of Reclaimed Wastewater shall be made in accordance with the City's ordinances, rules and regulations. End User shall obtain any additional city, state or federal permits which may be required for the use of Reclaimed Wastewater for snowmaking purposes. As a courtesy and not as an obligation, the City shall endeavor to inform End User of any such permit requirements known to the City. End User shall use the Reclaimed Wastewater in accordance with all applicable federal laws, including, but not limited to, the regulations of the Environmental Protection Agency, and in accordance with all applicable laws of the State of Arizona, including, but not limited to, the rules and regulations of the Arizona Department of Environmental Quality ("ADEQ"). In the event any such laws, rules or regulations shall be amended in the future so as to make it impossible or infeasible for End User to use the Reclaimed Wastewater, End User, at its option, shall have the right to terminate this Agreement by giving thirty (30) days' prior notice in writing to the City. End User shall comply with all of the conditions of the City's Reclaimed Wastewater Reuse Permit issued by the State of Arizona to the City. In addition, End User shall strictly comply with all of the following requirements:

- a. All hose bibs discharging Reclaimed Wastewater shall be secured to prevent any use by the public.
- b. All pipe carrying Reclaimed Wastewater shall be color-coded, buried with colored tape or otherwise suitably marked to indicate nonpotable water.

- c. All snowmaking with Reclaimed Wastewater shall be conducted only at such times as to minimize contact with the public and to keep all snowmaking areas reasonably dry and free from standing or ponding water during normal usage.
- d. Provide and install sufficient signage reading "Snow made with Reclaimed Wastewater, do not eat the snow or drink melted snow" or similar warnings. Such signs shall be prominently displayed at each reuse site. Such signs shall be placed at all logical points of entry to each reuse site, at the entrance to all lakes and ponds at each reuse site, at all plumbing outlets and at all hose bibs providing Reclaimed Wastewater .
- e. No drinking water fountains, potable water hose bibs or private residences shall be exposed to the mist from snowmaking activities.

4. RECLAIMED WASTEWATER QUALITY. The City hereby agrees to provide Reclaimed Wastewater under this Agreement that meets the quality requirements of its Reclaimed Wastewater Reuse Permit issued by ADEQ to the City. The City represents that it is now in compliance, and shall attempt to remain in compliance, with all regulatory and health and water laws, rules and regulations applicable to wastewater discharge. End User acknowledges and agrees that the Reclaimed Wastewater supplied under this Agreement is not intended or offered for potable use. Reclaimed Wastewater delivered under this Agreement shall not be directly or indirectly utilized or transferred for any uses other than snowmaking on ski areas without the prior written consent of the City. End User shall not be obligated to accept delivery of or to pay for inadequately treated Reclaimed Wastewater which cannot, as received, be lawfully used for snowmaking on ski areas in accordance with the rules and regulations of ADEQ . End User assumes all risks and liabilities in connection with End User's use of Reclaimed Wastewater which, at the Point of Delivery, meets all of the quality requirements of the City's Reclaimed Wastewater Reuse Permit described above. End User agrees that its remedies against the City for any breach of this Agreement by the City are limited to End User's right of refusal to accept delivery of Reclaimed Wastewater.

5. RESPONSIBILITY FOR DAMAGE. The City shall not be liable for any damage to End User or its property arising out of or resulting from any curtailment, interruption or apportionment of the supply of Reclaimed Wastewater occasioned by repairs or maintenance of the City's sewerage system, or from any threatened or actual Reclaimed Wastewater shortage or any other causes beyond the City's control.

6. CONTRACT TERM. The term of this Agreement shall be for a period of five (5) years from the effective date as indicated above. End User may request renewal of this Agreement for three (3) additional five (5) year periods by notifying the City thereof, in writing, at least forty-five (45) days prior to the expiration of the current term of this Agreement, or any renewal term of this Agreement. The Parties' renewal of this Agreement shall be contingent upon End User fulfilling all of its obligations under this

Agreement, and upon the City's ability to renew the City's Reclaimed Wastewater Reuse Permit from ADEQ. The terms and conditions of any renewal term of this Agreement shall be subject to change upon mutual agreement between the Parties, if desired, and shall be subject to any city, state and federal laws, rules or regulations in effect at the time of renewal.

This Agreement is contingent upon End User obtaining all necessary federal and state environmental approvals to proceed with snowmaking with Reclaimed Wastewater at the designated ski area. This Agreement shall become null and void two years from the date of its execution by both Parties in the event that End User is unable to obtain all necessary federal and state environmental approvals for the subject snowmaking activity. In the event that End User has not obtained all necessary federal and state environmental approvals within two years from the date of execution of this Agreement, and the Parties hereto mutually agree that End User has made substantial progress toward obtaining said approvals by the end of said two year time period, the Parties may mutually agree to extend the time period for obtaining such final approvals for an additional two years from the expiration date of the initial two year period. The Parties' agreement to such an extension shall be in writing and shall be fully executed by the Parties as a formal amendment to this Agreement.

7. RECLAIMED WASTEWATER RATE. End User agrees to pay the City for the treatment and delivery of all Reclaimed Wastewater accepted by End User at the Point of Delivery. The rate shall be that rate established by the Flagstaff City Council and set forth in the City Code of Flagstaff, Arizona. For the term of this Agreement, and any renewal hereof, the rate shall not exceed, on a per gallon basis, seventy-five percent (75%) of the then current commodity rate charged by the City for the sale of potable water used on the applicable property. End User shall pay any applicable taxes, fees or surcharges that any regulatory agencies may impose on the use of Reclaimed Wastewater obtained by End User at the Point of Delivery.

8. DEFAULT. In the event that End User shall fail to make any payments under this Agreement when due or within ten (10) days thereafter, or fails to meet any other terms of this Agreement, the City may terminate this Agreement upon giving thirty (30) days' notice in writing to End User. In the event that End User shall make all payments in default within thirty (30) days of such notice, or shall promptly correct its failure to meet the terms of this Agreement as determined by the City, this Agreement shall remain in full force and effect. The City's right to terminate this Agreement as set forth above notwithstanding, in the event End User fails to make all payments in default or to fulfill any of the other terms of this Agreement, the City may immediately suspend delivery of Reclaimed Wastewater to End User until or unless any such defaults are adequately cured as determined by the City.

9. INSURANCE. End User shall maintain during the term of this Agreement, and during any renewal term of this Agreement, general liability insurance in the minimum amount of One Million Dollars (\$1,000,000.00) to cover any liability arising from the acts and omissions of End User, its officers, employees or agents. The City shall be named as an additional insured on any such policy, and the policy may not be cancelled without at least thirty (30) days' prior written notice to the City. Prior to the delivery of any Reclaimed Wastewater by the City under this Agreement, or any renewal term of this Agreement, End User shall provide the City with a current certificate of insurance with respect to such coverage and conditions. In the event that End User fails to provide such insurance coverage at any time during the term of this Agreement, or any renewal term of this Agreement, End User shall be considered in material breach hereof and the City may, after thirty (30) days' written notice to End User, suspend delivery of Reclaimed Wastewater to End User and terminate this Agreement unless such insurance coverage has been restored within said thirty (30) day notice period.

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Arizona Snowbowl Resort

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- A. Providing or using Reclaimed Wastewater for direct human consumption;
- B. Direct Reuse for swimming, wind surfing, water skiing, or other full-immersion water activities with a potential for ingestion;
- C. Direct Reuse for evaporative cooling or misting;
- D. Application of Reclaimed Wastewater to any area other than an approved reuse site;
- E. Allowing runoff of Reclaimed Wastewater or Reclaimed Wastewater mixed with stormwater from a direct reuse site, except for agricultural return flow that is directed onto an adjacent field or returned to an Open Water Conveyance.

21. SUCCESSORS AND ASSIGNS. This Agreement shall be binding upon the successors and assigns of the City and End User but shall not be assigned or transferred by End User without the prior written consent of the City. Any approved assignment or transfer of the rights and/or obligations of End User under this Agreement shall require the execution of a binding contract between End User and any approved assignee or transferee.

22. EXCUSABLE NON-PERFORMANCE. In the event of an act of God, natural catastrophe, war, civil insurrection, accident, act of governmental or judicial bodies other than the City, the failure of either Party to perform its obligation under this Agreement shall be excused for so long as the condition interfering with performance continues. The

maintenance and operation of the City's sewerage system and of the City's wastewater treatment plants shall be solely within the discretion of the City, and, in the event the City discontinues the sewage treatment plant operation, or does not retain legal authority to provide Reclaimed Wastewater, all obligations of either Party to perform under this Agreement shall terminate without prejudice to any claims or causes of action existing prior to such termination of this Agreement.

23. CANCELLATION FOR CONFLICT OF INTEREST. This Agreement may be terminated by the City or by End User on the basis of conflict of interest in accordance with Arizona Revised Statutes, Section 38-511.

24. FEES. The City agrees not to charge End User for building inspection, building permits or other fees in connection with End User's construction and installation of any pipes, structures or other appurtenances necessary to accept, distribute and dispose of any Reclaimed Wastewater under this Agreement.

25. DISPUTE RESOLUTION. In the event that a dispute arises out of or relates to this Agreement and such dispute cannot be settled through negotiation, the Parties shall first attempt to resolve the dispute in good faith by mediation before resorting to litigation or some other dispute resolution procedure. Mediation shall be self-administered and conducted under the CPR Mediation Procedures established by the CPR Institute for Dispute Resolution, 366 Madison Avenue, New York, NY 10017, (212) 949-6490, www.cpradr.org, with the exception of the mediator selection provisions, unless other procedures are agreed upon by the Parties. Unless the Parties agree otherwise, the mediator(s) shall be selected from panels of mediators trained under the Alternative Dispute Resolution Program of the Coconino County Superior Court. Each Party shall bear its own costs in mediation. The Parties shall not be obligated to mediate if an indispensable Party is unwilling to join the mediation. This mediation provision shall not constitute a waiver of the Parties' right to initiate legal action if a dispute is not resolved through good faith negotiation or mediation.

26. AUTHORIZATION. The Parties to this Agreement represent and warrant that the persons executing this Agreement have full authority to bind the respective Parties to all of the terms and provisions of this Agreement.

27. CAPTIONS. The captions used in this Agreement are for convenience only, are not a part of this Agreement and do not in any way limit or amplify this Agreement's terms and provisions.

28. CONSTRUCTION OF AGREEMENT. This Agreement has been arrived at by fair negotiation and shall not be construed against either Party.

29. COUNTERPARTS. This Agreement may be executed in multiple counterparts, each of which shall constitute an original, but all of which together shall constitute one and the same instrument. The signature pages from one or more counterparts may be removed from the counterparts and attached to a single instrument so that the signatures of all Parties may be physically attached to a single document.

30. ENTIRE AGREEMENT. This Agreement constitutes the entire agreement between the Parties pertaining to the subject matter of this Agreement, and all prior and contemporaneous agreements, representations, negotiations and understandings of the Parties, oral or written, are hereby superseded and merged into this Agreement, except as expressly provided elsewhere in this Agreement.

31. GOVERNING LAW. This Agreement shall be governed by and construed under the laws of the State of Arizona, and venue for any action under this Agreement shall be Coconino County, Arizona.

32. WAIVER. Any waiver granted by either Party shall not be deemed effective except when specified in the waiver, in writing, and executed by the Party against whom enforcement of the waiver is sought. No waiver by any Party of a breach of any of the terms, covenants or conditions of this Agreement shall be construed or held to be a waiver of any other breach of the same or any other term, covenant or condition contained in this Agreement.

33. NO THIRD PARTY BENEFICIARIES. The Parties acknowledge and agree that the terms, provisions and conditions of this Agreement are for the sole benefit of, and may be enforceable solely by, the Parties to this Agreement, and none of the terms, provisions, conditions and obligations of this Agreement are for the benefit of, or may be enforced by, any person not a Party to this Agreement.

34. SEVERABILITY. In the event that any phrase, clause, sentence, paragraph, section or other portion of this Agreement becomes illegal, invalid or against public policy for any reason, or is held by any court of competent jurisdiction to be illegal, invalid or against public policy, the remaining portions of this Agreement shall not be affected thereby and shall remain in force and effect to the fullest extent permitted by law.

35. MODIFICATION OF AGREEMENT. This Agreement may be amended at any time by written amendment executed by both Parties. No modification of this Agreement shall be deemed effective unless in writing and signed by the Parties.

# Appendix K

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## Reclaimed water snowmaking to continue on San Francisco Peaks

*City of Flagstaff authorizes 20-year agreement allowing ski area to use 1.5 million gallons of Class A reclaimed water per day from November through February*

FLAGSTAFF, Ariz. - On Aug. 8, the city of Flagstaff authorized a 20-year agreement with Arizona Snowbowl allowing the ski area to use reclaimed water until 2034.

Clouds cover the top of the San Francisco Peaks. Arizona Snowbowl, located on the mountain, will continue to make snow with reclaimed water through 2034 after officials with the city of Flagstaff approved the 20-year agreement Aug. 8. Photo/Ryan Williams

A council ordinance adopted in 2002 and reaffirmed by council members in 2013, states that all agreements for existing reclaimed water customers are reviewed, approved, executed and enforced by the utilities director.

"Per city code and council adopted water policy, the utilities director shall renew all existing reclaimed water agreements that meet all financial and legal requirements of city, state and federal laws," the city's press release said.

Snowbowl General Manager J.R. Murray sent a letter to Brad Hill, utilities director for the city of Flagstaff, requesting the extension citing the need for more certainty for financial lenders with respect to the term and renewal of the current water agreement, ski owners' expectations to invest capital with the certainty of a longer agreement, and that the agreement benefits the city of Flagstaff and its new water policy.

City officials said that key elements of the agreement remain the same as the original agreement from 2002, which enabled them to handle the matter administratively instead of with public hearings or city council approval. City officials determined that Snowbowl had met all requirements and the utilities

director approved a 20-year agreement beginning Aug. 8 through Aug. 7, 2034.

"The volume of reclaimed water provided to Snowbowl and the duration of time for snowmaking (November to February) have not changed," according to the city's press release.

Snowbowl did not begin using reclaimed water until December 2012 despite the original 2002 agreement because of legal challenges from Native American tribes.

In January 2014, the Arizona Supreme Court cleared the way for the Hopi Tribe to move forward with its attempt to stop snowmaking with reclaimed wastewater on the San Francisco Peaks.

In April 2013, the Arizona Court of Appeals sided with the Hopi Tribe saying that the tribe could move forward with its efforts to stop snowmaking. The city of Flagstaff appealed that decision to the Arizona Supreme Court.

The court denied the city of Flagstaff's appeal.

In April 2013, the judges ruled that the tribe had filed in a timely manner and while previous litigation had considered the environmental effects of snowmaking, no one had argued what those environmental effects would be.

The Court of Appeals concluded that the Hopi Tribe should be allowed to proceed with its claim against the city of Flagstaff that reclaimed wastewater may contain elements "which are harmful

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to animals," and that the sale of reclaimed wastewater for snowmaking at Snowbowl will "interfere with the public use and enjoyment of surrounding land."

In response to that decision, then Hopi Tribal Chairman Leroy Shingoitewa said the Hopi Tribe has always maintained that snowmaking with reclaimed wastewater on the San Francisco Peaks is simply wrong. He said that using wastewater on the mountain harms the use and enjoyment of the area and degrades the pristine nature of the Kachina Peaks Wilderness Area.

With the current agreement, Snowbowl will have access to 1.5 million gallons (mgd) a day from November through February. The utilities director can raise that cap to 2.25 mgd. The city does not have to supply Snowbowl with more than 179.8 million gallons or an average of 1.12 mgd over four months.

The city is required to deliver Class A reclaimed water but city officials said the city has always delivered Class A+ reclaimed water to Snowbowl.

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# Appendix L

AFFIDAVIT  
Of  
Tony H. Joe, Jr.

I swear and affirm,

1. My name is Tony H. Joe, Jr. and I am the Supervisory Anthropologist with the Traditional Culture Program, Navajo Nation.
2. The Traditional Culture Program is part of the Historic Preservation Department of the Navajo Nation and provides consultation under ARPA, NHPA, NAGPRA and the CRPA laws to support the goals of the Historic Preservation Department by consulting with the Navajo People, including Hataalii and other knowledgeable Navajo People to ensure that Navajo values and traditions guide the Department's policies, procedures and activities for preservation and protection.
3. The Traditional Cultural Program also consults with federal and state agencies regarding the protection and preservation of the natural and cultural resources.
4. Neither the Navajo Nation Historic Preservation Department nor the Traditional Culture Program was given the opportunity of being consulted on a proposed lease renewal or the sale of the Arizona Snowbowl in Flagstaff, Arizona.
5. As the Supervisory Anthropologist I was not notified or given the privilege of being consulted as part to the United States Forest Service Land, Section 106 process.
6. I became aware of the renewal of the lease to Arizona Snowbowl after I purchased a copy of the daily newspaper, the Arizona Daily Sun, in Flagstaff, Arizona.
7. A consultation process should have been made by the United States Forest Supervisor in a face-to-face meeting as required by law.

These statements are true to the best of my knowledge.

Date: 2/21/15

Signature: [Handwritten Signature]

NOTARY:

SUBSCRIBED and SWORN TO before me  
by Tony Harold Joe, Jr. on this  
21 day of February, 2015  
[Handwritten Signature]  
Notary Public  
My Commission Expires: 12-24-2016  
my Commission Expires 12-24-2016

# Appendix M

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SNOWBOWL

# Arizona Snowbowl sells to Colo. businessman

October 30, 2014 7:00 am • [EMERY COWAN Sun Staff Reporter](#)[\(1\) Comments](#)

In a deal to be finalized next week, longtime Arizona Snowbowl owner Eric Borowsky will be selling the ski resort to Durango businessman James Coleman, along with a group of investors from Arizona, Colorado and Texas.

Arizona Snowbowl made the announcement Wednesday, the same day that owners of Colorado's Durango Mountain Resort went public with the news that they have agreed to sell to Coleman as well.

Coleman already owns or partially owns two ski resorts in New Mexico, Sipapu Ski and Summer Resort near Taos and Pajarito Mountain Ski Area near Los Alamos. He also has real estate investments across the Southwest.

"We're really glad to turn it over to an organization that is very similar to our ownership group," Borowsky said. "It's not a big company; it's not a Vail. It's a company who knows who their employees are, appreciates their employees and wants to take care of their customers. This resort is now poised for the next generation of improvements."

The 77-year-old resort wasn't for sale when Coleman approached Borowsky in March. But the Durango resident was specifically interested in the resort because of its location next to Flagstaff and close to Phoenix, the amazing views and the fantastic skiing, said Scott Price, the chief operating officer of Sipapu and of the newly created Snowbowl Recreation ILP, the company that will own Snowbowl. Coleman also visited the area many times as a child.

After talking through the offer with Coleman and Price during the spring, Borowsky said he brought it to the partnership that owns the resort and they agreed it was time to pass the baton.

The deal means that effective immediately, Snowbowl season pass holders will also have access to unlimited skiing and snowboarding at Sipapu and Pajarito. Select pass products will continue to include a certain number of free lift tickets to resorts throughout the West as well.

## Snowmaking continues

Coleman will continue to make snow using Flagstaff's treated wastewater, with plans to start blowing the icy water on slopes when nights get cold enough in November. All of the resorts Coleman owns use snowmaking, and it is a fundamental part of his business, Price said. The hope is to use snowmaking to extend Snowbowl's season even more.

Sipapu has the longest ski season in New Mexico and has been the first in the state to open for 10 years running, Price said.

The company has plans to increase snowmaking to cover 75 percent of the mountain, up from 60 percent now, said J.R. Murray, the resort's general manager. The resort began making snow in 2012, crediting the practice with allowing it to stay open consistently.

The city of Flagstaff will transfer ownership of the reclaimed water agreement to Snowbowl Recreation ILP through an administrative process that doesn't involve any kind of public hearing, said Brad Hill, the city's utilities director. That agreement was renewed in August and will expire in 2034.

The city of Flagstaff's 2002 decision to sell reclaimed wastewater to Arizona Snowbowl has faced a bevy of lawsuits, one of which the city confirmed is ongoing. That lawsuit, brought by the Hopi tribe, challenges the city's sale of reclaimed water on the argument that making snow with it causes a public nuisance.

Coleman said he sees the ability to use recycled wastewater, instead of tapping into ground or surface water, as an environmental plus.

### **New improvements**

Along with expanded snowmaking, Coleman has plans to install a new high-speed lift between the Sunset and Agassiz lifts, create a snowplay area and improve base area facilities. Price said they're looking at adding another lift that would provide more access to runs on the north side of the resort, closest to Humphreys Peak.

Financial details of the Snowbowl sale were not disclosed. The Arizona Snowbowl Limited Partnership, of which Borowsky is a part, bought the resort in 1992 for \$4 million. In 2009, the Navajo Tribal Council was considering offering \$49 million for the resort, with an aim of stopping the use of reclaimed wastewater for snowmaking on the mountain. The resort was not for sale then either, and the deal fell through after tribal lawmakers became concerned about the concept of buying and selling sacred sites.

Murray and the rest of the management staff will stay on board at Snowbowl even though the ownership is changing hands. The resort will start hiring seasonal employees after its Nov. 5 job fair and plans to open around Thanksgiving. Last year, Snowbowl saw about 143,000 skier visits.

---

Emery Cowan can be reached at (928) 556-2250 or [ecowan@azdailysun.com](mailto:ecowan@azdailysun.com)

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**Tags** [Arizona Snowbowl](#)

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# Appendix N



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SNOWBOWL

# Snowbowl sale stalls out



Madeline Zurga, 9, rides the Little Spruce carpet on Arizona Snowbowl's opening day Nov. 28.

[Buy Now](#)

January 23, 2015 5:45 am • [EMERY COWAN Sun Staff Reporter](#)

[\(1\) Comments](#)

Almost three months after announcing Arizona Snowbowl would come under new ownership, negotiations over the sale of the ski resort have been “temporarily delayed,” according to current owner Eric Borowsky.

Borowsky announced in late October that the resort was being purchased by James Coleman, a Durango, Colo., businessman who owns two resorts in New Mexico and is also purchasing a resort in Durango.

But those plans now appear to be on hold.

“The current ownership, The Arizona Snowbowl Resort Limited Partnership, continues to own and operate the ski area at this time. Additional details related to James Coleman’s involvement will be released as they become available,” Borowsky said in a written statement.

When asked in a later interview whether Coleman’s involvement was in question, Borowsky said the Durango businessman is still involved but they were “just trying to work out the details.”

When the sale was announced in late October, Scott Price, the chief operating officer of Snowbowl Recreation I LP, the company Coleman created to run the resort, had said the sale negotiations would be finished within a week.

“I think just because of the complexity of the transaction it’s still working its way through,” said J.R. Murray, the resort’s general manager.

Officials with the Coconino National Forest who were working on Coleman's application for a special use permit, which would allow him to operate the resort on Forest Service property, were also notified this week that the sale had been put on hold, said Brady Smith, spokesman with the Forest Service.

Meanwhile, the city of Flagstaff is continuing its reclaimed wastewater agreement with Arizona Snowbowl Resort Limited Partnership, the current owners of Arizona Snowbowl of which Borowsky is a part. The city hasn't made any moves to transfer that agreement over to Snowbowl Recreation I LP, said Brad Hill, the city's utilities director.

There are several things the city's attorneys need to work out before the city would be willing to assign that agreement to new Snowbowl owners, Hill said. That transfer process is an administrative one that will not go through a public hearing despite the controversial nature of the use of reclaimed wastewater on the San Francisco Peaks.

Price has said that Snowbowl Recreation I LP will stick with the resort's master development plan. If the company decides to stray from that plan, though, it might have to go through a potentially lengthy environmental analysis process, Smith said.

Snowbowl opened this year on Nov. 28 thanks to prolific snowmaking and has since opened up 80 percent of the mountain. Opening up the final 20 percent will require some help from Mother Nature because it can't be reached by snowmaking equipment, said Jason Stratton, spokesman for the resort.

Thanks to strong skier numbers during the weekends around Christmas, New Year's and Martin Luther King Jr. Day, Stratton said the resort is currently on track to hit close to 190,000 skier days this season.

"If you look at historical data, Snowbowl is pretty well known for February and March snowstorms, so we still have hopes," Stratton said. "We're only halfway through the winter."

Emery Cowan can be reached at (928) 556-2250 or [ecowan@azdailysun.com](mailto:ecowan@azdailysun.com)

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# Appendix O

# Snowbowl water contract renewed for 20 more years

**BY:** Associated Press

**POSTED:** 1:50 PM, Aug 9, 2014

**TAG:** [flagstaff \(/topic/flagstaff\)](/topic/flagstaff) | [northern arizona \(/topic/northern+arizona\)](/topic/northern+arizona)

FLAGSTAFF - The Arizona Snowbowl ski area will be able to use treated wastewater for snowmaking for the next 20 years.

The Arizona Daily Sun reports the city of Flagstaff announced Friday approval to extend an agreement giving Snowbowl access to reclaimed wastewater through 2034.

Snowbowl officials say they wanted a more long-term contract before borrowing or investing any money.

Some water conservationists say the arrangement is a wasteful use of water.

Snowbowl and Flagstaff first entered into a five-year contract in 2002. But legal challenges by area tribes and construction delays led to wastewater not being used until December 2012.

Officials say the terms will remain the same. Snowbowl will be able to use up to 1.5 million gallons a day November through February.

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October 2013



# Draft Land and Resource Management Plan for the Coconino National Forest

Coconino, Gila, and Yavapai  
Counties, Arizona



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Printed on recycled paper – October 2013

**Draft  
Land and Resource  
Management Plan  
for the  
Coconino National Forest**

**Coconino, Gila, and Yavapai Counties,  
Arizona**



# Preface

This draft land and resource management plan (also called the proposed plan) has been released for 90-day public comment along with the draft environmental impact statement (DEIS).

The proposed plan aims to promote responsible land management for the Coconino National Forest (Coconino NF) based on useful and current information and guidance and would replace the existing forest plan, originally adopted in 1987. Land management planning guides the Forest Service in fulfilling its responsibilities for the stewardship of the forest to best meet the needs of the American people. This plan will provide strategic guidance and information for project and activity decisionmaking on the Coconino NF for approximately the next 15 years.

The proposed plan for the Coconino NF was developed collaboratively and is the result of 6 years of iterative discussions and feedback. Comments received were used to modify and refine the draft plan, as well as to identify issues and alternatives evaluated in the DEIS.

Both the proposed plan and the DEIS can be found electronically on the Coconino NF Web site at:

<http://www.fs.usda.gov/detail/coconino/landmanagement/planning/>

Detailed assessments, evaluations, reports, and documents associated with development of the plan can also be viewed and downloaded from the Coconino NF Forest Plan Revision Web site.

Please submit your comments on this proposed plan and the DEIS to:

Coconino National Forest  
Attention: Yewah Lau, Forest Planner  
1824 S. Thompson Street  
Flagstaff, AZ 86001  
(928) 527-3411 or Fax (928) 527-3620

Hand delivered comments can be submitted to the Coconino NF Supervisor's Office from 8:00 a.m. to 12:00 p.m. (noon) and 12:30 p.m. to 4:30 p.m. Monday through Friday, excluding holidays.

Electronic comments must be submitted in a format such as an email message, plain text (.txt), rich text format (.rtf), or Word (.doc or .docx) to the following email address:

[coconino\\_national\\_forest\\_plan\\_revision\\_team@fs.fed.us](mailto:coconino_national_forest_plan_revision_team@fs.fed.us)

Electronic comments may also be submitted to the Coconino NF "Contact Us" Web submission site: <http://go.usa.gov/gnuj>

As this is a nonspecific commenting format, we ask that commenters indicate "Forest Plan Revision Comments" in the subject line of their comment.

Comments received in response to this solicitation, including names and addresses of those who comment, will be considered part of the public record and available for public inspection.



# Contents

<b>Chapter 1. Background.....</b>	<b>1</b>
Introduction .....	1
Purpose of the Land Management Plan .....	1
Summary of the Analysis of the Management Situation .....	1
Plan Content .....	5
Plan Organization .....	8
Guiding Future Projects, Program Plans, and Assessments .....	9
Transition in the Implementation of the Plan .....	9
Future Changes to the Plan .....	9
Roles and Contributions of the Coconino NF .....	10
<b>Chapter 2. Forestwide Management.....</b>	<b>15</b>
Introduction .....	15
Ecosystems .....	15
Air .....	15
Soil .....	16
Watersheds .....	18
Water Quality, Water Quantity, and Aquatic Systems .....	19
Water Quality and Water Quantity .....	20
Stream Ecosystems .....	21
Wetland/Cienega and Reservoirs/Lakes.....	23
Springs .....	26
Biophysical Features .....	27
Caves, Cliffs, and Talus Slopes.....	27
Paleontological Resources .....	30
Vegetation .....	32
All Vegetation Types .....	32
Riparian Types .....	34
Desert Communities.....	39
Grassland Types.....	40
Interior Chaparral.....	46
Piñon-Juniper Types .....	47
Ponderosa Pine.....	52
Mixed Conifer Types .....	58
Spruce-Fir .....	66
Alpine Tundra .....	70
Wildlife, Fish, and Plants .....	71
Invasive Species .....	76
People and the Landscape.....	78
Fire Management.....	78
Livestock Grazing .....	79
Forest Products.....	81
Energy and Minerals .....	83
Heritage Resources.....	84
Tribal Relations and Uses.....	89
Roads and Facilities.....	91
Land Adjustments.....	95
Special Uses .....	97
Recreation.....	102
General Description for Recreation .....	102
Desired Conditions for Recreation.....	102
Dispersed Recreation .....	102
Developed Recreation.....	110
Scenic Resources.....	112

## Contents

<b>Chapter 3. Management Areas and Special Areas.....</b>	<b>117</b>
Introduction .....	117
Management Areas .....	117
Pine Belt .....	118
Volcanic Woodlands .....	119
Painted Desert .....	120
San Francisco Peaks .....	121
Fort Valley/Mount Elden.....	122
Flagstaff Neighborwoods .....	123
Walnut Canyon.....	124
Anderson Mesa.....	125
Long Valley.....	127
Upper Clear Creek.....	128
Verde Valley .....	129
Sedona/Oak Creek.....	130
Sedona Neighborwoods.....	140
Oak Creek Canyon .....	141
House Mountain-Lowlands .....	144
Special Areas .....	145
Designated Wilderness Areas.....	145
Fossil Springs Wilderness .....	148
Kachina Peaks Wilderness.....	150
Munds Mountain Wilderness .....	151
Red Rock–Secret Mountain Wilderness .....	152
Strawberry Crater Wilderness.....	153
West Clear Creek Wilderness .....	154
Wet Beaver Wilderness.....	155
Sycamore Canyon Wilderness .....	155
Recommended Wilderness .....	156
Wild and Scenic Rivers .....	157
Verde Wild and Scenic River.....	158
Fossil Creek Wild and Scenic River .....	159
National Trails and Scenic Byways.....	160
Arizona National Scenic Trail.....	160
General Crook National Recreation Trail .....	162
Wilson Mountain National Recreation Trail.....	163
All Scenic Byways.....	163
Historic Route 66 All-American Road.....	163
Red Rock All-American Road .....	164
Research Natural Areas and Botanical and Geological Areas.....	165
Environmental Study Areas.....	168
Experimental Forests.....	169
<b>Chapter 4. Suitable Uses .....</b>	<b>171</b>
Introduction .....	171
Timber Suitability.....	171
Grazing Suitability.....	172
Recreation and Transportation Suitability .....	174
<b>Chapter 5. Monitoring Strategy.....</b>	<b>177</b>
Introduction .....	177
Monitoring Plan.....	177
Supplemental Monitoring Information .....	185

<b>List of Preparers</b> .....	<b>187</b>
List of Contributors .....	189
<b>Glossary</b> .....	<b>191</b>
<b>References</b> .....	<b>211</b>
<b>Appendix</b>	
A. Maps .....	215
B. Proposed and Probable Management Practices.....	235
C. Species Crosswalk .....	243
D. Other Sources of Information .....	247
E. Index of Other Supporting Plan Documentation .....	259

## List of Figures

Figure 1. Vicinity map of the Coconino NF.....	1
Figure 2. Visual example of plan decision code.....	7
Figure 3. Coconino NF and surrounding lands .....	11
Figure 4. Illustration of ponderosa pine growth rate for age classes 3A, 3B, 4A, and 4B .....	57
Figure 5. Illustration of ponderosa pine growth rate for age classes 3C, 3D and 4C, 4D .....	58

## List of Tables

Table 1. Flooding conditions by wetland type .....	24
Table 2. General starting point for width of stream management zones in riparian and nonriparian stream courses by erosion hazard .....	38
Table 3. Desired proportion of seral stages for Semidesert Grasslands .....	43
Table 4. Desired cover ranges for Great Basin and Montane/Subalpine Grasslands .....	44
Table 5. Desired proportion of seral stages for Interior Chaparral.....	46
Table 6. Desired proportion of seral stages for Piñon-Juniper with Grass .....	49
Table 7. Desired proportion of seral stages for Piñon-Juniper Evergreen Shrub .....	50
Table 8. Desired proportion of seral stages for Piñon-Juniper Woodlands .....	50
Table 9. Desired proportion of seral stages for Ponderosa Pine <sup>1</sup> .....	53
Table 10. Desired proportion of seral stages for Mixed Conifer with Frequent Fire .....	60
Table 11. Desired proportion of seral stages for Mixed Conifer with Aspen.....	64
Table 12. Desired proportion of seral stages for Spruce-Fir .....	68
Table 13. Objectives for social encounters in the Sedona/Oak Creek Management Area	138
Table 14. Timber suitability acreage calculation.....	172
Table 15. Recreation and transportation suitability.....	175
Table 16. Coconino NF’s plan monitoring questions, monitoring methods, units of measure, and frequency of measurements .....	179
Table 17. Supplemental information to clarify PNVTs and additional information applicable to monitoring questions.....	185

## Commonly Used Acronyms

**AMS** – Analysis of the Management Situation

**AZGFD** – Arizona Game and Fish Department

**BLM** – Bureau of Land Management

**BMP** – Best management practice

**d.b.h.** – Diameter at breast height

**ESA** – Environmental study area

**GIS** – Geographic Information System

**HUC** – Hydrologic unit code

**MA** – Management area

**MSO** – Mexican spotted owl

**MVUM** – Motor vehicle use map

**NEPA** – National Environmental Policy Act

**NF** – National forest

**NFMA** – National Forest Management Act

**NFS** – National Forest System

**NPS** – National Park Service

**OHV** – Off-highway vehicle

**ORV** – Outstandingly remarkable values

**P** – Primitive

**PAC** – Protected activity center

**PFA** – Post-fledgling family area

**PFC** – Proper functioning condition

**PNVT** – Potential natural vegetation type

**RNA** – Research natural area

**ROS** – Recreation opportunity spectrum

**SIO** – Scenic integrity objective

**SPNM** – Semiprimitive nonmotorized

**TES** – Terrestrial ecosystem survey

**USFWS** – U.S. Fish and Wildlife Service

**WOS** – Wilderness opportunity spectrum

**WUI** – Wildland-urban interface

# Chapter 1. Background

## Introduction

The Coconino National Forest [Land and Resource Management Plan](#) (hereinafter referred to as the forest plan or simply the plan) covers the [National Forest System \(NFS\) lands](#) within the boundary of the Coconino National Forest (Coconino NF or the forest), excluding land designated as experimental forest.

The Coconino NF is located in north-central Arizona (figure 1) in Coconino, Gila, and Yavapai Counties and encompasses approximately 2 million acres. The Coconino NF is managed by the Forest Service, an agency of the U.S. Department of Agriculture (USDA). Ranger district offices are located in Flagstaff, the Village of Oak Creek, and Blue Ridge. The forest supervisor's office is located in Flagstaff.

## Purpose of the Land Management Plan

This plan aims to promote responsible land management for the Coconino NF based on useful and current information and guidance. Land management planning guides the Forest Service in fulfilling its responsibilities for the stewardship of the forest to best meet the needs of the American people.

This plan provides strategic guidance and information for project and activity decisionmaking on the Coconino NF for approximately the next 15 years. The plan is intended to provide additional direction not already provided by existing law, regulation, or policy. This plan does not include site-specific project and activity decisions. Project and activity decisions are analyzed separately. All project and activity decisions, however, must comply with the guidance provided by this plan unless amendments are made to the plan that allow for deviation.

The plan provides a framework that contributes to sustaining native ecological systems by managing toward appropriate conditions that support native plant and animal diversity. The plan integrates forest [restoration](#); watershed protection; resilience to changing climate; wildlife conservation; and contributions to social and economic values, goods, and services. The plan honors the continuing validity of private, statutory, or pre-existing rights.

## Summary of the Analysis of the Management Situation

The "Analysis of the Management Situation" (AMS) (Forest Service, 2010a), published in May 2010, highlights the social, economic, and ecological conditions and trends in and around the Coconino NF, as detailed in the forest's "Economic and Social Sustainability Assessment" (ESSA) (Forest Service, 2008), the "Ecological Sustainability Report" (ESR) (Forest Service, 2009), as well as the "Recreation, Grazing, Minerals, and Timber Demand Report" (Forest Service, 2010c). The AMS used these key



Figure 1. Vicinity map of the Coconino NF

findings, along with public input<sup>1</sup>, to identify areas in existing plan direction that do not provide adequate guidance for the present and future, and it attempts to consider potential implications of those plan needs for change to other resources. The draft AMS and its supporting materials were used by the Coconino NF leadership team to determine the initial scope of plan revision topics.

Social and economic trends and conditions show increasing demand on the Coconino NF for a wide variety of human uses. Ecological conditions and trends demonstrate there are current and future threats to the [sustainability](#) of some of the forest's [ecosystems](#) and the species they support. Identified plan needs for change are summarized below and grouped into three broad topics: Recreation, Community-Forest Interaction, and Maintenance and Improvement of Ecosystem Health.

## Recreation

### Condition and Trends

Recreational use of the Coconino NF has changed significantly since the 1987 “Coconino National Forest Land and Resource Management Plan” (1987 plan) (Forest Service, 1987a) was developed. Some of the trends and conditions related to recreation include: increased use of [developed recreation](#) areas; changing demographics; increased conflicts in social values, culture, and expectations tied to public lands<sup>2</sup>; new types of recreation; the adoption of a new scenery management system; increased recognition of tribal cultural uses and values; and pressures on [riparian](#), [wilderness](#), and other special areas.

### Needs for Change

In order to allow for changing trends and conditions, the revised plan needs to:

- Update desired conditions and other plan components for recreation and [scenery](#) management where guidance is partial or absent in the 1987 plan.
- Update the plan components for existing special areas.
- Incorporate special area recommendations and related plan components into the revised plan.

## Community-Forest Interaction

### Condition and Trends

Relationships with the surrounding communities have changed significantly since the 1987 plan was developed. Some of the trends and conditions related to community-forest interaction include: a shift from a commodity-based (e.g., timber, mineral development) to a service-based (e.g., recreation) economy; the influence of forest management activities on the local economy and environment; population growth and loss of forest access or open space; and increased demand for community infrastructure.

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<sup>1</sup> See appendix B, Public Collaboration and Involvement/Other Planning Efforts, found in the “Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan” (Forest Service, 2013).

<sup>2</sup> For example, between those who believe that only recreational activities that are less disruptive of nature (wildlife viewing or hiking) should occur on the forest and those who believe the forest should be equally available for all recreation types (hiking, off-road vehicle use, large group events).

### Needs for Change

In order to allow for changing trends and conditions, the revised plan needs to:

- Update plan language to acknowledge open space values.
- Update plan language to acknowledge potential future community growth and expansion desires.
- Update guidance on energy and mineral development.
- Provide guidance related to forest products and consideration of culturally important forest products.
- Clarify regulatory authorities relating to air quality and include approaches for addressing smoke and [fugitive dust](#) emissions.
- Review and update plan guidance on communication sites.

## Maintenance and Improvement of Ecosystem Health

### Condition and Trends

Since development of the 1987 plan, there is new knowledge of forest ecosystems, and the emphasis of forest management has shifted from timber outputs to the maintenance and improvement of ecosystem health. Some of the trends and conditions related to ecosystem health include: recognition of each ecological resource on the forest, from soil to wildlife; forest resilience; changed frequency and severity of natural disturbances in fire-adapted ecosystems; decline of aspen; loss of [understory](#) species; lack of current plan direction regarding rarer ecosystems (e.g., tundra, spruce-fir, riparian); and susceptibility to uncharacteristic disturbances (e.g., fire, drought, insects and disease), climate change, [invasive species](#), and human-caused habitat fragmentation.

### Needs for Change

In order to allow for changing trends and conditions, the revised plan needs to:

- Update desired conditions and objectives for soil resources.
- Integrate and update management direction for riparian, aquatic, and water resources.
- Incorporate desired conditions that reflect the composition, structure, and natural disturbance attributes appropriate for the different ecosystems, and integrate desired conditions across different resource areas.
- Address invasive flora and fauna.
- Ensure plan components address concerns of forest analysis species<sup>3</sup> and their habitat.
- Address the importance of habitat connectivity.
- Address strategies to address effects of climate change.

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<sup>3</sup> Forest analysis species are plant, animal, and aquatic species considered for analysis during the forest plan revision process.

## Other Needs for Change

Direction in the existing 1987 plan that is still current and timely will be carried forward into the revised plan, but other direction may be modified or removed for the following reasons:

- Administrative functions, such as budgeting, are not the desired conditions of land and resources.
- Duplications or conflicts exist with direction found in existing law, regulation, or policy.
- Plan components are based on outdated information, such as policies, schedules of activities, or science.
- The format is inconsistent and hard to use.

New information and changing conditions will necessitate changes in management. Iterative and adaptive planning may facilitate the incorporation of new information into potential plan amendments. Under the National Forest Management Act (NFMA) of 1976 (P.L. 94-588), projects and activities must be consistent with the plan.

## Climate Change Concerns

The revised plan includes updated plan language for soil, riparian, aquatic, and water resources; changing climate; habitat connectivity; and noninvasive animals and grasses and other vegetation.

With respect to climate change<sup>4</sup>, observed concentrations of greenhouse gases are projected to increase, and climate change may intensify the risk of ecosystem change for terrestrial and aquatic systems, thereby affecting ecosystem structure, function, and productivity. Because the effects of climate change are difficult to discern in the short term from climate variability and other contributing factors, it is addressed as an integrated part of this plan, rather than as a distinct set of plan direction. For example the desired conditions for all vegetation types state, “[v]egetation conditions are resilient to the frequency, extent, and severity of disturbances, such as fire in fire-adapted systems and flooding in riparian systems, and climate variability.”

Improved ecosystem function (i.e., progress toward desired conditions) is presumed to improve the resiliency of ecosystems to withstand changes in disturbance patterns, such as changes in frequency, intensity, timing, and spatial extent, as a result of climate change. The nature of the revised plan to manage toward desired conditions, regardless of current or changing conditions (e.g., climate change), is intended to allow management of the forest to adapt as necessary to continue moving toward ecological and social desired conditions. Although the revised plan monitoring program does not include components to specifically monitor climate change, it can track the forest’s progress toward desired conditions and whether management activities are promoting resilient ecosystems, as well as provide indications about whether influences of climate change are hindering progress toward desired conditions.

Current conditions and trends related to climate change may be found in various documents used to develop and evaluate the revised plan, including the ESR, the AMS, and other documents

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<sup>4</sup> Climate change is a change in overall climate or its variability from season to season, persisting for an extended period (typically decades or longer). Climate change may be due to natural processes or human-caused changes in the composition of the atmosphere or in land use. The United Nations Framework Convention on Climate Change makes a distinction between “climate change” which is attributable to human activities altering the atmospheric composition and “climate variability” which is attributable to natural causes (2011).

contained in the project record. The “Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan” (DEIS) also evaluates climate change with the potential effects of future management under this plan and its alternatives.

## Plan Content

This plan includes “plan decisions” and “other content.” Once plan decisions are approved, any substantive changes to them will require a plan amendment. A change to “other content” may be made using an administrative correction process. Administrative corrections are also used to make nonsubstantive changes to plan decisions such as data and map corrections, or updates and typographical errors. The public will be notified of all plan amendments and administrative corrections.

## Plan Decisions

Plan decisions are the equivalent of plan components. They include goals (hereafter identified as desired conditions), objectives, standards, guidelines, suitability, and monitoring.

- **Desired conditions** (or goals) set forth the desired social, economic, and ecological goals of the Coconino NF. They attempt to paint a picture of what we (the public and the Forest Service) desire the forest to look like or the goods and services we desire it to provide. Desired conditions are generally expressed in broad, general terms; however, more specificity may be added to clarify the intent. Desired conditions are timeless in that there is no specific date by which they are to be completed. They may only be achievable over a long timeframe (e.g., several hundred years). In some cases, a desired condition matches the current condition, so the goal is to maintain the current condition.

Desired conditions are the focus of this plan; management of the Coconino NF’s resources will be directed toward achieving the desired conditions. Desired conditions are the basis for the other plan components and describe the framework for future projects and activities. They are aspirations and not commitments or final decisions approving projects. Projects and site-specific activities must be consistent with desired conditions (see the “[Guiding Future Projects, Program Plans, and Assessments](#)” section below). A plan amendment would be required if project level activities deviated from the progress toward long-term achievement of desired conditions.
- **Objectives** are concise, time specific statements of measurable, anticipated results that respond to desired conditions. Activities specified in objectives are intended to help make progress toward achieving desired conditions and represent just some of the outcomes or actions expected to accomplish movement toward desired conditions. Not every action or objective the Coconino NF may do is identified in the plan, just the primary ones.

Objectives are written based on recent trends, current and anticipated staffing levels, and anticipated budgets. Changes in environmental conditions, budgets, and other factors during the plan period may result in a need to re-evaluate plan objectives.
- **Standards** are constraints upon project and activity design. A standard is an absolute requirement to be met in the design of projects and activities. A project or activity is consistent with a standard when its design is in accord with the explicit provisions of the standard; variance from a standard is not allowed except by plan amendment.
- **Guidelines** are sideboards that guide management activities and provide specifications that a project or activity would adopt unless there is a compelling or defensible reason to

vary from the guideline. Deviation from the explicit provisions of the guideline is permitted without a plan amendment, as long as the intent of a guideline is met. Deviation from the explicit provisions of a guideline, if it is meeting the intent of the guideline, must be documented in the project record. **Projects that deviate from a guideline’s intent must be accompanied by a plan amendment that would allow for the deviation.**

- **Suitability** describes the appropriateness of applying certain resource management practices to a particular area of land. A unit of land may be suitable for a variety of individual or combined management practices. Where current management is not consistent with suitability determinations in this plan, future decisions should adjust activities to be consistent with suitability determinations and associated desired conditions stated in this plan.
- **Management areas** are lands that have management direction that is more specific than forestwide and include lands designated as special areas by Congress or another delegated authority. Special areas are identified because of their unique or special characteristics. Examples include: wilderness, [research natural areas](#), scenic byways, and national recreation trails.
- **Monitoring** is used to determine the degree to which on-the-ground management is maintaining or making progress toward desired conditions. The monitoring plan includes questions and performance measures designed to inform implementation and effectiveness of plan decisions. It helps ensure that the plan remains adaptive, in that new knowledge and information can be analyzed and the plan changed accordingly.

Plan decisions are contained in chapters 2 through 5. In chapters 4 and 5, plan decisions are displayed within tables 14 through 21. In chapters 2 and 3, a code is used to reference and visually distinguish plan decisions more easily. Abbreviations are used in each code to identify: (1) if a plan decision applies forestwide or within a particular management area or special area; (2) resource area; and (3) type of plan decision. The last part of each code contains a number which is displayed in the left margin. For example “FW-Air-Qual-DC-1” refers to the first listed desired condition for air quality; “MA-FlagN-O-2” refers to the second listed objective for the Flagstaff Neighborwoods Management Area; and “SA-WSR-Verde-S-1” refers to the first listed standard for the Verde Wild and Scenic River, a designated special area (see figure 2 for a visual example).

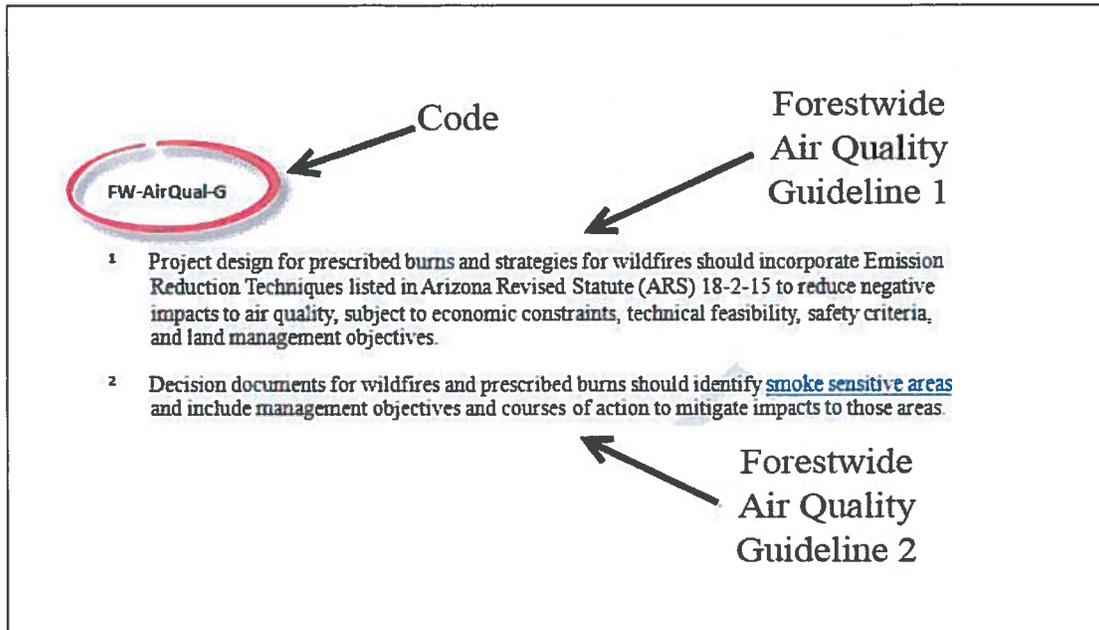


Figure 2. Visual example of plan decision code

### Other Content

Besides the plan decisions mentioned above, the plan also contains other content. Other content includes chapter 1, certain sections in chapters 3 and 4 (i.e., background, management approaches, and related plan content), and all appendices. These sections are meant to provide information and assist in understanding the larger management context. These sections are not intended to be mandatory direction.

The **background** section provides a narrative regarding resource conditions. The primary sources for the information found in this section are derived from the AMS, ESR, ESSA, and several resource evaluations.

The **management approach** sections identify probable management actions to accomplish desired conditions and objectives. Management approaches describe the priorities and expectations for future program coordination. Partnerships and collaborative arrangements are also included as part of the management approaches for accomplishing desired conditions. Management approaches are strongly influenced by recent trends, past experiences, anticipated staffing levels, and short-term budgets. Decisions about what projects are actually proposed and approved, as well as details of project design, are determined by public involvement, science, and professional experience at the project or activity level.

The **related plan content** section lists other main portions of the plan that contain related information; however, this is not an exhaustive list.

The plan includes several **maps** throughout the document, including in appendix A. Some maps display the potential natural vegetation types (PNVTs) on the forest. The PNVT mapping is based

on [terrestrial ecosystem survey \(TES\)](#) data, and the acres and distribution of PNVTs are based on this coarse filter information. Since the transition between the potential natural vegetation types (PNVTs) is highly variable, there may be some variability where some areas do not match the map of the PNVTs. In these instances, proposed activities are governed by plan components of the PNVT that most accurately depicts that area. Project level or site-specific analysis may refine PNVT information in the corporate Geographic Information System (GIS) data in the future. The following statement applies to all maps found within the plan:

*The USDA Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. Using GIS products for purposes other than those for which they were intended may yield inaccurate or misleading results. The USDA Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. This map is not a legal land line or ownership document. Public lands are subject to change and leasing, and may have access restrictions; check with local offices. Obtain permission before entering private land.*

The **appendix** provides additional information to the plan and includes: maps, an overview of the proposed and probable management practices, a crosswalk of common and scientific species names, a list of other sources of information (e.g., relevant laws, regulations, and policies), and an index of documents that support the plan.

## Plan Organization

This plan is organized as follows:

- Chapter 1. Background** — briefly describes the Coconino NF, the analysis of the management situation, the purpose of the plan, plan content, and plan organization. For a quick preview of the plan structure, glance at the contents pages. This chapter does not contain any plan decisions.
- Chapter 2. Forestwide Management** — contains plan decisions and other content that are applicable forestwide.
- Chapter 3. Management Areas and Special Areas** — contains plan decisions and other content that is applicable to particular management areas, in addition to forestwide direction.
- Chapter 4. Suitable Uses** — describes the appropriateness, or suitability, of certain resource management practices (uses) across the forest.
- Chapter 5. Monitoring Strategy** — contains the monitoring plan decisions and provides a framework for subsequent monitoring and evaluation.
- List of Preparers** — contains a list of the specialists who contributed to development of the plan.
- Glossary** — contains definitions for technical terms used in the plan.
- References** — contains a list of citations for documents referenced in the plan.
- Appendix** — consists of multiple parts and supplements information contained in the plan.

Hypertext is used throughout the plan; it allows the user of the electronic version of this plan to click on a word (indicated by blue underlined text, for example [glossary](#)) and be redirected to

another area of the plan or an external reference. Users can then click on the word again and be redirected back to their original location. The first occurrence of words that are found in the glossary are hyperlinked.

## Guiding Future Projects, Program Plans, and Assessments

During implementation, management activities affecting the Coconino NF must be consistent with the plan. This consistency is achieved in the following ways:

- Management activities are developed specifically to achieve the desired conditions (goals) of the plan. To the extent practicable, documentation for such projects should identify the elements of the desired conditions to be achieved by the project. All projects or activities may not contribute to all desired conditions or objectives but rather to a limited subset. Also, some projects designed to contribute to some desired conditions may have consequences considered adverse to the achievement of other desired conditions. In this situation, the responsible official for the project needs to identify and disclose these effects in the project documentation and make a decision that balances these considerations.
- Management activities for projects that are necessary but are not specifically related to one of these elements of the plan (e.g., routine road and facility maintenance) should be briefly evaluated to assess if they conflict or impede contribution to the desired conditions or objectives.
- Projects are expected to comply with suitability, standards, and guidelines contained in the plan. The applicable standards, guidelines, and suitability considerations should be identified early in the project planning process. To ensure compliance with the plan, each project should document consistency with these standards and guidelines.

## Transition in the Implementation of the Plan

The plan is used as a source of direction for future projects, plans, and assessments. A smooth and gradual transition to the new plan is anticipated, rather than one that forces an immediate re-examination or modification of all contracts, projects, permits, and other activities already in progress. Existing projects will be evaluated and, if necessary, modified to comply with new direction as soon as it is practicable. As new project decisions, contracts, permits, renewals, and other activities are considered, conformance to the new plan direction as described in the previous section is expected.

## Future Changes to the Plan

A change to the plan requires either administrative correction or amendment. The following summarizes circumstances that warrant corrections or amendments to the plan:

- **Administrative corrections** are minor changes to the plan that do not substantively affect the management direction or create additional environmental consequences. These minor changes include the following:

## Chapter 1. Background

- Elements of the plan that are not plan decisions as described in the previous section, “Other Content.”
- Corrections and updates of data published in the plan and minor changes to maps.
- Changes in proposed or probable actions expected to occur during the plan period.
- Minor text changes such as typographical errors and clarification of explanatory text.

Unless otherwise required, administrative correction must be initially published as a proposed correction either on the Coconino NF’s Web site or in a local newspaper of record. The proposed correction must identify the language or map to be corrected, the proposed correction, and the reason for the correction. The public will have an opportunity to comment on the proposed correction within a 30-day period following publication. After reviewing the comments received, the final correction may be similarly published and the plan corrected.

- **Site-specific plan amendments** occur to allow specific projects or other activities to deviate from certain plan direction. These amendments occur only for a specific area or a specific project. They do not lead to permanent changes in plan language, and if changes are made to management area map layers, they are made only for the area affected. Such amendments are usually proposed with appropriate [National Environmental Policy Act \(NEPA\)](#) analysis for the site-specific project proposal. The procedures for processing a site-specific plan amendment are outlined in the applicable planning regulation.
- **Programmatic plan amendments** permanently change the text and language of the plan decisions identified in the earlier section “Plan Decisions” and any other changes that cannot be addressed through administrative corrections or site-specific plan amendments. The procedures for addressing a programmatic plan amendment are outlined in the applicable planning regulation.

## Roles and Contributions of the Coconino NF

The distinctive characteristics of the Coconino NF frame the roles and contributions it provides to the local area, the State of Arizona, the Southwestern Region, and the Nation. The approximately 2 million-acre Coconino NF is located in north-central Arizona and is at the southern end of the Colorado Plateau. The Coconino NF is one of six national forests in Arizona, and it shares borders with the Apache-Sitgreaves, Kaibab, Prescott, and Tonto National Forests; private land; and lands administered by the State and National Park Service. The forest is within a couple miles of the Navajo Nation. (See figure 3.)

The Coconino NF ranges in elevation from 2,600 to 12,633 feet. The north part of the forest is dominated by the San Francisco Peaks, which includes Humphreys Peak, the highest point in Arizona. Numerous cinder hills and volcanoes of the San Francisco Peaks volcanic field are scattered across the northern portion. The Mogollon Rim, a 1,000-foot-high cliff that runs for about 200 miles across central Arizona, delineates the southeast border of the forest. Deep canyons containing several [perennial streams](#) dissect the rim. The Verde River forms the southwest boundary of the forest while one of its major tributaries, Sycamore Creek, separates the Coconino from the Kaibab and Prescott National Forests on the west.

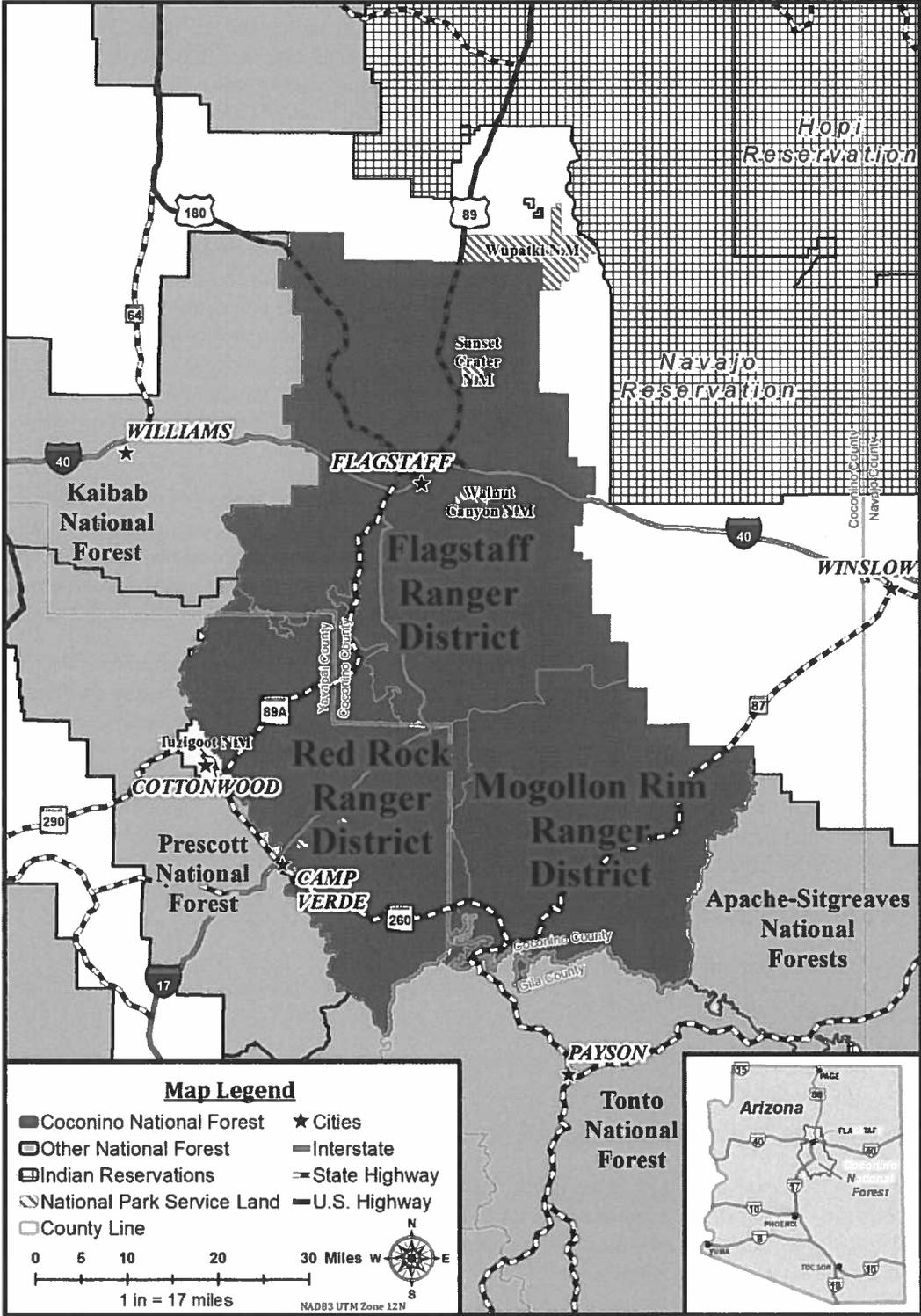


Figure 3. Coconino NF and surrounding lands

The Coconino NF has a high diversity of vegetation communities due to the wide range of elevations, complex topography, and the presence of perennial and ephemeral water. Vegetation communities at the lowest elevations are desert communities and riparian areas supporting cottonwoods and willows, while the highest elevation atop the San Francisco Peaks supports the only alpine tundra in Arizona. In between, there are extensive areas of piñon-juniper vegetation types, ponderosa pine, and mixed conifer vegetation types interspersed with grasslands and scattered pockets of aspen at higher elevations. Riparian vegetation is supported by perennial and [intermittent](#) waters.

The Coconino NF contains more water than most of the surrounding landscapes. There are about 224 perennial stream miles on the forest. Mormon Lake is Arizona's largest natural lake. There are 13 reservoirs, constructed primarily for municipal water use, recreation, and livestock. The forest lies mainly in the Verde River and Little Colorado River Plateau groundwater basins. The areas of highest precipitation and [groundwater recharge](#) for these basins occur on lands within the Coconino NF. The forest also contains about 78 riparian wetlands totaling about 10,186 acres, the second highest number on National Forest System lands in Arizona. Over 200 springs occur on the forest.

The diverse ecosystems on the Coconino NF provide habitat for a wide array of wildlife, fish, and plants. There are a number of rare species such as the Wupatki Arizona pocket mouse, Chiricahua leopard frog, Little Colorado spinedace, and rare plants like the San Francisco Peaks ragwort and Arizona cliffrose. Fifteen native fish species occur on the forest. Portions of nearly 80 percent of the perennial streams support native fish. Some native fish are only known to occur in this area.

The Coconino NF is a regional, national, and international year-round recreation destination. Visitors are drawn to the diversity of settings provided, including: warm grasslands in the Verde Valley, cool riparian respites in canyons, prominent red rock spires and buttes around Sedona, and snow covered peaks and forests near Flagstaff. Visitors come to the forest seeking a change from summer heat and city living. Many people gravitate to water or snow-based activities. Others enjoy the diverse scenery of red rocks, grasslands, deserts, and cool forests. The activities that see the greatest number of participants are hiking/walking; driving for pleasure; and viewing natural features, wildlife, and archaeological sites.

The top five activities identified are as follows (Forest Service, 2006a, p. 14):

1. Viewing natural features (83.9 percent)
2. Hiking/walking (79.1 percent)
3. Viewing wildlife (70 percent)
4. Relaxing (64.8 percent)
5. Driving for pleasure (54.8 percent)

Visitors enjoy the [developed recreation sites](#) throughout the Coconino NF that include the Arizona Snow Bowl ski area, popular lakes, and campgrounds. There are abundant year-round [dispersed recreation](#) activities. Ten wilderness areas provide opportunities for solitude and backcountry experiences. Several archaeological sites developed by the forest for public [interpretation](#) and an abundance of private sector guided tours display the significant cultural heritage preserved on the forest. Trails and roads provide numerous hiking, biking,

horseback, and motorized vehicle access to natural areas in the forest landscape. Wildlife viewing, big game hunting, and fishing are popular activities. The Coconino NF is a destination for winter activities such as snow play, snowmobiling, skiing, and snowshoeing.

American Indians and ranchers are a significant part of Coconino NF history, and their traditional uses remain an important part of the cultural landscape.

Some additional features that make the Coconino NF unique on a regional and national scale include the following:

- Coconino NF ranges from 2,600 feet in elevation in the Verde Valley to 12,633 feet atop Humphreys Peak. This wide range in elevation makes the forest unique in Arizona, because it contains all major biotic communities except true desert. All of the alpine tundra on National Forest System lands in Arizona is on the Coconino NF.
- Night sky viewing opportunities abound, and four observatories are located within or adjacent to the Coconino NF boundary. In recognition of the area's unique and valuable night sky viewing opportunities, Flagstaff became the world's first international "Dark Sky City."
- The Cinder Lakes volcanic field was used from 1968 to 1973 to train NASA astronauts in the Apollo 11 through Apollo 15 missions. This training was vital to the success of the Apollo program and the first U.S. landing on the moon by Neil Armstrong and Edwin Aldrin in July 1969.
- The Coconino NF manages seven archaeological sites that are open to the public: Sacred Mountain, Honanki, Palatki, V-V and Red Tank Draw Petroglyph sites; Clear Creek Ruins; Old Caves Pueblo; and the award-winning Elden Pueblo Project, one of America's Hands on the Land designated sites. In addition, there are six national monuments (Walnut Canyon, Sunset Crater Volcano, Wupatki, Montezuma Castle, Montezuma Well, and Tuzigoot) and four state parks (Red Rock, Slide Rock, Dead Horse Ranch, and Fort Verde) nearby.
- The Coconino NF has one of the highest natural (i.e., lightning-caused) fire occurrences in the U.S. Over a 23-year period, the forest had the highest natural fire occurrence in the U.S. for 18 years, and it was in the top 6 every year.
- The State of Arizona has designated three streams—Fossil Creek, Oak Creek, and West Fork of Oak Creek—as being outstanding state resources and classified them as Outstanding Arizona Waters.
- The only two designated [wild and scenic rivers \(WSRs\)](#) in Arizona occur on the Coconino NF. The Verde River WSR is shared with the Prescott and Tonto National Forests. The Fossil Creek WSR is shared with the Tonto National Forest. Eleven additional segments in 9 different streams are eligible for inclusion in the National Wild and Scenic Rivers System, including portions of the West Fork of Oak Creek.
- Fossil Creek contains the largest assemblage in Arizona of native fish species in a creek that is free of nonnative fish. In addition, the [travertine](#) formation in Fossil Creek is of international significance because it is of similar scale and significance with a handful of travertine systems in China, Afghanistan, Croatia, Italy, Guatemala, and Turkey. Stream chemistry creates travertine formations and gives the stream its unique turquoise color.
- The Coconino NF contains the two largest natural lakes in Arizona: Mormon Lake and Stoneman Lake.

## Chapter 1. Background

- The Coconino NF has a greater proportion of the perennial stream miles relative to the proportion of watersheds that overlap the forest. Of particular note, the Coconino NF contains 55 percent of the perennial stream miles in the Middle Little Colorado River 4<sup>th</sup> code watershed, even though only 15 percent of the 4<sup>th</sup> code watershed is on the forest.
- Oak Creek has the largest number of caddisfly species reported in any drainage in Arizona.
- The Coconino NF has all of Arizona's big game species except buffalo and includes: pronghorn, black bear, bighorn sheep, elk, javelina, turkey, mountain lion, mule deer, and white-tailed deer.
- Several factors make the Coconino NF unique for its bald eagle habitat. Edgar Mearns documented the first bald eagle nest in Arizona at Stoneman Lake in the late 1800s. The largest concentration of bald eagles ever counted in Arizona (120 eagles) was counted on the forest near Mormon Lake. Fifteen to 20 percent of all bald eagles counted in Arizona in the winter occur on the forest. The forest contains seven bald eagle nesting areas.
- Because of the wide range in biotic communities and natural features, the Coconino NF supports a high diversity of bat species. Of the 28 bat species known to occur in Arizona, 19 have been documented on the forest.

### **The Coconino National Forest's Mission**

"Caring for the Land and Serving People" is the Forest Service motto. This translates into sustaining the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The overall goal of managing National Forest System (NFS) lands is to sustain the multiple uses of its resources in perpetuity while maintaining the long-term productivity of the land.

The Coconino NF's staff strives to effectively and efficiently manage NFS lands and resources to meet the needs and desires of the public while enhancing the environment.

### **The Coconino National Forest's Vision**

The Coconino NF contains healthy ecosystems with an abundant and diverse flora and fauna. The forest provides a variety of high quality outdoor recreation opportunities and serves as an important part of the rich southwestern scenic and cultural heritage. Historic uses, such as timber harvesting and livestock grazing, continue within sustainable levels and support rural economies.

# Chapter 2. Forestwide Management

## Introduction

This chapter sets forth plan decisions and other content that apply forestwide. Plan decisions can be visually distinguished and referenced easily in this chapter by a coding system (described in detail in chapter 1 and figure 2) that identifies: (1) where a plan decision is applicable (forestwide or within a specific management or special area); (2) what resource area is affected by the decision; and (3) what type of plan decision is being made.

See chapter 1 for descriptions of plan decisions (e.g., desired conditions, objectives, guidelines, and standards) and other content (e.g., general description and background, and management approaches). In the event of conflicts with other sections of this plan, the more restrictive plan decision always applies. However, a project or activity-level evaluation may be required to resolve the conflict.

## Ecosystems

### Air

#### Air Quality

##### General Description and Background for Air Quality

Smoke occurs during wildfires, and when fire is used to reduce fuels and restore fire-adapted ecosystems, it is the primary air emission from forest management activities. Management activities that use fire are likely in the short term to increase atmospheric particulates.

The Environmental Protection Agency (EPA), as required by the Clean Air Act of 1963 (P.L. 88-206) as amended, has established National Ambient Air Quality Standards for six pollutants<sup>5</sup> to protect human health, as well as to protect against decreased visibility, damage to animals, crops, vegetation, and buildings. These standards apply to the two airsheds (Little Colorado River Airshed and Verde River Airshed) that overlap the Coconino NF. In addition, the EPA established in 1999 the Regional Haze Rule (40 CFR Part 51) for improved visibility in national parks and wilderness areas. These areas are known as Class I areas and are granted special protections against human-caused air pollution. One of the 12 Class I areas in Arizona overlaps a portion of the Coconino NF to the west (Sycamore Canyon Wilderness). Management activities on the forest are coordinated with the Arizona Department of Environmental Quality (ADEQ), as well as with adjacent agencies, to maintain and protect the air quality in the two airsheds and the Class I area.

##### Desired Conditions for Air Quality

###### FW-Air-Qual-DC

- 1 Air quality on the Coconino NF meets State and Federal air quality standards including visibility and public health. Air quality related values of high quality visual conditions and healthy breathable air are maintained within the Class I area.

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<sup>5</sup> Carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

### Guidelines for Air Quality

#### FW-Air-Qual-G

- 1 Project design for prescribed burns and strategies for wildfires should incorporate emission reduction techniques, such as those listed in Arizona Revised Statute (ARS) 18-2-15, to reduce negative impacts to air quality, subject to economic constraints, technical feasibility, safety criteria, and land management objectives.
- 2 Decision documents for wildfires and prescribed burns should identify [smoke sensitive areas](#) and include management objectives and courses of action to mitigate impacts to those areas.

### Management Approaches for Air Quality

Coordinate with ADEQ during prescribed burns to comply with State and Federal regulatory requirements for emissions and impacts to Class I areas.

Coordinate with ADEQ during wildfires to ensure ADEQ is aware of potential smoke impacts to [receptors](#).

To promote public awareness and protection of human health and safety, notify stakeholders and the public about potential smoke from fire activities through methods of advanced notification through the media and smoke warning signs along roads when visibility may be reduced due to wildland fire.

### Related Plan Content for Air Quality

See the following: [Fire Management](#); [Scenic Resources](#); [Sycamore Canyon Wilderness](#)

## Soil

### General Description and Background for Soils

Soil is the outer, mostly unconsolidated, layer of the Earth's crust that is composed of a mixture of organic, mineral, air, and water in which plants grow. The ability of the soil to function within ecosystem boundaries is important to sustain biological productivity, maintain environmental quality, and promote plant and animal health. Soils are variable on the forest and range from hot, dry desert soils at the lowest elevations to cold, moist soils found in the alpine tundra at the highest elevations. Soils are inventoried and classified in the terrestrial ecological unit inventory called the "Terrestrial Ecosystem Survey<sup>6</sup> of the Coconino NF" (TES) (Miller et al., 1995).

### Desired Conditions for Soil

#### FW-Soil-DC

- 1 Soils function properly to distribute water and cycle nutrients to a variety of vegetation including lichens, mosses, grasses, [forbs](#), shrubs, and trees.
- 2 [Soil productivity](#) and functions, including the ability of the soil to resist [erosion](#), infiltrate water and recycle nutrients, are sustained and functioning properly, so terrestrial and riparian

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<sup>6</sup> The TES contains information for use in land planning and management programs on the Coconino NF. It contains predictions and limitations of soil and vegetation behavior for selected land uses. It also highlights hazards or capabilities inherent in the soil and the impact of selected uses on the environment.

ecosystems are more resilient and better adapted to climate change. Herbaceous vegetation cover is maintained at levels that contribute to suitable hydrologic function, soil stability, and nutrient cycling. The diversity of grass and forb species and presence of plant [litter](#) and grass, forb, shrub, and tree [basal area](#) surface cover reduce occurrences of compaction and erosion.

- 3 Soils are protected by adequate vegetative ground cover on the soil surface to prevent erosion from exceeding natural rates of soil formation (soil tolerance).
- 4 [Biological soil crusts](#) are present with limited soil disturbance (<1/3 of area impacted) and functioning on coarse textured and sandy soils.

### Objectives for Soil

#### FW-Soil-Obj

- 1 Maintain satisfactory soil conditions and improve impaired and unsatisfactory soil conditions on 100,000 to 350,000 acres during the 10 years following plan approval<sup>7</sup>.

### Guidelines for Soil

#### FW-Soil-G

- 1 The forest should implement and monitor [best management practices \(BMPs\)](#) for all ground disturbance activities in accordance with the intergovernmental agreement between ADEQ and the Forest Service Southwestern Regional Office to control and manage nonpoint source pollution.
- 2 To preserve biological soil crusts, disturbance should be minimized in areas where the percentage of biological soil crusts exceeds 5 percent.

### Management Approaches for Soil

Implement projects that are beneficial for maintaining and improving soil condition and productivity and water quality and quantity. Consider giving priority to activities with the least ground disturbance.

Use published terrestrial ecosystem survey information: (1) for broad resource and forestwide assessments and land management and project planning at regional, forest, and district levels; (2) as the basis for determining project goals and objectives, desired ecological conditions, and for predicting effects and impacts of the different management prescriptions and activities upon each terrestrial ecosystem; and (3) for the initial selection of areas for proposed projects.

Conduct onsite soil investigations and refine mapping for soil disturbing projects that require site-specific, precise, highly detailed soil information, which is beyond the scale of the terrestrial ecosystem survey. Analyze or collect site-specific terrestrial ecosystem survey information as needed to accurately determine limitations, suitabilities, and productivity potentials of the different terrestrial ecosystems that occur.

Work with the Rocky Mountain Research Station and other research organizations to understand the linkages among the physical and biological components of soil and plant populations that can

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<sup>7</sup> Treatment priorities should move forest priority 6<sup>th</sup> code watersheds toward satisfactory conditions.

inform managers on responses of ecological and hydrological structure and function to management and disturbance.

#### **Related Plan Content for Soil**

See the following: [Water Quality and Quantity](#); [Vegetation](#); [Fire Management](#); [Roads and Facilities](#)

### **Watersheds**

#### **General Description and Background for Watersheds**

Plan direction for watersheds is described using watershed scales to help provide their relative importance or [niche](#). Conditions for larger land areas are described under the 4<sup>th</sup> to 5<sup>th</sup> code [watershed scale](#). More detailed descriptions for site-specific conditions are described at the 6<sup>th</sup> code watershed scale.

Municipal watersheds are those designated where communities obtain municipal water supplies by special use authorization. The only designated municipal watershed is the Inner Basin. Woody Well Field and Lake Mary Well Field are located in municipal supply watersheds.

#### **Desired Conditions for Watersheds**

##### **FW-WtrShd-DC**

- 1 Watersheds are functioning and are resilient to natural and human disturbances.
- 2 Watersheds exhibit high [geomorphic](#), hydrologic, and biotic integrity relative to their potential natural condition. All watersheds function properly, and the natural hydrologic, hydraulic, geomorphic, and biologic processes function at a level that allows retention of their unique physical and biological properties. Watersheds have enough [effective vegetative groundcover](#), such that they are resilient, recover rapidly from natural and human disturbances, and maintain long term soil productivity. They exhibit a high degree of connectivity along the stream, laterally across the [flood plain](#) and valley bottom and vertically between surface and subsurface flows.
- 3 Watersheds provide important ecosystem services such as clean water, recharge streams and aquifers, maintain riparian communities, and moderate climate variability and change. They maintain long term soil productivity. Watersheds provide habitat that supports adaptive animal and plant communities that reflect natural processes.

#### **Objectives for Watersheds**

##### **FW-WtrShd-Obj**

- 1 [Class 2](#) (functioning at risk) and Class 3 (impaired) 6<sup>th</sup> code watersheds are trending toward Class 1 in 5 to 7 priority 6<sup>th</sup> code watersheds<sup>8</sup> during the 10 years following plan approval.

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<sup>8</sup> Priority watersheds are identified based on ecological, economic, social considerations, partnership opportunities, and potential benefits following the National Watershed Condition Framework or more current methodologies.

### **Guidelines for Watersheds**

#### **FW-WtrShd-G**

- 1 To enhance the protection of human health and safety, watershed treatments such as vegetation thinning, prescribed burning, and channelization should be considered where protection of people, structures, and community infrastructure (e.g., roads, bridges, and power corridors) in and associated with the [wildland-urban interface \(WUI\)](#) are at risk.
- 2 Watershed restoration and maintenance should focus on priority 6<sup>th</sup> code watersheds to ensure that ecosystem processes, resilient vegetation conditions, and natural disturbance regimes are improved to, or remain in, [proper functioning condition](#) in those watersheds.

### **Management Approaches for Watersheds**

Coordinate with the Rocky Mountain Research Station and other research organizations on long term and landscape studies of watershed function.

### **Related Plan Content for Watersheds**

See the following: [Soil, Aquatic Systems](#); [Vegetation](#); [Wildlife, Fish, and Plants](#); [Fire Management](#); [Roads and Facilities](#)

## **Water Quality, Water Quantity, and Aquatic Systems**

### **General Description and Background for Water Quality, Water Quantity, and Aquatic Systems**

Aquatic systems depend on water quality and water quantity to function properly. Water quality also supports the designated beneficial uses (e.g., aquatic and wildlife, full or partial body contact, fish consumption, domestic water source, agriculture irrigation, and agriculture livestock watering). The aquatic systems contained in the plan include stream ecosystems, wetlands and reservoirs/lakes, springs, and constructed waters (e.g., earthen stock tanks and artificial drinkers).

Desired conditions for some aquatic systems are described using watershed scales to help provide their relative importance or niche. Conditions for larger land areas are described under the 4<sup>th</sup> to 5<sup>th</sup> code watershed scale. More detailed descriptions for site-specific conditions are described at the 6<sup>th</sup> code watershed scale. Not all aquatic systems require a description at each scale.

Four percent of the plants known to be used by tribes that traditionally use the forest occur in water.

Municipal watersheds are those designated where communities obtain municipal water supplies by special use authorization. The only designated municipal watershed is the Inner Basin. Woody Well Field and Lake Mary Well Field are located in municipal supply watersheds.

## Water Quality and Water Quantity

### Desired Conditions for Water Quality and Water Quantity

#### FW-Aq-Wat-DC

- 1 Adequate quantity and timing of water flows are maintained to retain or enhance ecological functions, including aquatic species and riparian vegetation consistent with existing [water rights and claims](#).
- 2 Water quantity (base flows) of intermittent and perennial streams are seasonally sustained while peak flows and flood potential occur within the historic range of variability for that stream system.
- 3 New and existing instream water rights are maintained or procured to ensure that enough water is guaranteed to provide for habitat needs, as well as other needs on the forest, over the long term.
- 4 Water tables are high or elevated so minimal channel downcutting occurs.
- 5 Water quality is sustained at a level that retains the biological, physical, and chemical integrity of the aquatic systems and benefits survival, growth, reproduction, and migration of native aquatic and riparian species.
- 6 Water quality meets or exceeds Arizona water quality standards and supports identified designated beneficial uses and native aquatic species.
- 7 Watersheds that contain recharge areas for designated and eligible wild and scenic river segments retain water quality and recharge to those segments.

### Guidelines for Water Quality and Water Quantity

#### FW-Aq-Wat-G

##### *Water Quality*

- 1 For [impaired waters](#), approved [total maximum daily load \(TMDL\)](#) recommendations or implementation plans should be considered and implemented as appropriate<sup>9</sup> to maintain or improve water quality to meet or exceed Arizona water quality standards and support identified designated beneficial uses.
- 2 At least 80 percent of total streambank linear distance should be maintained in a stable condition to reduce sedimentation, maintain functioning of the channel with its flood plain, and maintain water quality and riparian habitat and function.
- 3 Best management practices for [ground disturbing activities](#) in and outside of streamside management zones should be identified, implemented, and monitored to maintain water quality, quantity, and timing of flows. Ground-disturbing activities should be mitigated through identification and implementation of BMPs from [Forest Service Handbook \(FSH\) 2509.22](#) (Soil and Water Conservation Practices Handbook) and Draft FSH 2509.25 when finalized, or more current guidance.

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<sup>9</sup> As determined by a forest interdisciplinary team.

### *Water Quantity*

- 4 Instream flow water rights for fish, other wildlife, and recreation beneficial uses should be procured for those streams without current water rights to ensure that the water remains on site and is not diverted for other consumptive uses, so it benefits aquatic species, habitat, and recreation.
- 5 Use of water quantity appropriated within existing water rights should be utilized to let excess water flow freely back into existing channel, spring, and riparian habitat to maintain and improve water quality, quantity, and timing of flows for aquatic species and associated habitat.

### **Management Approaches for Water Quality and Water Quantity**

File for water rights on appropriable waters following State procedures. Complete all documentation required for the adjudication process in the Little Colorado and Gila River (Verde watershed) specified by the courts.

Participate in State water rights adjudications and settlement discussions for negotiating water rights settlements outside of extended adjudication.

Secure water rights through purchase or severance and transfer when additional sources are needed.

Maintain and annually update an inventory of all water used on the forest in the forest water rights database.

Develop implementation plans as required by Arizona Revised Statute 49-234 for existing TMDLs to provide strategies to reduce existing pollutant loads identified in TMDLs and to be in compliance with applicable water quality standards for impaired waters.

Coordinate with county and State governments and stakeholders to protect public health and safety with respect to water quality, specifically, the threat of fertilizers to downstream resources on the forest.

Coordinate with stakeholders on water rights issues that can be utilized to maintain or improve riparian attributes.

### **Related Plan Content for Water Quality and Water Quantity**

See the following: [Stream Ecosystems](#); [Wetland/Cienega and Reservoirs/Lakes](#); [Springs](#); [Riparian Types](#); [Wild and Scenic Rivers](#); [Monitoring Plan](#)

### **Stream Ecosystems**

#### **General Description and Background for Stream Ecosystems**

Stream ecosystems have flowing water and include rivers, creeks, and streams and their associated riparian vegetation zones. There are microhabitats such as riffles, pools, and backwaters. Plants, animals, and micro-organisms are specialized to live in and around flowing water. Stream ecosystems collect and transport water, sediment, and organic material from upslope, upstream, and moderate flood events.

## Chapter 2. Forestwide Management

A riparian vegetation zone is the interface between the terrestrial uplands and water, and it includes water dependent plants near the water and often a combination of upland and riparian species as distance from water increases. Riparian areas are more productive per acre in biomass of plants and animals than other vegetation communities, and they border many other vegetation communities, which adds significantly to their ecosystem diversity.

Healthy riparian areas slow water which raises the water table and saturation zone and recharges aquifers. Riparian zones protect streams from excessive sedimentation, erosion, and pollution, and, thus, play a role in water quality. They provide shelter and food for aquatic animals and shade that is important for water temperature regulation. They dissipate stream energy which can reduce flood damage. They provide wildlife habitat, increased biodiversity, and [wildlife corridors](#), enabling aquatic and riparian organisms to move along river systems and thus avoiding isolated communities. Soils within riparian zones play a key role in nutrient and water storage and distribution.

Natural disturbances in stream ecosystems include animals such as beavers, flooding, and changing climatic conditions, such as extended drought. The seasonality and quantity of water in floods are key factors in the germination and establishment of riparian vegetation. Fire is an infrequent disturbance and is dependent on the [fire regime](#) in adjacent vegetation communities.

Stream ecosystems provide water, [forage](#), shelter, and habitat for nesting, roosting, and bedding and are among the most important habitats for wildlife on the Coconino NF. Species that require water for part of their life cycle (i.e., aquatic and semiaquatic species) on the forest are entirely dependent on these limited and scattered water sources. Ninety-three percent (14 out of 15) of the native fish species on the forest are considered [special status species](#). All three native leopard frogs on the forest are either [federally listed](#) or Forest Service sensitive species. Riparian areas make up less than 1 percent of the forest, yet are one of the most biologically diverse ecosystems. Two of the four most imperiled species in the Southwestern Region, Little Colorado spinedace and spikedace, occur in stream ecosystems on the forest. Additional special status species are supported by stream ecosystems such as the southwestern willow flycatcher and northern Mexican and narrow-headed garter snakes. Riparian areas provide migration corridors important for birds and bats.

On the Coconino NF, there are three types of watercourses: ephemeral, intermittent, and perennial. They differ in the timing and duration of waterflow and corresponding vegetation. Ephemeral watercourses flow short term in response to storm events. Intermittent watercourses flow seasonally usually in response to snowmelt and may contain perennial pools. Perennial stream courses flow year-round, and some of their flows may be below the surface. Watercourses include their associated drainages and flood plains.

The main forest riparian potential natural vegetation types (PNVTs) associated with intermittent and perennial systems on the Coconino NF are: (1) Cottonwood Willow Riparian Forest (Cottonwood Willow), (2) Mixed Broadleaf Deciduous Riparian Forest (Mixed Broadleaf), (3) Montane Willow Riparian Forest (Montane Willow) and (4) Gallery Coniferous Riparian Forest (Gallery Coniferous). These are described in the “Vegetation” section of this plan. The vegetation in ephemeral drainages is not as diverse as perennial systems but supports different vegetative species than in the adjacent uplands.

### **Desired Conditions for Stream Ecosystems**

#### **FW-Aq-Strm-DC**

- 1 Stream ecosystems, riparian corridors, and associated stream courses are functioning properly and resilient to natural disturbances (e.g., flooding) and climate change; promote the natural movement of water, sediment, and woody debris; and provide habitat for native and desirable nonnative riparian and aquatic species.
- 2 Streams maintain their natural sinuosity, and their associated flood plains are intact. Channel depths allow for flood plains to be wetted during flood events. Watercourses and the riparian zone have access to their flood plains so that when floods do occur, energy can be dissipated without causing damage to the streambanks of the channel.
- 3 Watercourses, associated flood plains, and riparian zones are capable of filtering sediment, capturing and/or transporting [bedload](#), aiding flood plain development, improving floodwater retention, improving or maintaining water quality, and providing groundwater recharge within their natural potential.
- 4 Stream ecosystems, including ephemeral watercourses, are not fragmented by infrastructure or development, consistent with existing water rights and claims. Ephemeral watercourses are important for dispersal, access to new habitats, perpetuation of genetic diversity as well as nesting and foraging for special status species.
- 5 Flooding is the primary disturbance. Streams and rivers maintain a natural hydrograph, or waterflow over time, including periodic flooding, which promotes natural movement of water, sediment, nutrients, and woody debris. Flooding creates a mix of stream substrates for fish habitat, including clean gravels for fish spawning and sites for germination and establishment of riparian vegetation.
- 6 Native fish and other native aquatic species are present, and habitat conditions are capable of supporting self-sustaining populations. Fish habitat is provided by overhanging banks where possible. Woody and herbaceous [overstory](#) and understory regulate stream temperatures and maintain soil moisture in the [streamside management zone](#).
- 7 Links between aquatic and upland components are maintained, providing access to food, water, cover, nesting areas, and protected pathways for aquatic and upland species. Native fish and other aquatic organisms have unobstructed passage upstream and downstream at all bridge, culverts, and diversion structures, unless there is a specific need to provide a passage barrier such as to physically separate native and nonnative fish.

#### **Related Plan Content for Stream Ecosystems**

See the following: [Water Quality and Quantity](#); [Springs](#); [Riparian Types](#)

### **Wetland/Cienega and Reservoirs/Lakes**

#### **General Description and Background for Wetland/Cienega and Reservoirs/Lakes**

Wetland/cienega ecosystems encompass discrete bodies of water such as wetlands, cienegas, lakes, and reservoirs and their associated vegetation composition and structure. This classification includes wetlands such as Mormon Lake and Stoneman Lake or reservoir/lakes such as C.C. Cragin Reservoir, Knoll Lake, Upper Lake Mary, and Lower Lake Mary.

On the Coconino NF, the term wetland means those areas that are inundated by water with a frequency sufficient to support—and under normal circumstances does or would support—a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions (i.e., presence of hydric soil) for growth and reproduction. Wetlands on the forest are generally disconnected from groundwater and perched above regional groundwater tables and, thus, are completely reliant on precipitation for water input. Therefore, standing water and vegetation in wetlands can fluctuate wildly from basically nonexistent in dry periods to highly productive wetlands in wet periods. Other key processes include the development and presence of hydric soils, decomposition, and nutrient cycling, as well as the geomorphic setting. The combination of these processes result in unique vegetation components and in a functioning wetland.

Natural disturbances are drought and flooding. Disturbances controlled by management activities are livestock grazing, stock tank construction, roads, and off-road vehicle use and other recreation use. Indirect disturbances include increasing tree cover that reduces ground cover in the upland soils and results in erosion and sedimentation of wetlands. Natural fire is an infrequent disturbance, entering from adjacent vegetation communities during drought conditions.

Wetland types differ in water permanency, wetland vegetation, and size. The wetland types are semipermanent, seasonal, temporary or ephemeral wetlands, and reservoirs (table 1).

**Table 1. Flooding conditions by wetland type**

Wetland Type	Flooding Regime <sup>1</sup>	Plant Species Occupying Deepest Zone	Flooding Frequency
Reservoir/lakes, open water	Permanent water	Submergent vegetation; bare soil	Every year
Semipermanent	6–12 months	Hardstem bulrush, cattail; submerged aquatics	>7 of 10 years
Seasonal	3–6 months	Manna grass, spikerush, sedges.	<7 of 10 years
Temporary	1–2 months	Alpine timothy, Foxtail barley	3 of 10 years
Ephemeral	2–6 weeks	Bare soil, dock, western wheatgrass, deergrass	< 3 of 10 years

<sup>1</sup> Flooding regime relates to the timing, spatial extent, depth, and response to runoff associated with the overflowing of water from the normal confines of a stream or other body of water.

Wetlands provide water storage, wildlife habitat, recreation, fisheries, and livestock watering. On the Coconino NF, wetlands primarily occur at elevations ranging from 6,200 to 7,200 feet and cover about 10,000 acres. Most are on Anderson Mesa, which is on the east-central side of the forest. They range in size from Mormon Lake at about 5,500 acres to smaller wetlands less than 10 acres in size.

Cienegas are linear streams associated with spring recharge that are primarily herbaceous and do not have woody vegetation. The forest contains 20 acres of cienegas. An example is Buck Springs on the Mogollon Rim Ranger District. Most cienegas now have stock tanks or dams associated with them that were constructed many years ago. Vegetation composition and structure and soil condition have been altered by stock tanks and dams because water persistence and depth has

changed, negatively affecting riparian function. Most cienegas do not have proper functioning condition (PFC) data, but those assessed were moderately departed.

#### **Desired Conditions for Wetland/Cienega and Reservoirs/Lakes**

##### **FW-Aq-Wtlnds-DC**

- 1 Wetlands and reservoirs/lakes provide functional soil and water resources to support diverse vegetation for native and desirable nonnative, riparian, and aquatic species habitat.
- 2 Within the capability of individual wetland types and consistent with the hydrologic cycle, wetland vegetation has diverse [age classes](#), a diverse composition of [native species](#), and includes species that indicate maintenance of riparian soil moisture characteristics (i.e., plants that occupy deep zones in table 1 above). This provides abundant food, cover, nesting, and spawning habitat.
- 3 Wetlands that are in proper functioning condition are maintained in proper functioning condition. All wetlands except reservoirs are maintaining or trending toward proper functioning condition, at a minimum.
- 4 Soil condition and riparian function are in satisfactory condition on most acres. Soil function (i.e., ability to infiltrate water, recycle nutrients, and resist erosion) is sustained.
- 5 Wetland types provide habitats that are consistent with their flood regime and flood potential.
- 6 Wetlands and reservoirs are managed consistent with designated beneficial uses associated with existing claimed or certified water rights. Water quality is maintained or improved so it fully supports identified beneficial [designated special uses](#) by ADEQ or State water quality standards.
- 7 Plants known to be used by tribes that traditionally use the forest are thriving.

#### **Objectives for Wetland/Cienega and Reservoirs/Lakes**

##### **FW-Aq-Wtlnds-O**

- 1 Restore 5 to 10 wetlands currently not in proper functioning condition (PFC) so that they are in, or are trending toward, proper functioning condition during the 10 years following plan approval.

#### **Guidelines for Wetland/Cienega and Reservoirs/Lakes**

##### **FW-Aq-Wtlnds-G**

- 1 Where necessary to restore waterfowl nesting habitat, fire may be used to remove vegetation and maintain wetland conditions that provide open water, cover, and other beneficial habitat features.

#### **Related Plan Content for Wetland/Cienega and Reservoirs/Lakes**

See the following: [Water Quality and Quantity](#); [Stream Ecosystems](#); [Springs](#); [Riparian Types](#)

## Springs

### General Description and Background for Springs

There are multiple types of springs within the Coconino NF that vary based on landform and geology. Examples include seeps and hanging gardens. Some springs have a unique chemistry that depends on the underlying geology such as the springs that feed Fossil Creek—producing the unique turquoise color and resulting in travertine formations.

Many springs are used as water sources for domestic use, livestock, or wildlife. Springs and wetlands are centers of biological diversity. Springs provide habitat or biological refugia for some species, particularly narrow [endemics](#).

Springs are also important to tribes who have traditionally used lands within the Coconino NF.

### Desired Conditions for Springs

#### FW-Aq-Spr-DC

- 1 Springs provide sufficient water to maintain healthy habitats for native and desirable nonnative riparian and aquatic species and meet the demands of legally held water rights and uses.
- 2 Springs and associated streams and wetlands have the necessary soil, water, and vegetation attributes to be healthy and functioning at or near potential. Waterflow patterns, recharge rates, and geochemistry are similar to historic levels and persist over time.
- 3 Water quality and quantity maintain native aquatic and riparian habitat and water for wildlife and designated beneficial uses, consistent with water rights and site capability.
- 4 Water rights are maintained or procured to protect in situ (onsite) water quantity necessary for riparian vegetation needs; fish and wildlife; and domestic, agricultural, and livestock use.
- 5 Native vegetation around springs exhibits diverse age classes and composition of native species and includes species that indicate maintenance of riparian soil moisture characteristics (e.g., sedges, rushes, willows, and other riparian vegetation), consistent with the type of spring. Vegetation association with springs is variable depending on spring type and can include aquatic plants (e.g., diatoms and algae), submergent and floating vegetation, [emergent vegetation](#), grasses, forbs, sedges, shrubs, and deciduous trees.
- 6 Plant cover protects the banks, edges, and shorelines of springs. Plant distribution (i.e., where it occurs on the landscape) and occurrence are resilient to natural disturbances.
- 7 Soil condition is in satisfactory condition on most acres with only minor components in unsatisfactory or impaired conditions. Soil function is sustained.
- 8 Spring riparian zones are capable of filtering sediment, capturing and/or transporting bedload, improving or maintaining water quality, and providing groundwater recharge within their natural potential.
- 9 Springs are resilient to natural disturbances and changing climate conditions and are functioning across the landscape within their type and capability. They are in proper functioning condition.
- 10 Stream and spring ecosystems are not fragmented by infrastructure or development, consistent with existing water rights and claims. Springs are rarely developed and altered by

human-made structures such as head boxes, cisterns, and pipelines, consistent with existing water rights and claims.

- 11 The physical and biological components of springs provide habitat for a diverse community of riparian and aquatic species including cover, forage, available water, microclimate, and nesting/breeding habitat.

### **Objectives for Springs**

#### **FW-Aq-Spr-Obj**

- 1 Reconstruct<sup>10</sup> or restore riparian function to at least 25 springs identified as not in proper functioning condition to provide water quantity and aquatic habitat for the recovery of plant and animal species during the 10 years following plan approval.

### **Guidelines for Springs**

#### **FW-Aq-Spr-G**

- 1 Fences constructed around springs should not cause harm to wildlife.
- 2 Structures that divert or alter spring flows should be avoided and/or modified to allow some flow from the spring's source to maintain habitat around the spring while still providing for established water rights.
- 3 Open vegetative conditions in the watersheds surrounding springs should be maintained to raise the water table.

### **Management Approaches for Springs**

Continue working with partners and stakeholders, including tribes, to inventory, classify, and prioritize springs for restoration. Include consideration of rare and endemic species when evaluating springs for restoration.

Work with partners and stakeholders to develop strategies for restoration of upland watersheds to improve spring flows.

Secure water rights for springs where there are no existing water rights or claims.

### **Related Plan Content for Springs**

See the following: [Water Quality and Quantity](#); [Stream Ecosystems](#); [Riparian Types](#)

## **Biophysical Features**

### **Caves, Cliffs, and Talus Slopes**

#### **General Description and Background for Caves, Cliffs, and Talus Slopes**

Biophysical features include geological features such as caves, cliffs, and talus slopes. Caves include any naturally occurring void, cavity, recess, or system of interconnected passages beneath the surface of the Earth or within a cliff or ledge, and that is large enough to permit a person to

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<sup>10</sup> Where there is a structure in place to utilize water from a spring as a water source. In this case, water should be piped out of the riparian area to avoid trampling of the riparian area around the spring.

enter, whether the entrance is excavated or naturally formed. This definition includes any fissure (large crack), lava tube, natural pit, sinkhole, or other opening which is an extension of a cave entrance or which is an integral part of the cave. Cliffs are any high, steep, or overhanging rock or Earth face. Talus slopes are the accumulation of rock piled up at the base of a cliff, chute, or slope.

Cave resources include any material or substance occurring naturally in caves such as plant and animal life, paleontological deposits, sediments, minerals, cave formations, and cave relief features. Most cave resources are not replaceable and not renewable.

The Coconino NF contains many significant karst/limestone and volcanic/lava tube cave resources including Lava River Cave, a designated recreational cave. Caves often contain archaeological materials and are of traditional importance to various American Indian groups. Caves identified as the abodes of deities or forces of nature where ceremonial offerings are still made are traditional cultural properties. Caves provide habitat for a variety of wildlife, including bats. Temperature, humidity, and disturbance levels affect the ability of bats to roost in caves. Karst and other subterranean hydrological systems are important to the sustainability of the cave ecosystem, related interdependent fauna, and overall beneficial uses of the groundwater and surface water system. Recreational activities dependent on biophysical features (e.g., rock climbing) occur on the forest. Several rock climbing areas on the forest are nationally and internationally known.

#### **Desired Conditions for Caves, Cliffs, and Talus Slopes**

##### **FW-BioPhys-Geo-DC**

- 1 Caves, cliffs, and talus slopes have geological features that provide unique habitats for plants and wildlife, including some rare species, and are protected from damage or alteration that may result from recreational uses such as cave exploring and rock climbing.
- 2 Significant cave resources' aesthetic, cultural, and scientific values remain intact and are protected from damage. Caves provide a range of recreational and educational opportunities, without diminishing the cave resource.
- 3 Caves provide habitat for species that require specialized conditions for roosting and overwintering such as bats. Caves maintain moisture and temperature levels consistent with historic conditions. Caves known to be important for species of conservation concern are intact or provide habitat for these species. New bat diseases, such as white-nose syndrome, are not introduced in caves.
- 4 Archaeological, geological, paleontological, and biological features of caves are not disturbed by visitors.
- 5 Cave formations and relief features continue to develop or erode under natural conditions. Water flowing into, from, or within the cave system is not altered or diverted in its flow; contains normally fluctuating background levels of sediment, organic matter, and dissolved minerals; and is not polluted.
- 6 Cliffs and rock outcrops continue to support nesting and feeding habitats for birds of prey and roosting habitat for bats, and they provide escape, bedding, and lambing cover for Rocky Mountain bighorn sheep. They provide habitat for rare plants such as cliff fleabane, Senator Mine alumroot, and Flagstaff pennyroyal.

- 7 Rock climbing and related recreational activities offer challenges and opportunities for rock climbing, canyoneering, and other related recreational activities, but they do not diminish the quantity or quality of specialized vegetation, such as lichens, and wildlife communities nor do these activities disrupt life processes of rare or threatened species.
- 8 Dispersed recreation activities do not alter plant and wildlife communities or their substrate on cliffs and in caves. Graffiti and vandalism also do not occur within or on these sensitive habitat areas.
- 9 Talus slopes are natural, generally undisturbed features that provide habitat for lizards, snakes, land snails, lichens, and rare plants, including the San Francisco Peaks ragwort. They maintain near historic levels of moisture and are free from excessive sedimentation. In areas where there are species of conservation concern, there is a near historic level of high quality rocky habitat.

#### **Standards for Caves, Cliffs, and Talus Slopes**

##### **FW-BioPhys-Geo-S**

- 1 For caves that have been designated or nominated as “significant,” manage to perpetuate those features, characteristics, values, or opportunities for which they were designated.

#### **Guidelines for Caves, Cliffs, and Talus Slopes**

##### **FW-BioPhys-Geo-G**

- 1 To prevent siltation into sinkholes, cave entrances, collapse of cave passageways, and alteration of the chemical, physical, and biological conditions of the cave resource, project design should include protections for cave entrances and subsurface geology, where they occur. A radius of 200 feet should be used for restrictions on activities<sup>11</sup> that can alter the cave’s resources, functions and associated features unless site-specific adjustments are made based on topography, drainage, soil type, and the expected impact of the proposed activity.
- 2 Blasting and/or controlled source seismic surveys requiring explosives or other disruptive techniques should minimize damage to cave features.
- 3 To increase chances of survival for young wildlife, active roosts, nests, and dens should not be disturbed.
- 4 Human alteration of caves should be mitigated to mimic pre-disturbance conditions and function or where this level of restoration is not feasible to prevent further degradation of the cave resource and functions.
- 5 If previously undiscovered caves are encountered above the zone of saturation for the regional water aquifer during drilling operations, precautions should be taken to protect the cave, including sealing the casing above and below the cave to prevent airflow and water leakage to maintain sensitive ecosystem conditions.
- 6 Closure areas around caves or gating of caves should only be considered as a management practice when there are no other options to protect cave and wildlife resources and public

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<sup>11</sup> This radius is not intended to exclude all management activities within the restricted area; only activities such as direct fire ignition, road construction, and mechanical treatment of vegetation which are expected to alter cave conditions are intended to be restricted or mitigated.

safety. When closing caves to public entry, wildlife friendly gates that meet Bat Conservation International (BCI) recommendations should be installed to protect bats and/or other wildlife species that are present.

### **Management Approaches for Caves, Cliffs, and Talus Slopes**

Foster collaboration and exchange of information between governmental agencies, partners, and other stakeholders to address conservation and interpretation and education management for cave resources, grottos, and associated species.

Coordinate with partners and State and Federal agencies to both manage and monitor bat roosts to determine population dynamics at least once every 3 years.

Encourage partnerships with caving organizations, scientists, and outdoor recreationists to secure, preserve, and protect forest biophysical features and their resources.

Educate the public about the unique ecological and aesthetic value of biophysical features including cave protection, safety, and etiquette, particularly at Lava River Cave.

At the program level, monitor significant caves or other biophysical features to determine visitor impacts and the conditions of key resources in order to protect the long-term ecology of the feature or resource.

Periodically update the list of significant caves on the forest.

Foster collaboration with the U.S. Fish and Wildlife Service, Bat Conservation International, Arizona Game and Fish Department, and other stakeholders to address conservation and interpretation and education management for bat species.

Educate the public on disease prevention “best practices” for caves.

### **Related Plan Content for Caves, Cliffs, and Talus Slopes**

See the following: [Paleontological Resources](#); [Alpine Tundra](#); [Wildlife, Fish, and Plants](#); [Heritage Resources](#); [Dispersed Recreation](#)

## **Paleontological Resources**

### **General Description and Background for Paleontological Resources**

Paleontological resources are any fossilized remains, traces, or imprints of organisms, preserved in or on the Earth’s crust that are of paleontological interest and provide information about the history of life on Earth.

### **Desired Conditions for Paleontological Resources**

#### **FW-BioPhys-Paleo-DC**

- 1 The unique fossils that represent paleontological resources are available for scientific research and limited public collection with minimal human impacts to study and/or collection sites.

- 2 The scientific value of paleontological sites is preserved and sites are generally free from adverse impacts. Sites retain integrity and stability, especially sites susceptible to imminent risks or threats, or where the values are rare or unique. Visitor impacts to sites are minimal, and significance and integrity are maintained through conservation and preservation efforts. Vandalism, theft, and human-caused damage to paleontological resources are rare. Vertebrate fossils (commonly bones, bone fragments, teeth and/or tracks) remain on the forest, unless collected by permit. Casual collecting of reasonable amounts of common invertebrate and plant paleontological resources for noncommercial personal use result in negligible surface disturbance. Paleontological resources and copies of associated records are preserved for the public in an approved repository, to be made available for scientific research and public education.

### **Guidelines for Paleontological Resources**

#### **FW-BioPhys-Paleo-G**

- 1 To conserve scientific, interpretive, and legacy values, known locations of key paleontological resources (Classes 3, 4, and 5 of the [Probable Fossil Yield Classification](#) system) should be protected from disturbance. If full protection is not feasible, effects of disturbance should be mitigated to the extent possible.
- 2 Areas including, but not limited to, wilderness, botanical, or geological special areas, and research natural areas may be closed to casual fossil collecting or require a permit for any fossil or paleontological resource collection to protect the resources for which those areas were designated. Locality information of paleontological resources should also be protected to preserve cultural integrity and value.

### **Management Approaches for Paleontological Resources**

Emphasize interagency coordination and collaborative efforts, where possible, with the scientific community, non-Federal partners, and the general public.

Conduct paleontological surveys in areas where there is high potential to encounter these resources prior to ground-disturbing activities.

Facilitate evaluation of the discovery and development of appropriate mitigation measures if paleontological resources are discovered.

Develop a prioritized list of localities that need stabilization activities to preserve them. Monitoring of localities is prioritized in high visitation areas such as roads, campgrounds, and trails.

Retain records at Forest Services offices when they need to be accessed regularly for research purposes. Maintain electronic records, including an index of documents of historic research value.

Work with partners such as the Museum of Northern Arizona and Northern Arizona University to protect and monitor localities.

Promote educational programs, interpretive presentations, or publications to increase public awareness of forest paleontological resources and their significance.

### Related Plan Content for Paleontological Resources

See the following: [Caves, Cliffs, and Talus Slopes](#); [Heritage Resources](#); [Recreation](#)

## Vegetation

### All Vegetation Types

See appendix A, map 4.

### General Description and Background for All Vegetation Types

#### Scale

The ecological desired conditions for terrestrial ecosystems are grouped by potential natural vegetation types (PNVTs) and described at multiple, nested [scales](#) and may only be achievable over a long timeframe (e.g., several hundred years). Descriptions at various scales are developed to provide detail and guidance for the design of future projects and activities that help achieve the desired conditions over time. Descriptions under the landscape scale provide the “big picture” desired conditions for terrestrial resources across the larger land area. Descriptions at the mid-scale and fine scale provide further details necessary for guiding future site-specific projects and activities. A combination of fine scale units adds up to the mid-scale and a combination of mid-scale units adds up to the landscape scale. These scales are for descriptive purposes, and not all scales may necessarily apply to every project.

The landscape scale is an assemblage of mid-scale units, typically composed of variable elevations, slopes, aspects, soils, plant communities, and disturbance processes. An area at the landscape scale is comprised of multiple mid-scale units, most often 10 or more. For this plan, the mid-scale is a unit of 100 to 1,000 acres and is composed of assemblages of fine scale units that have similar biophysical conditions. The fine scale description is usually a 10-acre area or less at which finer scale items are described such as the distribution of individual trees (e.g., single, grouped, or aggregates of groups).

### Desired Conditions for All Vegetation Types

#### FW-Veg-All-DC

##### *Landscape Scale (10,000 acres or greater)*

- 1 Each PNVT contains a [mosaic](#) of vegetation conditions, densities, and structures. This mosaic occurs at a variety of scales across landscapes and watersheds and reflects the natural disturbance regimes affecting the area.
- 2 Vegetation conditions are resilient to the frequency, extent, and severity of disturbances such as fire in fire-adapted systems, flooding in riparian systems, and climate variability. Coconino NF landscapes are [functioning ecosystems](#) that retain their components, processes, and functions. Natural and human disturbances provide desired overall plant density, species composition (i.e., mix of species), [structure](#) (i.e., form, shape, arrangement, and density of the species of the composition on the landscape), [coarse woody debris](#), and nutrient cycling. Desired disturbance regimes, including fire, are restored where practical.
- 3 Native plant communities dominate the landscape while invasive species are nonexistent or in low abundance and do not occur at levels that disrupt ecological functioning.

Establishment of invasive plant species new to the Coconino NF is prevented. Existing invasive plant species are prioritized for eradication, containment, or control.

- 4 Vegetation and stream connectivity provides for upland and aquatic species movements and genetic exchange consistent with landforms and topography.
- 5 Vegetation conditions allow for transition zones or [ecotones](#) between riparian areas, forests, woodlands, shrublands, and grasslands. Transition zones shift in time and space due to factors affecting site conditions (e.g. fire, climate).
- 6 Native insect and disease populations are generally at endemic levels with occasional outbreaks. A variety of vegetation structures usually restrict the scale of localized insect and disease outbreaks.
- 7 Vegetation provides sustainable amounts of products, such as wood fiber or forage. Herbivory (the act of feeding on plants) aids in sustaining or improving native vegetation cover and composition. Livestock grazing and wood fiber harvest activities contribute to aspects of the social, economic, and cultural structure and stability of rural communities.
- 8 Ecosystem contributions (e.g., nutrient cycling, water [infiltration](#), wildlife habitat) are sustained as vegetation on the forest adapts to a changing climate.
- 9 Plants known to be used by tribes that traditionally use the forest are thriving.
- 10 Rare and culturally important plant species are valued, and their habitats are enhanced and protected.

*Mid-Scale (100 to 1,000 acres)*

- 11 The composition, density, structure, and mosaic of vegetation conditions reduce the threat of uncharacteristic wildfires to local communities and ecosystems.
- 12 Potentially suitable habitat for Southwestern Region sensitive plant species helps maintain the [viability](#) of those species.

*Fine Scale (10 acres or less)*

- 13 Endemic rare plant communities are intact and functioning.
- 14 Unique plant community habitats (e.g. limestone cliffs, margins of springs, Verde Valley Geological Formation, basalt lava flows/cinders, calcareous soil/alkaline clay, canyons/cliffs and ledges, granitic soils/igneous rocks, and sandstone rocks/soils) are present to maintain self-sustaining populations of associated native plant species.
- 15 Habitat conditions promote pollinator success and survival.
- 16 Snags are present in adequate numbers to provide habitat features such as cavities and loose bark.

**Objectives for All Vegetation Types**

**FW-Veg-All-O**

- 1 Achieve 1,000 acres of aspen and maple restoration during the 10 years following plan approval.

### Standards for All Vegetation Types

#### FW-Veg-All-S

- 1 Clearcutting may be used as a cutting method only where it is determined through site-specific analysis to be the optimum method for a particular area to make progress toward desired conditions. The maximum size opening that may be created using the clearcut method shall not exceed 40 acres except when it is following a large-scale disturbance event such as a stand-replacing fire, wind storm, or insect or disease outbreak.
- 2 Seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an [even-aged stand](#) of timber may be used as a cutting method only where it is determined to be appropriate to meet the desired conditions. These other even-aged methods may exceed 40 acres when, following interdisciplinary review, it is determined appropriate to meet land management objectives. This standard requires 60 days public notice and review by the regional forester.
- 3 When [openings](#) are created with the intent of regeneration, efforts shall be made to ensure that lands can be adequately restocked within 5 years of final harvest.

### Guidelines for All Vegetation Types

#### FW-Veg-All-G

- 1 In order to reduce the risk of wildfires in wildland-urban interface areas, forest and woodland vegetation within the wildland-urban interface may have lower tree density, more open [stand](#) conditions, younger age classes, and less coarse woody debris and [snags](#).
- 2 Even-aged silvicultural practices may be used as a strategy for achieving the desired conditions over the long-term such as bringing mistletoe infection levels to within a sustainable range or for old tree retention.
- 3 Naturally ignited fires (i.e., lightning-caused fires) should be allowed to burn in fire adaptive vegetation types when burning conditions facilitate progress toward desired conditions.

### Management Approaches for All Vegetation Types

Foster partnerships with the Rocky Mountain Research Station and other science organizations to develop concepts and tools applicable to vegetation management on the Coconino NF, as well as identify research opportunities related to management activities aimed at restoring ecosystems.

Work with volunteer groups on projects that improve vegetation and ecosystem function.

### Related Plan Content for All Vegetation Types

See the following: [Aquatic Systems](#); [Biophysical Features](#); [Soil](#); [Wildlife, Fish, and Plants](#); [Invasive Species](#); [Fire Management](#); [Livestock Grazing](#); [Forest Products](#); and [Scenic Resources](#)

### Riparian Types

See appendix A, map 5.

## **General Description and Background for Riparian Types**

### **Cottonwood Willow Riparian Forest**

Cottonwood Willow Riparian Forest currently covers about 2,507 acres of the Coconino NF and is found between 2,500 and 4,300 feet in elevation. It is patchily distributed along the lower gradient reaches of perennial streams including the Verde River, Oak Creek, West Clear Creek, Wet Beaver Creek, Dry Beaver Creek, and Fossil Creek as well as other perennial and intermittent streams and tributaries. Dominant vegetation includes: Fremont cottonwood, willow, ash, box elder, alder and others. Various grasses and forbs are usually present. Riparian vegetation generally occurs along the stream channel.

Cottonwood Willow is adjacent to the main communities of Cottonwood, Camp Verde, and Cornville and other communities in the broader valley flood plains along the Verde and confluences of its major tributaries. Much of this PNVF along the Verde River, lower Oak Creek and lower Wet Beaver Creek is privately owned or managed by Arizona State Parks. Water diversions and increasing human development in the watersheds have affected quantity and seasonality of historical flood regimes.

Eighteen percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

### **Mixed Broadleaf Deciduous Riparian Forest**

Mixed Broadleaf Deciduous Riparian Forest covers approximately 3,612 acres of the Coconino NF. Found between 3,300 and 6,400 feet in elevation, it is patchily distributed across the forest and includes Sycamore Canyon; mid-elevation portions of West Clear Creek, Oak Creek, Beaver Creek and Fossil Creek; and associated tributaries. Mixed Broadleaf consists of a vegetation mix of riparian woodlands and shrublands with various dominant species, depending on site-specific characteristics. Vegetation can include: Arizona sycamore, thin leaf alder, willow, conifers, box elder, narrow leaf or Fremont cottonwoods, velvet ash, Arizona walnut, and often contains oaks and conifers, including Arizona cypress, from adjacent uplands. Soil productivity is inherently low on terraces and higher along flood plains.

Twenty-seven percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

### **Montane Willow Riparian Forest**

Montane Willow Riparian Forest covers approximately 3,829 acres of the Coconino NF. Found between 4,700 and 8,700 feet in elevation, it is scattered along perennial streams such as Upper Clear Creek and its tributaries; seasonally intermittent streams; wet meadows; and isolated springs at higher elevations. Trees include: Bebb's willow, narrowleaf cottonwood, velvet ash, cherry, box elder, Arizona walnut, and Arizona alder. Dominant shrubs include red osier dogwood, willows, and woods rose. The understory consists of a variety of grass and grasslike species, including sedge, Baltic rush, spikerush, and deergrass. Outlying populations of this PNVF may have unique genetic components.

Eight percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

### Gallery Coniferous Riparian Forest

Gallery Coniferous Riparian Forest covers approximately 200 acres of the Coconino NF. Found between 6,100 and 6,800 feet in elevation, it is known as the “canyon bottom forest,” and it is located in areas such as Jack’s Canyon (north of State Highway 87) on the Mogollon Rim Ranger District and the upper end of the West Fork of Oak Creek. Historically this PNVNT had over 10 percent tree and shrub cover, with the exception of early, post-disturbance communities. This PNVNT experiences periodic flooding and high water tables. Dominant tree species typically include: subalpine fir, Engelmann spruce, Douglas-fir, blue spruce, quaking aspen, narrowleaf cottonwood, bigtooth maple; box elder, alder, willows, Gambel oak, ponderosa pine, and Rocky Mountain juniper. Dominant shrubs include red osier dogwood, willows, and woods rose. The understory consists of a variety of grass and grasslike species, including sedge, Baltic rush, spikerush, and deergrass.

### Desired Conditions for Riparian Types

#### All Riparian Forest Types

##### *FW-Veg-Rip-All-DC*

- 1 Riparian PNVNTs have healthy watersheds and riparian areas that are resilient to disturbances (e.g., flooding); allow a variety of plant and animal species to thrive, especially those unique to these habitats; and allow ecological processes to perform their natural role. Generally, riparian areas are rarely impacted negatively by livestock.
- 2 Riparian zones filter sediments and contaminants, build and stabilize banks, reduce the effects of flooding, store and release water, recharge the aquifer, support a diverse composition of riparian vegetation which regulates water temperature, and support a high diversity of native aquatic and water-dependent fauna. Native riparian vegetation is diverse and provides the structure and composition to function within their natural potential and provide food and cover for wildlife.
- 3 Riparian areas are properly functioning and are comprised of a diverse age class of riparian-wetland vegetation and composition that have root masses and herbaceous vegetation capable of stabilizing banks, and function to filter sediment and maintain or improve water quality to attain designated beneficial resource uses. Riparian vegetation includes native aquatic plants, aquatic macrophytes, aquatic emergents, grasses and sedges, forbs, shrubs, and deciduous trees. The diversity of riparian vegetation in all age classes provides for structural diversity important to fauna. Structural diversity includes aquatic vegetation; leaf litter; ground cover and understory, mid-story, overstory, dead and live trees; and dead and down woody material. This woody material provides prey base habitat, aquatic nutrient cycling, and soil retention. Multiple [seral stages](#) and age classes of native vegetation are represented. Enough seedlings and saplings are present for replacement and succession.
- 4 Mesquite bosques are open, parklike stands of mesquite trees which are adjacent to Cottonwood Willow or Mixed Broadleaf Deciduous Riparian vegetation. The water table is high enough so that mesquite bosques persist on upland terraces. The combination of Cottonwood Willow Riparian Forest with mesquite bosques creates a unique vegetation community favored by bird species such as the yellow-billed cuckoo and Bell’s vireo.
- 5 In mesquite bosques, a variety of age classes are present and old trees are prominent. The understory is comprised of native grasses and forbs that support the [natural fire regime](#). Based on terrestrial ecosystem survey map units, vegetation ground cover in mesquite

bosques is comprised of about 15 percent litter and 10 percent plant basal area. Non-vegetation ground cover consists of sandy soils and rock fragments of gravel, cobble, and rock outcrop.

- 6 Riparian areas also provide abiotic structure such as silt, sand, gravel, cobble, boulders, and bedrock—all of which are important for a variety of aquatic and terrestrial fauna. The associated water table supports riparian vegetation and restricts nonriparian vegetation. Riparian vegetation assists in filtering ash from flowing into perennial streams.
- 7 Soils are rarely compacted by management activities and are protected by leaf litter cover.
- 8 Soil function is sustained so it infiltrates and disperses water properly, withstands accelerated erosion, and cycles nutrients. Upland vegetation is maintained or improved to prevent excessive erosion of or sedimentation into downstream aquatic habitat.
- 9 Soil in wet and headwater meadows has a spongy, moist nature, generally as a result of a shallow water table and functions to filter water. These soils also store and release water over an extended period of time and release it so it is distributed downstream and through associated meadows.
- 10 Flooding is the primary disturbance, not fire. Fire is a disturbance from incursions originating in adjacent systems and may creep into riparian corridors. Fire in riparian areas is influenced by the fire regime condition class in adjacent vegetation types. Depending on temperature, precipitation, and drought, fire behavior and effects are variable. Fire in the surrounding watersheds periodically provides slight increases in sediment, nutrients, and water that cause minimal channel modifications.
- 11 Habitat and ecological conditions are capable of providing self-sustaining populations of native, riparian-dependent plant and animal species.

**Cottonwood Willow Riparian Forest**

*FW-Veg-Rip-CWRF-DC*

- 1 Associated higher stream terraces support a mix of riparian and upland vegetation, including mesquite and desert willow. Soil productivity is inherently low on terraces and high on flood plains due to available soil and water. Flood plains tend to have higher surface litter and diversity of species, more protective ground cover, and greater vegetation productivity (i.e., biomass) than terraces. Consequently, flood plains have greater ability to resist erosion and recycle nutrients. Bends in the stream channel and low gradient help disperse stream energy. Water tables remain high year round.

**Mixed Broadleaf Deciduous Riparian Forest**

*FW- Veg-Rip-MBDRF-DC*

- 1 Generally, both terraces and flood plains have high amounts of protective litter and plant cover and are not compacted. Consequently, terraces and flood plains are able to resist erosion and recycle nutrients. Water tables remain high year round.

**Montane Willow Riparian Forest and Gallery Coniferous Riparian Forest**

*FW- Veg-Rip-MW&GCRF-DC*

- 1 Soils have high amounts of litter and plant cover, and a spongy, moist surface in terraces and wet meadows. Soil productivity is moderate to high on terraces and higher along flood

plains. Generally, both have high amounts of protective litter and plant cover and are not compacted. Consequently, terraces and flood plains are able to resist erosion and recycle nutrients. Water tables in Montane Willow Riparian are at levels that sustain properly functioning riparian forests. Water tables in Gallery Coniferous Riparian are seasonally high.

**Objectives for Riparian Types**

**All Riparian Forest Types**

*FW-Veg-Rip-All-O*

- 1 Restore the structure of at least 200 to 500 acres of nonfunctioning and functioning-at-risk riparian areas during the 10 years following plan approval, with emphasis on priority 6<sup>th</sup> code watersheds, so that they are in or moving toward proper functioning condition.

**Guidelines for Riparian Types**

**All Riparian Forest Types**

*FW-Veg-Rip-All-G*

- 1 In riparian areas, recreation activities, permitted uses, and management activities should occur at levels or scales that do not significantly impact soil function, riparian vegetation, and water quality.
- 2 A vegetated streamside management zone<sup>12</sup> should be identified and maintained.

**Table 2. General starting point for width of stream management zones in riparian and nonriparian stream courses by erosion hazard**

Erosion Hazard	Width of Zone in Nonriparian Stream Courses	Width of Zone in Riparian Stream Courses
Severe	100 feet each side of stream course	120 feet each side of stream course
Moderate	70 feet each side of stream course	100 feet each side of stream course
Slight	35 feet each side of stream course	70 feet each side of stream course

- 3 When riparian areas are accessible, livestock use should be restricted to times when vegetation is dormant. To avoid negative impacts to vegetation, livestock utilization should not exceed 20 percent on woody vegetation (e.g., trees and shrubs such as cottonwood and willow). Within riparian areas, an adequate height of herbaceous, water-loving vegetation should be maintained to protect streambanks. This guideline would not apply to structural

<sup>12</sup> This zone generally follows the shape of the water course or riparian areas and consists of vegetation and vegetative litter. The purpose is to buffer against detrimental changes in the temperature regime of the water body, provide bank stability, filter excessive sediments such as ash flows and nutrients, and provide shade for fisheries habitat. The intent is to minimize, not necessarily exclude, soil and vegetation disturbance from management activities in this zone. The ability of the stream management zone to trap and filter sediments is a function of the amount and type of material on the ground and width and slope of the zone. Table 2 is intended to be a general starting point for determining the width of the streamside management zone, based on average cover conditions and erosion hazard. Other considerations for the size and shape of a streamside management zone include soil type or hydrologic soil group, orientation of stream or river to the sun, connection of stream to impaired waters, presence of threatened or endangered species, and condition of the riparian area.

developments such as gaps, pipelines, or other infrastructure used to minimize impacts to riparian areas at a larger scale.

- 4 To provide habitat for wildlife, particularly special status species such as the yellow-billed cuckoo, mesquite bosques should not be fragmented by development and infrastructure.
- 5 To assure vegetative diversity at the fine scale, management activities should promote the presence over the long term (i.e., within 10 years) of three or more riparian species, where site potential exists, in a variety of age classes including seedling, sapling, mature, and overmature.
- 6 In order to achieve bank stability and soil and riparian function, [effective](#) (80 percent of natural herbaceous levels) vegetative cover within flood plains, terraces, and riparian areas should be maintained. This guideline would not apply to structural developments such as gaps, pipelines, or other infrastructure used to minimize impacts to riparian areas at a larger scale.

#### **Related Plan Content for Riparian Types**

See the following: [Aquatic Systems](#); [Soil](#); [Wildlife, Fish, and Plants](#); [Invasive Species](#); [Recreation](#)

#### **Desert Communities**

See appendix A, map 6.

#### **General Description and Background for Desert Communities**

Desert Communities (also known as desert scrub) cover approximately 63,548 acres of the Coconino NF. Generally found between 2,700 and 4,800 feet in elevation, they are located on the Red Rock Ranger District. Desert Communities contain numerous roads and private land parcels and adjoin the communities of Cottonwood, Camp Verde, Cornville, and Page Springs. Desert Communities are comprised of two vegetation subtypes that vary in composition and structure: creosote bush-dominated sites and crucifixion thorn-dominated sites.

Some soils in this PNVT contain significant quantities of calcium carbonate, and a pH of 8 or more is common. There is severe [erosion hazard](#) on slopes greater than 35 percent. The hot arid climate and calcareous soils significantly limit potential for revegetation. This is not a fire-adapted community, but fire has historically occurred at infrequent intervals. This PNVT supports a unique community of endemic plants adapted to these calcium-rich soils, and it is the location of the Verde Valley Botanical Area.

Fifty-seven percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

#### **Desired Conditions for Desert Communities**

##### **FW-Veg-DC-DC**

##### *Landscape Scale (10,000 acres or greater)*

- 1 Desert Communities have functional soils that support a variety of native species, including endemic plants such as Arizona cliffrose.

## Chapter 2. Forestwide Management

- 2 Predominant plants are native shrubs and grasses in various age classes. There is sparse vegetation cover over most of the area that includes native perennials and varying amounts of native annual species. Cover of these can be high after exceptionally wet winter or summer seasons, but the cover is of short duration and does not lead to uncharacteristic fire. There is successful regeneration and establishment of native endemic plant species.
- 3 Erosion occurs at natural rates. There is little sign of compaction or accelerated erosion. Arroyos are stabilizing and recovering. Soils are [friable](#) and biologically diverse so plants form beneficial relationships with soil microbes. Roots are covered with soil and there is little evidence of plants perched above the soil with exposed roots (i.e., pedestalling).
- 4 Fires are rare because this is not a fire-adapted community.

### *Mid-Scale (100 to 1,000 acres)*

- 5 Habitat for Arizona cliffrose (a federally endangered species) and endemic plants is connected and preserved. Population numbers for Arizona cliffrose remain static or increase over the long term. Habitat for Arizona cliffrose and other endemic plants remains suitable.

### *Fine Scale (10 acres or less)*

- 6 Biological soil crusts are present to improve nutrient cycling and stabilize soils, especially in sandier soils.

## **Guidelines for Desert Communities**

### **FW-Veg-DC-G**

- 1 Excessive ground disturbance<sup>13</sup> should be avoided to limit accelerated erosion and to minimize bringing more calcareous soil to the surface<sup>14</sup>.

## **Related Plan Content for Desert Communities**

See the following: [Soil](#), [Wildlife, Fish, and Plants](#)

## **Grassland Types**

See appendix A, maps 6 and 11.

## **General Description and Background for Grassland Types**

Great Basin Grasslands and Montane Grasslands provide habitat for pronghorn, a [management indicator species](#).

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<sup>13</sup> According to the TES, excessive ground disturbance results in the extent of exposed soil greater than expected for the site; active erosion features with soil being carried offsite in most areas, not just in localized patches; live plants and litter not protecting most of the area; obvious flow patterns and fan deposits; abundant deep rills; and deep gullies with sharp edges.

<sup>14</sup> Bringing calcareous soil to the surface would limit soil plant nutrient availability.

### **Semidesert Grasslands**

Semidesert Grasslands cover approximately 89,683 acres of the Coconino NF. They occur on the Red Rock Ranger District and are bounded by the PNVTs Desert Communities at lower elevations and Piñon-Juniper Evergreen Shrub at higher elevations. They contain numerous roads and private land parcels and adjoin the main communities including Camp Verde, Cottonwood, and Cornville. Soils in this PNVT are generally not suited for intensive disturbance because they are dominated by soils that are shallow, have high amounts of surface rock, high amounts of carbonates at or near the surface, or high amounts of clay with low bearing strength (i.e., the inability to support a load without soil movement). Agaves provide food for birds, javelina, invertebrates, other wildlife, and American Indians.

Thirty-five percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

### **Great Basin and Montane/Subalpine Grasslands**

Lying in a patchwork across the Colorado Plateau, these grasslands vary in size from just a few acres to well over 1,000 acres. A wide variety of species of grasses and forbs characterize their vegetation which varies according to soil type, soil moisture, and temperature. These grasslands provide vegetative diversity needed by wildlife and breathtaking views, and they are themselves a highly attractive visual resource. Prairie dogs are present in a variety of locations. Where they exist, they are a key component in their environment because their burrows provide shelter, and they are prey for a variety of birds and animals. Lack of fire as a natural disturbance in some soil types has encouraged the growth of trees and shrubs.

Great Basin Grasslands cover approximately 96,335 acres or approximately 5 percent of the Coconino NF. Found between 4,800 and 7,500 feet in elevation, they are more arid than Montane/Subalpine Grasslands. Typical locations are Anderson Mesa and near Wupatki National Monument. They consist mostly of grasses with smaller amounts of forbs and shrubs. Trees can be present in trace amounts depending on the soil; however, tree canopy is increasing in some areas, especially in the northeast part of the forest around Wupatki National Monument. Species include, but are not limited to, western wheatgrass, black grama, blue grama, galleta grass, hairy grama, spike muhly, and needle and thread grass. Trees may include sparse one-seed juniper, alligator juniper, red berry juniper, Utah juniper, and Colorado piñon pine. Natural disturbances are weather, fire, and natural soil movement (e.g., natural shrink–swell and seasonal surface cracking).

Twelve percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Montane Grasslands generally occur at elevations between 6,000 and 8,000 feet. Typical locations include Kendrick Park, Antelope Park, and Mule Park. They are more productive than Great Basin and Semidesert Grasslands. Species include, but are not limited to muttongrass, mountain muhly, spike muhly, Arizona fescue, blue grama, red three-awn, squirreltail, yarrow, and pine dropseed. Nonnative Kentucky bluegrass is present. Trees occur along the periphery of Montane Grasslands. Vegetation in some of the Montane Grasslands soil types are maintained by fire. They are also influenced by weather. Tree canopy is increasing in some areas. These grasslands are susceptible to channel and gully erosion and subsequent dropping of the seasonal, perched water table during runoff events.

Subalpine Grasslands occur at elevations ranging from 8,000 to 10,300 feet on deeper soils with warmer, drier aspects than adjacent Mixed Conifer vegetation types or Spruce-Fir. A typical location is on the San Francisco Peaks. These productive communities often harbor several plant associations with varying dominant grasses and herbaceous species. Such dominant species may include: pine dropseed, nodding brome, various sedges, Arizona fescue, mountain junegrass, mountain muhly, muttongrass, and squirreltail. Trees may occur in trace amounts within these grasslands and along their periphery. Shrubs may also be present. These meadows are seasonally wet and closely tied to snowmelt. They are often maintained by fire.

### **Desired Conditions for Grassland Types**

#### **All Grassland Types**

##### *FW-Veg-Grass-All-DC*

- 1 Grasslands are open, grassy areas with limited trees and shrubs and contribute to functional and productive soils and watersheds, provide habitat for wildlife, and provide ground fuels conducive to low severity fires.

#### **Semidesert Grasslands**

##### *FW-Veg-Grass-SDG-DC*

##### **Landscape Scale (10,000 acres or greater)**

- 1 Semidesert Grasslands are open and connected grasslands punctuated by groves of trees and shrubs. Predominant species are perennial native grasses. The moderate to dense native herbaceous cover includes annual and perennial desert grasses and forbs, succulent species, shrubs, and some herbaceous cover of annuals. Cool and warm season species are present at varying heights. Tree and shrub cover is less than 10 percent. Tree and shrub species include turbinella oak, catclaw mimosa, crucifixion thorn, Utah juniper, redberry juniper, and one-seed juniper. All age classes are present.
- 2 Herbaceous vegetation cover is maintained at levels that contribute to suitable hydrologic function, soil stability, and nutrient cycling. A diversity of grass and forb species and presence of plant litter reduces the occurrence of compaction and erosion. Diversity of grass and forb species is at or nearing potential. Arroyos and gullies are stabilizing and recovering. Soils have adequate vegetative ground cover including herbaceous cover and leaf litter to maintain soil productivity and are permeable and capable of infiltrating water to reduce instances of overland flows during precipitation events. Improved water infiltration reduces arroyos and gullies and head cuts from forming in drainages.
- 3 Fire plays its natural role on the landscape. Native grasses or understory species carry fire and maintain the natural fire regime (greater than 75 percent overstory mortality or herbaceous top kill). Although the presence of annuals may be of short duration, they do not cause changes to the natural fire regime.

##### **Mid-Scale (100 to 1,000 acres)**

- 4 Multiple seral stages of native vegetation are present.

**Table 3. Desired proportion of seral stages for Semidesert Grasslands**

Successional Structure, Composition, and Cover Class	Reference Percent Composition
Grass forb regeneration	24%
Open perennial bunchgrass	76%
Perennial bunchgrass with shrubs and trees	0%
Shrubs and trees with perennial bunchgrass	0%

***Fine Scale (10 acres or less)***

- 5 In the Schoolhouse area on the Red Rock Ranger District, remnant populations of big sacaton grass are reproducing sustainably on suitable soils.
- 6 Biological soil crusts are present to improve nutrient cycling and stabilize soils, especially in sandier soils.

**Great Basin and Montane/Subalpine Grasslands*****FW-Veg-Grass-GB&MSG-DC******Landscape Scale (10,000 acres or greater)***

- 1 The composition, structure, and distribution of native vegetation reflects a mix of early, middle, and late seral stages. Early seral stages will typically contain more forbs, and as stages get older, they are dominated by more grasses and fewer forbs. Vegetation height, density, and cover support the historic fire return interval, where fire played a role, while providing food and cover for wildlife species, including pronghorn. Historic fire is thought to be [low-intensity fire](#) with a 1- to 35-year fire return interval and is generally dependent on the fire regime in adjoining vegetation types.
- 2 Tree and shrub cover are each less than 10 percent. There are [inclusions](#) and variability within the landscape as well as ecotones on the fringes. There is regeneration, seed head production, and balance of grasses and forb species, including warm and cool season species in most years and within the capability of soils.
- 3 Vegetative ground cover and herbaceous vegetation provide protection from accelerated erosion and promote water infiltration and nutrient cycling function. Soil function is sustained. Soil has the ability to infiltrate water, resist erosion, and recycle nutrients to maintain long-term soil productivity. Soil surface structure is granular or well aggregated to promote water infiltration and reduce [runoff](#). Grasslands are connected based on the distribution of Mollisol soils and not fragmented. Natural surface drainages and subsurface flow patterns are not altered by human-made or ungulate disturbance, and they are maintained to assure waterflow into connected waterbodies or streams.
- 4 Leafy spurge, an invasive [noxious weed](#), is not present on the landscape. If it is present, it does not compete with rare plant species such as Arizona sneezeweed and Apache beardtongue.

**Mid-Scale (100 to 1,000 acres)**

- 5 Table 4 below shows desired ranges for grass and forb cover and plant basal area and litter cover by grassland types based on estimated production potential in TES.

**Table 4. Desired cover ranges for Great Basin and Montane/Subalpine Grasslands**

Grassland Type	Grass and Forb Cover <sup>1</sup>	Plant Basal Area and Herbaceous Litter Cover
Great Basin	20 to 50%	25 to 4% depending on soil
Montane	65 to 80%	at least 40% depending on soil
Subalpine	>80%	>90%

<sup>1</sup> Depends on terrestrial ecosystem unit or soil type.

**Fine Scale (10 acres or less)**

- 6 Fine scale features such as rock piles and wet areas are present within Montane Grasslands to support rare plant species such as grassyslope sedge and Arizona sneezeweed.
- 7 Within site capability, a mosaic of vegetation density exists across the landscape ranging from densely vegetated areas that provide cover for ground-nesting birds and pronghorn fawns to bare areas that result from natural activities such as freeze–thaw action or prairie dog burrowing.

**Objectives for Grassland Types<sup>15</sup>**

**Semidesert Grasslands**

*FW-Veg-Grass-SDG-O*

- 1 Mechanically restore/enhance 3,500 acres of Semidesert Grasslands every 10-year period during the life of the plan.

**Great Basin Grasslands**

*FW-Veg-Grass-GBG-O*

- 1 Mechanically restore/enhance 10,800 to 12,400 acres of Great Basin Grasslands every 10-year period during the life of the plan.

**Montane Subalpine Grasslands**

*FW-Veg-Grass-MSG-O*

- 1 Mechanically restore/enhance 7,600 to 11,400 acres of Montane Subalpine Grasslands every 10-year period during the life of the plan.

<sup>15</sup> Objectives for Semidesert Grasslands and Great Basin Grasslands maintain and improve habitat for pronghorn, a management indicator species.

### **Standards for Grassland Types**

#### **Semi-Desert Grasslands**

##### *FW-Veg-Grass-SDG-S*

- 1 Recreation goals are subordinate to antelope protection.

### **Guidelines for Grassland Types**

#### **All Grassland Types**

##### *FW-Veg-Grass-All-G*

- 1 Disturbance from management activities in key pronghorn fawning areas during fawning season should be minimized to maximize reproductive success.
- 2 Natural waters within a quarter of a mile of fawning habitat should be maintained and available to pronghorn during the fawning season to maximize reproductive success.

#### **Semidesert Grasslands**

##### *FW-Veg-Grass-SDG-G*

- 1 Ground-disturbing activities should occur during times soil is dry especially soils with high clay content and low-bearing strength to minimize [soil compaction](#), displacement, and [trafficability](#) problems.
- 2 [Road](#) and [trail](#) locations should consider antelope protection goals.

#### **Great Basin and Montane/Subalpine Grasslands**

##### *FW-Veg-Grass-GB&MSG-G*

- 1 Move toward 90 percent vegetative ground cover to reduce erosion and gully formation and maintain soil function and productivity.
- 2 New stock tanks and wildlife waters should be placed in locations that reduce concentrations of grazing animals and subsequent vegetation and soil effects in open areas.
- 3 To promote satisfactory soil conditions in Great Basin Grasslands, vegetation in soils classified with clayey (Vertic) subgroups should not be burned until vegetative ground cover is near potential conditions as listed in TES.

### **Management Approaches Grassland Types**

#### **Great Basin and Montane/Subalpine Grasslands**

Provide media and public information focused on the unique properties of, and appropriate activities within, grasslands.

Collaborate with partners and stakeholders on grassland restoration, grassland connectivity, and education.

Coordinate with Arizona Game and Fish Department on objectives for wildlife conservation, education, habitat restoration, and improvements, particularly regarding pronghorn and prairie dogs.

**Related Plan Content for Grassland Types**

See the following: [Soil](#); [Wildlife, Fish, and Plants](#); [Livestock Grazing](#)

**Interior Chaparral**

See appendix A, map 7.

**General Description and Background for Interior Chaparral**

Interior Chaparral covers approximately 50,471 acres of the Coconino NF. Found between 3,750 and 7,300 feet in elevation, it is a fire-dependent PNVT and varies from widely scattered pockets within grasslands and woodlands to more extensive areas on steep slopes. Species composition and dominance vary across the broad range of soils and topography but are dominated by shrubs. Soil productivity is naturally low and most soils are inherently unstable due to the steep slopes.

Twenty-four percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

**Desired Conditions for Interior Chaparral**

**FW-Veg-IC-DC**

*Landscape Scale (10,000 acres or greater)*

- 1 Interior Chaparral has vegetation with varying age classes and densities that protects against accelerated erosion and is maintained by frequent intervals of high-severity fires.
- 2 During early stages of succession, Interior Chaparral contains a grass and forb component in the understory. The mid- to late-development stages are dense, nearly impenetrable thickets with considerable (about 35 to 45 percent of soil surface) shrub litter (e.g., small stems, leaves). Standing dead material may accumulate in areas that have not burned for several decades. Greater than 70 percent of chaparral is mid- to late-development closed canopy with some openings of grasses and forbs. Canopy is more open at dry sites and more closed at wetter sites.

**Table 5. Desired proportion of seral stages for Interior Chaparral**

State	Reference Percent Composition	Description, Size, and Cover Class
Early: grass, forb	2%	Recently burned, sparsely vegetated, and all corresponding herb types.
Early-Mid: grass, shrub	5%	Grass and Shrub-Open. All corresponding shrub types.
Mid-Late: dense shrub, no understory	93%	Dense shrub-closed <i>and</i> all tree size and cover classes.

- 3 Interior Chaparral is in a constant state of transition from young to older stages and back again, with fire being the major disturbance factor. Natural high severity fires (75+ percent mortality or top kill) occur with a frequency of once every 35 to 100 years. Long fire return intervals allow for reestablishment of seed bank and development of fuel loads and spatial continuity of fuels necessary for fire.

- 4 Although soil productivity is generally low and most soils are inherently unstable on steep slopes, there is sufficient vegetation and litter cover to protect soil from accelerated erosion.

*Mid-Scale (100 to 1,000 acres)*

- 5 Fire hazard and severity is reduced in the wildland-urban interface (WUI) and, as a result, human life and property are protected. Vegetation conditions within the WUI are composed of younger and more widely spaced shrub [patches](#). The frequency of disturbance (e.g., fire, vegetation treatments) within the WUI may be higher than the natural disturbance regime.

*Fine Scale (10 acres or less)*

- 6 Soils exhibit few signs of soil compaction or accelerated erosion. This, along with ground cover provided by litter and plant basal area, indicates that soil function is being sustained and soil is functioning properly and normally. Biological soil crusts are present to improve nutrient cycling and stabilize soils, especially in sandier soils.

**Guidelines for Interior Chaparral**

**FW-Veg-IC-G**

- 1 To provide varying seral stages and habitat diversity, fire treatments within Interior Chaparral should provide diversity of burn intensity within burn units, and at the landscape scale, burn unit locations should be rotated.

**Management Approaches for Interior Chaparral**

Emphasize coordination with local partners and stakeholders to reduce the risk of uncharacteristic fire (e.g., more frequent high intensity fires or uncharacteristically large fires) in the WUI on the Coconino NF and adjacent non-National Forest System lands.

**Related Plan Content for Interior Chaparral**

See the following: [Soil](#); [Fire Management](#)

**Piñon-Juniper Types**

See appendix A, map 8.

**General Description and Background for Piñon-Juniper Types**

The Piñon-Juniper (PJ) Woodland vegetation community generally occurs at elevations between 2,500 and 8,300 feet and is collectively composed of the following PNVTs:

- Piñon-Juniper with Grass (includes Juniper Grasslands) generally occurs between 5,000 and 8,300 feet in elevation and covers about 261,432 acres of the forest.
- Piñon-Juniper Evergreen Shrub generally occurs between 2,564 and 6,942 feet in elevation and covers about 263,835 acres on the forest.
- Piñon-Juniper Woodlands (also called Persistent Piñon-Juniper) generally occurs between 2,997 and 7,489 feet in elevation and covers about 75,393 acres on the forest.

Piñon and juniper PNVTs are dominated by one or more species of piñon pine and/or juniper and can occur with a grass and forb dominated understory (i.e., Piñon-Juniper with Grass), a shrub dominated understory (i.e., Piñon-Juniper Evergreen Shrub), or a sparse discontinuous understory of some grasses and/or shrubs (i.e., Piñon-Juniper Woodlands). Two-needle and single-leaf piñon pine are common as well as one-seed, Utah, redberry, Rocky Mountain, and alligator juniper and a lesser abundance of oaks. Species composition and stand structure vary by location primarily due to precipitation, elevation, temperature, and soil type. In some locations, grassland soil types are interspersed with piñon-juniper soil types. Spreading, low intensity surface fires had a very limited role in molding stand structure and dynamics of many or most piñon and juniper woodlands in the historical landscape. However, where tree density is sparse and grass cover is significant, the Piñon-Juniper with Grass type may be an exception.

Sixty-three percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

### **Desired Conditions for Piñon-Juniper Types**

#### **All Piñon-Juniper Types**

##### *FW-Veg-PJ-All-DC*

- 1 Piñon-juniper types have a mosaic of trees and open areas that provide wildlife habitat, contribute to functional soils, and are resilient to natural disturbances and climate change.
- 2 There is connectivity of openings between trees that provide for sufficient sighting distance to facilitate pronghorn movement. Large snags and old trees with dead limbs and tops are persistent and scattered across the landscape. The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances (e.g. insects, diseases, and fire) and climate variability.
- 3 Pine stringers, noncontiguous narrow communities of predominantly ponderosa pine, extend below the normal elevation distribution of ponderosa pine, often into piñon and juniper, and they persist where they naturally occur.
- 4 Plant litter (e.g., leaves, needles) and coarse woody debris are present in sufficient quantity to resist accelerated soil erosion and promote nutrient cycling, water retention, and the microclimate conditions necessary for piñon seed germination. Large, coarse woody debris is present. There are sufficient [nurse trees](#) to provide microclimate conditions in the understory. Nurse trees provide improved nutrient and soil properties, higher soil moisture, lower temperatures, and light levels which increase piñon seedling survival under harsh conditions. Biological soil crusts are present to improve nutrient cycling and stabilize soils, especially in sandier soils.
- 5 There are opportunities for collecting [forest products](#) (e.g., firewood, piñon nuts, and posts and poles) consistent with other desired conditions.
- 6 On non-grassland soils, seral grasslands created by previous vegetation treatments, or [pushes](#), in the piñon-juniper types trend toward restoration of desired conditions.

**Piñon-Juniper with Grass**

*FW-Veg-PJ-PJG-DC*

- 1 Piñon-Juniper with Grass is generally uneven-aged and open in appearance. Trees occur as individuals and small groups and range from young to old. Basal area ranges from 10 to 30 basal area per acre. Scattered shrubs and an herbaceous understory relative to site capability, including native grasses, forbs, and annuals, are present to support frequent surface fires and provide food and cover for wildlife. Shrubs, grasses, and vegetative ground cover (e.g., forbs, litter, and coarse woody material) maintain soil stability and soil productivity. Snags and older trees with dead limbs are scattered across the landscape.

**Table 6. Desired proportion of seral stages for Piñon-Juniper with Grass**

State	Desired Percent Composition	Size and Cover Class
Early Development	5%	Recently burned, grass, forb, and shrub types
Mid-Open	25%	Seed/saplings-open; Seed/saplings-closed; Small-open
Late-Open	50%	Medium-open, very large-open
Mid-Closed	10%	Small-closed
Late-Closed	10%	Medium-closed, very large-closed

- 2 Old growth structure occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- 3 Fires typically occur every 1 to 35 years with low severity and patches of mixed severity (Fire Regime I) favoring regrowth and germination of native grasses and forbs.

**Piñon-Juniper Evergreen Shrub**

*FW-Veg-PJ-PJES-DC*

- 1 Piñon-Juniper Evergreen Shrub is a mix of trees and shrubs that occurs as a series of vegetation states that move over time from herbaceous-dominated to shrub-dominated to tree-dominated. Trees occur as individuals or in smaller groups ranging from young to old. In later successional stages, basal area ranges from 10 to 40 square feet per acre. Piñon trees are occasionally absent but one or more juniper species is always present. Arizona cypress and live oak are scattered across the landscape. Typically groups are even-aged in structure with all ages represented across the landscape for an overall uneven-aged grouped appearance. The understory is dominated by low to moderate density of shrubs, depending on successional stage. The shrub component consists of one or a mix of evergreen shrub, oak, manzanita, mountain mahogany, sumac, and other shrub species, which are well distributed. A variety of low to high growing native perennial and annual grasses and forbs are present in the interspaces, and they maintain soil stability and soil productivity.

**Table 7. Desired proportion of seral stages for Piñon-Juniper Evergreen Shrub**

State	Desired Percent Composition	Size and Cover Class
Early Development	5%	Recently burned, grass, forb, and shrub types
Mid-Open	55%	Seed/saplings-open; Seed/saplings-closed; Small-open
Late-Open	40%	Medium-open, very large-open
Mid-Closed	0%	Small-closed
Late-Closed	0%	Medium-closed, very large-closed

- 2 Old growth structure occurs throughout the landscape, generally in small areas as individual old growth components or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- 3 Fires are typically mixed severity (25 to 75 percent mortality or top kill with a moderate frequency or Fire Regime III), while some evergreen shrub types exhibit occasional high severity fires (greater than 75 percent mortality or Fire Regime IV). Vegetation conditions within the WUI may be composed of younger and more widely spaced shrub patches and tree groups so fires can be suppressed more easily when necessary.

**Piñon-Juniper Woodlands (Persistent)**

*FW-Veg-PJ-PJW-DC*

- 1 Piñon-Juniper Woodlands (or Persistent Piñon-Juniper) is characterized by even-aged patches of piñons and junipers that at the landscape level form multi-aged woodlands. Very old trees (greater than 300 years old) are present. Tree density is high and where interlocking crowns shade the ground over extensive areas, shrubs are sparse to moderate and herbaceous cover is low and discontinuous.

**Table 8. Desired proportion of seral stages for Piñon-Juniper Woodlands**

State	Desired Percent Composition	Size and Cover Class
Early Development	10%	Recently burned, grass, forb, and shrub types
Mid-Open	5%	Seed/saplings-open; Seed/saplings-closed; Small-open
Late-Open	10%	Medium-open; very large-open
Mid-Closed	15%	Small-closed
Late-Closed	60%	Medium-closed; very large-closed

- 2 Old growth structure generally occurs over large areas as stands or forests where old growth components are concentrated. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth

components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

- 3 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances (e.g. insects, diseases, fire), and climate variability. Insects and disease occur at endemic levels. Fire as a disturbance is less frequent and variable due to differences in ground cover. The fires that do occur are mixed to high severity (Fire Regimes III, IV, and V).

### **Objectives for Piñon-Juniper Types**

#### **Piñon-Juniper with Grass**

##### *FW-Veg-PJ-PJG-O*

- 1 Mechanically treat between 1,000 and 10,000 acres of Piñon-Juniper with Grass to move toward desired conditions during the 10 years following plan approval. Treatment priorities should move forest priority 6<sup>th</sup> code watersheds toward satisfactory conditions.
- 2 Using naturally ignited fires (i.e., lightning-caused fires), treat 3,750 acres with low to mixed severity fire during the 10 years following plan approval. Treatment priorities should move forest priority 6<sup>th</sup> code watersheds toward satisfactory conditions.

#### **Piñon-Juniper Evergreen Shrub**

##### *FW-Veg-PJ-PJES-O*

- 1 Using naturally ignited fires (i.e., lightning-caused fires), treat 3,750 acres with low to mixed severity fire during the 10 years following plan approval.

### **Guidelines for Piñon-Juniper Types**

#### **All Piñon-Juniper Types**

##### *FW-Veg-PJ-All-G*

- 1 On grassland soil types, seral grasslands created by former vegetation treatments, or pushes, of Piñon-Juniper with Grass or Piñon-Juniper Evergreen Shrub should be maintained.
- 2 Grassland soil inclusions (also called Mollisol soils) with tree encroachment within the piñon-juniper types should be restored to grassland desired conditions.
- 3 In areas where there is little understory and treatments are proposed, slash treatments (e.g., lop and scatter and mastication) should be used that improve herbaceous vegetation growth, soil and watershed condition, and soil productivity<sup>16</sup>.
- 4 If available and needed to support restoration activities, seeding with native species appropriate for the ecological unit (or similar in elevation, soil type, and ecosystem) should be used to restore the desired native species composition of the area.

### **Related Plan Content for Piñon-Juniper Types**

See the following: [Soil](#); [Ponderosa Pine](#); [Wildlife, Fish, and Plants](#); [Fire Management](#)

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<sup>16</sup> The intent is to encourage response in herbaceous vegetation and allow smaller debris to decompose in place on the ground.

## **Ponderosa Pine**

See appendix A, map 9.

### **General Description and Background for Ponderosa Pine**

Ponderosa Pine covers approximately 792,000 acres of the Coconino NF and is found between 4,500 and 9,000 feet in elevation. It is adjacent to Flagstaff and numerous other communities. Besides ponderosa pine trees, other species commonly found in this PNVTS are oak, juniper, and piñon. More infrequently species such as aspen, Douglas-fir, white fir, and blue spruce may be present in small groups or individual trees. There typically is an understory of grasses and forbs and sometimes shrubs.

Ponderosa Pine includes two subtypes: Ponderosa Pine Bunchgrass and Ponderosa Pine Gambel Oak. The Gambel Oak subtype is particularly important to many wildlife species, including Mexican spotted owls. Higher species richness has been correlated with higher densities of Gambel oak. This subtype provides important nesting and foraging habitat for wildlife. The desired conditions below apply to both subtypes. This community also contains unique features such as pine stringers—noncontiguous, narrow communities of predominantly ponderosa pine that extend below their normal elevation distribution into the Piñon-Juniper Woodlands and Grasslands PNVTS. Pine stringers provide connectivity between two vegetation communities as well as a unique microclimate in lower elevation environments.

Sixty-four percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Ponderosa Pine PNVTS provides habitat for two management indicator species: the pygmy nuthatch (mature ponderosa pine and snags) and Mexican spotted owl (ponderosa pine-Gambel oak subtype).

### **Desired Conditions for Ponderosa Pine**

#### **FW-Veg PP-DC**

##### *Landscape Scale (10,000 acres or greater)*

- 1 Ponderosa Pine has a mosaic of trees with varying age classes and understory vegetation which provide habitat for a variety of species, including Mexican spotted owls and northern goshawks, and ground fuels conducive to low-severity fires.
- 2 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances and climate variability that is similar to conditions prior to 1850 (pre-fire disruption<sup>17</sup>). The landscape is a functioning ecosystem that contains its components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, fire, and wind), including snags, downed logs, and old trees. Grasses, forbs, shrubs, and needle cast (e.g., fine fuels), and small trees maintain the natural fire regime. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.

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<sup>17</sup> Pre-fire disruption is intended to refer to the period before human activities such as past grazing practices, logging, and fire suppression changed the way fire burned on the landscape, which is approximated to be before 1850.

- 3 Frequent, low-severity fires (Fire Regime I) are characteristic in this PNVT, including throughout northern goshawk home ranges. Spatial heterogeneity and discontinuous crowns (interspaces between groups and single trees) prevents fire spread. Natural and human disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.
- 4 At the landscape scale and as shown in table 9, Ponderosa Pine is composed of trees in structural stages that range from young to old and are dominated by ponderosa pine trees. Forest appearance is variable but generally uneven-aged and open; occasional areas of even-aged structure are present. Forest arrangement is in individual trees, small clumps, and groups of trees interspersed within variably sized openings of grasses, forbs, and shrubs that are similar to historic patterns. Openings typically range from 10 percent in more productive sites to 70 percent in the less productive sites. The size and shape of trees, number of trees per group, and number of groups per area are variable across the landscape. Denser tree conditions exist in some locations such as north-facing slopes and canyon bottoms.

**Table 9. Desired proportion of seral stages for Ponderosa Pine<sup>1</sup>**

State	Desired Percent Composition	Description, Size, and Cover Class
Early development	0%	Recently burned, grass, forb, and shrub types
Early forest	1.4%	Seed/saplings–open Seed/saplings–closed Conditions indicative of occasional even-aged stand dynamics and the development of closed mature forest habitat; >10% tree cover.
Young forest	1.4%	Small–open Conditions indicative of occasional even-aged stand dynamics and the development of closed mature forest habitat; <30% cover.
Mid-age forest, mature/old forest with regeneration	88%	Medium–open (even and uneven-aged) Very large–open (even and uneven-aged) Based on reference condition, and the predominance of uneven-aged dynamics and open forest. The plurality of stands on low-productivity sites likely to occur as medium-open/uneven-aged, versus high-productivity sites where very large-open/uneven-aged is more likely; <30% cover.
Young forest	1.4%	Small–closed Condition indicative of occasional even-aged stand dynamics and the development of closed mature forest habitat; >30% cover.
Mid-age forest, mature/old forest with regeneration	7.8%	Medium–closed (even and uneven-aged) Very large–closed (even and uneven-aged). Based on reference condition, and the predominance of uneven-aged dynamics and open forest. The plurality of stands on low-productivity sites likely to occur as medium–closed/uneven-aged, versus high-productivity sites where very large–closed/uneven-aged is more likely; >30% cover.

<sup>1</sup> Assumes 60 percent pine-bunchgrass and 40 percent pine-oak.

- 5 Ponderosa Pine is composed predominantly of [vigorous](#) trees, but [declining](#) trees are a component. Declining trees are well distributed across the landscape and may occur as clumps or individual trees. They provide for snags, top-killed, lightning-scarred and fire-scarred trees, and coarse woody debris (greater than 3-inch diameter, including large logs).
- 6 Old growth structure occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Consistent with vegetative characteristics of a frequent, low severity fire regime, old growth is a component of uneven-aged forests, generally comprised of groups of similarly aged trees and single trees interspersed with open grass-forb-shrub interspaces, but occasionally, it occurs in larger even-aged patches where local microsites facilitate less frequent fire regimes. Within [group](#) variability may be low but variation among groups is typically high and proportions of patches with different developmental stages may vary depending on site-specific conditions. Old growth components include old trees, dead trees (snags), and dead and downed wood (coarse woody debris including large size classes). Snags and large dead and downed fuels are irregularly distributed across the landscape and may not exist in some patches. The location of old growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- 7 Where aspen is present, it is reproducing successfully. The young to old large aspens, snags, and downed logs provide habitat for a variety of wildlife species.
- 8 In the Gambel oak subtype, all sizes, structures (i.e., the shrub or tree forms depending on the capability of the site), and ages of oak trees are present. The Gambel oak subtype is reproducing and maintaining its presence on suitable sites across the landscape. Large to moderate sized oak snags are scattered across the landscape, as are moderate to large live oak trees with dead limbs, hollow boles, and cavities. These provide shelter and nesting habitat for a variety of wildlife species, including owls and bats.

*Mid-Scale (100 to 1,000 acres)*

- 9 At the mid-scale, Ponderosa Pine is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The more biologically productive sites contain more trees per group and more groups per area, resulting in less space between groups. At the mid-scale, openings typically range from 30 percent in more productive sites to 60 percent in the less productive sites, but extreme outlying sites can range from 10 percent (i.e., high elevation, mesic sites) and may be as much as 70 percent in low elevation sites on south-facing slopes. Tree density within forested areas generally ranges from 20 to 80 square feet basal area per acre.
- 10 The mosaic of tree groups generally comprises an uneven-aged forest with all age classes present, including old growth. Groups of seedlings and saplings are maintained at sufficient levels to provide a reliable source of replacement as trees grow and progress into succeeding size and age classes. Infrequently patches of even-aged forest structure are present. Disturbances sustain the overall age and structural distribution.
- 11 Ponderosa pine snags are typically 18 inches or greater [diameter at breast height \(d.b.h.\)](#) and average 1 to 2 snags per acre, but this can vary in space and time<sup>18</sup>. They are generally well

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<sup>18</sup> Snags per acre and logs per acre are general measures of abundance at the fine scale and usually an average calculated from data collected at the mid-scale or higher.

distributed to meet the needs of species that use snags and to provide for future downed logs. There are varying sizes of snags greater than 18 inches d.b.h.. Downed logs (greater than 12-inch diameter at mid-point and greater than 8 feet long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris, including large downed logs, is sufficient to maintain or improve long-term soil productivity and provide important wildlife habitat, and it is generally well distributed and averages from 3 to 10 tons per acre.

- 12 Diversity of understory species (e.g., grasses, forbs, and shrubs) is consistent with site potential and provides for infiltration of water and reduction of accelerated erosion. The understory has a variety of heights of cool and warm season vegetation and produces seed heads and all age classes of vegetation for food and cover for wildlife. A mosaic of dense cover and high amounts of litter and bare ground provide habitat for small mammals.
- 13 Fires burn primarily on the forest floor and do not spread between tree groups as crown fire. Single tree torching and isolated tree torching, however, is not uncommon, resulting in a mosaic across the landscape.
- 14 In order to reduce fire intensity and to maintain the ability to control fire in WUI, forest structure may be at the low range of desired conditions for levels of snags, logs, coarse woody debris, and tree density, and have groups of trees that are more widely spaced or have fewer trees per group (but still within desired condition) than in the non-WUI areas. Crown base heights may also be higher than non-WUI areas to reduce the likelihood of fire reaching the tree canopy.
- 15 Forest conditions in [goshawk post-fledgling areas \(PFAs\)](#) are similar to general forest conditions except these forests contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in [goshawk foraging areas](#) and the general forest. [Goshawk nest areas](#) have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the Ponderosa Pine type.

*Fine Scale (10 acres or less)*

- 16 Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking. Openings surrounding tree groups are variably shaped and comprised of a grass/forb/shrub mix.
- 17 Some openings contain individual and randomly distributed patches of trees. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Size of tree groups typically is less than 1 acre, but they may range from a few to many trees in extent and be larger in areas managed for bald eagles and Mexican spotted owls. Old-growth groups contain trees having similar age characteristics and conditions. Such groups may include fairly similar tree ages and sizes or combinations of ages and sizes, limited amounts of dead and downed material, and dead trees and spike tops, but they are readily distinguished from adjacent groups having different characteristics. Groups at the mid-aged to old stages consist of 2 to approximately 40 trees per group.
- 18 Dwarf mistletoe is an element of the forest landscape, including the Ponderosa Pine and Mixed Conifer forest types. There is a varied level of mistletoe across the landscape, comparable with historic conditions such that it does not impede achieving and sustaining uneven-aged forest structure. Witches brooms may form on infected trees, providing habitat for wildlife species.

- 19 Large oak trees and pine-oak groups in the Ponderosa Pine Gambel Oak subtype provide cooler, moister microsites and higher overstory diversity than surrounding the Ponderosa Pine Bunchgrass subtype. Gambel oak acorns provide food for wildlife species.

#### **Objectives for Ponderosa Pine<sup>19</sup>**

##### **FW-Veg-PP-O**

- 1 Use prescribed cutting (i.e., [group selection](#) or [free thinning](#)) to treat 50,000 to 260,050 acres of Ponderosa Pine during the 10 years following plan approval. Treatment priorities should move forest conditions within priority 6<sup>th</sup> code watersheds toward satisfactory conditions.
- 2 Use [prescribed fire](#) to underburn (low severity) 150,000 to 300,000 acres of Ponderosa Pine during the 10 years following plan approval. Treatment priorities should move forest conditions within priority 6<sup>th</sup> code watersheds toward satisfactory conditions.
- 3 Use naturally ignited fires (i.e., lightning-caused fires) to treat at least 135,000 acres with [low-severity](#) fire to move vegetation toward desired conditions during the 10 years following plan approval.

#### **Guidelines for Ponderosa Pine**

##### **FW-Veg-PP-G**

- 1 To protect old-growth forest components, existing old-growth forest attributes should be protected from uncharacteristic natural disturbances. Methods of protecting existing old-growth forest components on the landscape may include prescribed cutting, prescribed fire, and wildfires that include resource objectives.
- 2 To perpetuate old-growth forest components, the development of old-growth conditions should be encouraged in areas where old growth is lacking. Uneven-aged vegetation treatments should be designed such that replacement structural stages and age classes are proportionally present to assure continuous representation of old-growth characteristics across the landscape over time.
- 3 In promoting an uneven-aged forest condition that maintains or contributes to the restoration of old-growth conditions characteristic of the forest type, preference for retention should be given to presettlement trees, often the largest, oldest, and tallest trees onsite. For Ponderosa Pine, presettlement trees may be determined by the following characteristics described by Thomson (1940) as age class 3 (intermediate to mature) and age class 4 (mature to over-mature) (figures 4 and 5):
  - **Age** – approximately 150 years and older.
  - **Bark** – ranging from reddish brown, shading to black in the top with moderately large plates between the fissures to reddish brown to yellow, with very wide, long and smooth plates.

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<sup>19</sup> Objectives for Ponderosa Pine move the PNVT toward desired conditions and indirectly maintain and improve habitat for the Mexican spotted owl and pygmy nuthatch, which are management indicator species.

- **Branching** – ranging from upturned in upper third of the crown, horizontal in the middle third and drooping in the lower third of the crown to mostly large, drooping, gnarled or crooked. Branch whorls range from incomplete and indistinct except at the top to completely indistinct and incomplete.
- 4 To promote old growth attributes consistent with desired conditions, manage for large Gambel oak trees and snags to be sustained over time.
  - 5 To provide necessary habitat components, snags and downed logs should be emphasized along edges of openings and within groups/clumps of trees to provide habitat and roost sites for wildlife species such as small mammals, cavity-nesting birds, and tree-dwelling bats.
  - 6 Management activities that result in accumulations of green slash should be timed to minimize potential impacts from bark beetles. Accumulating green slash before overwintering beetles emerge should be avoided, generally April to June.

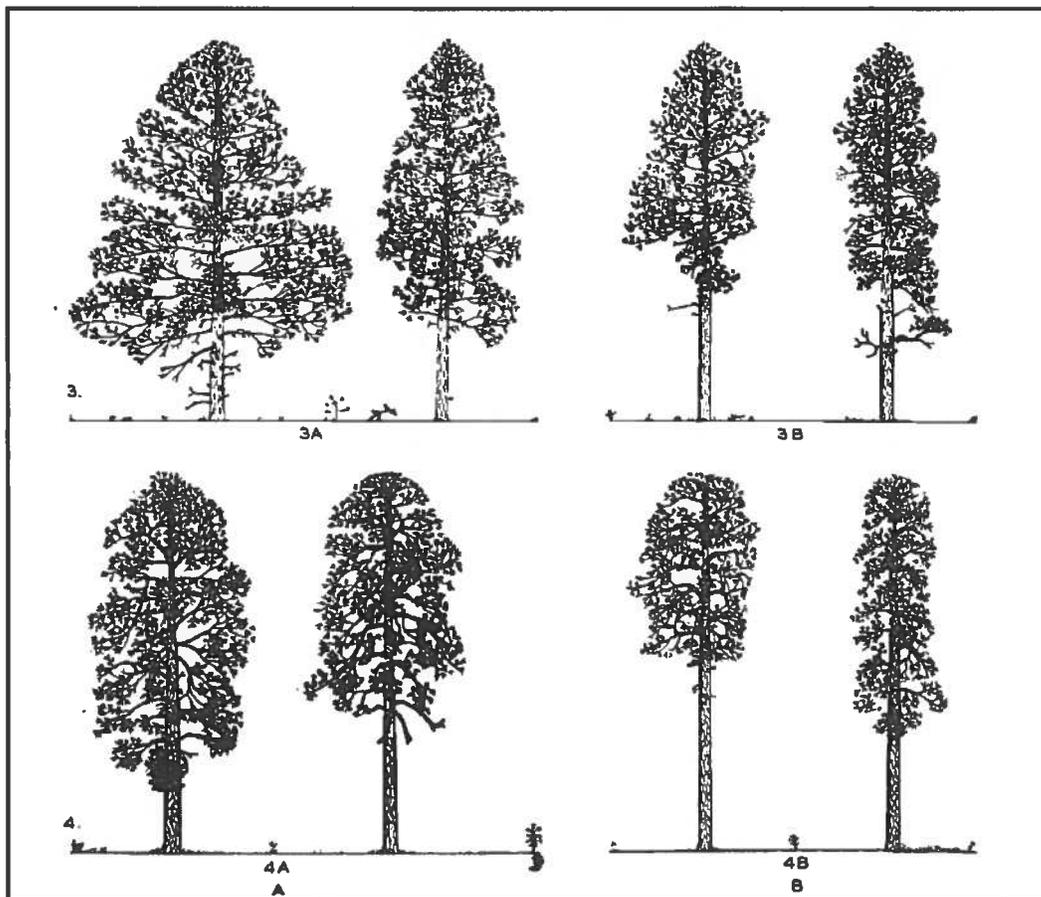


Figure 4. Illustration of ponderosa pine growth rate for age classes 3A, 3B, 4A, and 4B<sup>20</sup>

<sup>20</sup> Numbers under each illustration represent the age class, while the letters represent the vigor class. Vigor classes are as follows: A (Full), B (Medium), C (Light), and D (Weak) (Thomson, 1940).

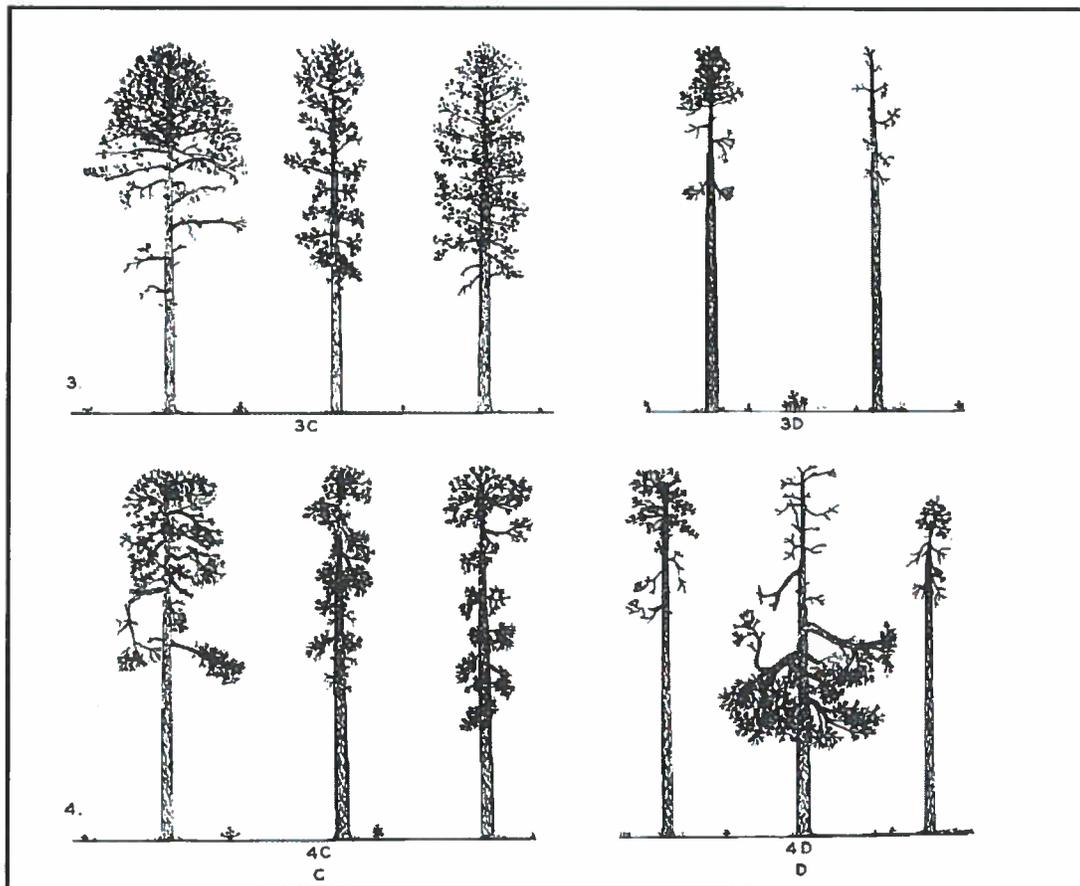


Figure 5. Illustration of ponderosa pine growth rate for age classes 3C, 3D, 4C, and 4D

- 7 To increase small mammal occupancy in areas where logs are deficient and to provide nesting habitat for turkeys, slash piles may be retained across the landscape for several years, rather than immediately being burned. This should be consistent with [scenic integrity objectives](#) (SIO) and balanced with potential threats from bark beetles and fire/fuels concerns.

#### Related Plan Content for Ponderosa Pine

See the following: [Soil](#); [Piñon-Juniper Types](#); [Wildlife, Fish, and Plants](#); [Fire Management](#); [Forest Products](#); [Pine Belt Management Area](#)

#### Mixed Conifer Types

See appendix A, map 10.

## **General Description and Background for Mixed Conifer Types**

### **All Mixed Conifer Types**

Sixty-seven percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

These communities also contain unique features such as mixed conifer stringers—noncontiguous, narrow communities of predominantly Mixed Conifer that extend below their normal elevation distribution into other PNVTS. Mixed conifer stringers provide connectivity between two vegetation communities as well as a unique microclimate in lower elevation environments.

These Mixed Conifer PNVTS have higher biodiversity and different wildlife assemblages than Ponderosa Pine. In addition, they provide habitat for the Mexican spotted owl (MSO), a threatened species and management indicator species. Recommendations regarding Mexican spotted owl (MSO) habitat are contained in the “Mexican Spotted Owl Recovery Plan<sup>21</sup>.”

### **Mixed Conifer with Frequent Fire**

Mixed Conifer with Frequent Fire covers approximately 49,619 acres of the Coconino NF and is found between 4,700 and 8,900 feet in elevation (above Ponderosa Pine). It occurs on mountain slopes and may also occur in canyons and north-facing slopes. This PNVTS occupies the warmer and drier sites of the mixed conifer life zone and is characterized by a historic fire regime of frequent, low-severity fires and infrequent, mixed-severity fires with a relatively open structure. These conifer forests are dominated by mainly shade intolerant trees such as: ponderosa pine, southwestern white pine, limber pine, and Gambel oak, with a lesser presence of New Mexican locust and big toothed maple. Moderately shade tolerant species such as Douglas-fir and white fir tend to increase in older stages of succession. Aspen may occur as small groups in north-facing slopes, drainages, and other microsites where cooler, moister conditions prevail.

This PNVTS typically occurs with an understory of graminoids, forbs, and shrubs. The understory is similar to Ponderosa Pine, but it generally has more sedges, mosses, and liverworts. Big toothed maple primarily occurs on the Mogollon Rim Ranger District. Historically this PNVTS had over 10 percent tree cover, with the exception of early, post-fire plant communities.

### **Mixed Conifer with Aspen (Infrequent Fire Mixed Conifer)**

Mixed Conifer with Aspen covers approximately 37,083 acres of the Coconino NF and is generally found between 8,000 and 10,400 feet in elevation. It occurs on mountain slopes such as the San Francisco Peaks and may also occur in canyons and north-facing slopes such as on Hutch Mountain and Mormon Mountain. Tree species composition varies depending on seral stage, elevation, and moisture availability. This PNVTS can be composed of dominant and codominant species such as: Douglas-fir, New Mexico locust, southwestern white pine and limber pine, and late seral species such as maple, white fir, and blue spruce. Ponderosa pine may be present in minor proportions. The absence of significant proportions of Engelmann spruce and/or corkbark fir distinguishes Mixed Conifer with Aspen from the Spruce-Fir PNVTS. Historically, this PNVTS had over 10 percent tree cover, with the exception of early, post-fire plant communities.

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<sup>21</sup> As of December 2012, the U.S. Fish and Wildlife Service has completed a revised recovery plan (Fish and Wildlife Service, 2012).

Aspen occurs as groups. Its distribution is influenced by soil type, soil moisture, low temperatures, and disturbances that stimulate root sprouting and colonization. Aspen sites may or may not have a significant conifer component depending on successional status. Aspen regenerates successfully and is self-sustaining.

Disturbances typically occur at two temporal and spatial scales: large scale infrequent disturbances (mostly mixed severity fires at 35 to 200 year frequency or Fire Regime III) and small-scale, frequent disturbances (e.g., fire, insect, disease, wind).

Mixed Conifer with Aspen has an understory with a wide variety of shrubs, grasses, and forbs depending on soil type, aspect, elevation, disturbance, and other factors. In addition, it generally has more sedges, mosses, and liverworts than Mixed Conifer with Frequent Fire and more leaf litter because there are more deciduous species. Lichens may occur on the Douglas-fir trees. Understory vegetation tends to flower more in the spring and, compositionally, be more similar to vegetation in the adjoining Spruce-Fir PNVNT or in canyons.

**Desired Conditions for Mixed Conifer Types**

**All Mixed Conifer Types**

*FW-Veg-MC-All-DC*

- 1 Mixed Conifer types have a mosaic of trees with varying age classes and understory vegetation which provide habitat for wildlife species, including Mexican spotted owls and northern goshawks; ground cover for healthy watersheds; and fuel for fire to occur according to historic ranges of frequency and severity.

**Mixed Conifer with Frequent Fire**

*FW-Veg-MC-MCFF-DC*

**Landscape Scale (10,000 acres or greater)**

- 1 At the landscape scale, Mixed Conifer with Frequent Fire is a mosaic of forest conditions composed of structural stages that range from young to old trees. This PNVNT contains sufficient numbers of groups and patches of old growth to be representative of the forest type in historical times. However, portions of the forest may be in various stages of development (even temporary openings or groups of very young trees) to provide future old-growth structure in the landscape.

**Table 10. Desired proportion of seral stages for Mixed Conifer with Frequent Fire**

State	Desired Percent Composition	Description, Size, and Cover Class
Early development, all structures	9%	Seed/saplings–open Seed/saplings–closed Recently burned, grass, forb, and shrub types, and conditions indicative of even-aged stand dynamics and the development of MSO habitat.
Mid-development, open	3%	Small–open Reference condition, and conditions indicative of even-aged stand dynamics and the development of MSO habitat.

State	Desired Percent Composition	Description, Size, and Cover Class
Late development, open	60%	Medium–open (even and uneven-aged) Very large–open (even and uneven-aged) Based on reference condition and the predominance of uneven-aged dynamics and open forest. The plurality of stands on low-productivity sites likely to occur as medium–open/uneven-aged, versus high-productivity sites where very large–open/uneven-aged is more likely.
Mid-development, closed	3%	Small–closed > 30% cover Reference condition and conditions indicative of even-aged stand dynamics and the development of MSO habitat.
Late development, closed	25%	Medium–closed (even and uneven-aged) Very large–closed (even and uneven-aged) > 30% cover Conditions indicative of mature closed forest habitat and occasional even-aged dynamics that occurred in the reference condition (Romme et al., 2010), particularly on north-facing slopes and canyons. The plurality of stands on low-productivity sites likely to occur as medium–closed, versus high-productivity sites where very large–closed is more likely.

- 2 Old-growth structure occurs throughout the landscape, generally in small areas as individual old-growth components or as clumps of old growth. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old-growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Old growth is often mixed with groups of younger trees or as individual groups of mostly old trees.
- 3 Forest appearance is variable but generally uneven-aged and open; occasional patches of even-aged structure are present. Forest arrangement is in small clumps, groups, single trees, and patches of trees that are interspersed within variably sized openings of graminoids, forbs, and shrubs similar to historic patterns. Openings typically range from 10 percent in more productive forested sites to 50 percent in the less productive forested sites. The size and shape of trees, number of trees per group, and number of groups per area are variable across the landscape. Where they naturally occur, groups and patches and all structural stages of oak are present. Denser tree conditions exist in some locations such as north-facing slopes and canyon bottoms.
- 4 Mixed Conifer with Frequent Fire is composed predominantly of vigorous trees, but declining trees are a component. Declining trees are well distributed throughout the landscape and provide for snags; top-killed, lightning-scarred, and fire-scarred trees; and coarse woody debris (greater than 3-inch diameter). A variety of snag species and coarse woody debris are well distributed throughout the landscape.
- 5 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances and to climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g., insects, diseases, fire, and wind) including: snags,

downed logs, and old trees. Graminoids, forbs, shrubs, needle cast (e.g., fine fuels), and small trees maintain the natural fire regime.

- 6 Organic ground cover and native herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Frequent, low-severity fires (Fire Regime I) are characteristic. Natural and human-caused disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.

***Mid-Scale (100 to 1,000 acres)***

- 7 At the mid-scale, Mixed Conifer with Frequent Fire is characterized by variation in the size and number of tree groups, depending on elevation, soil type, aspect, and site productivity. The more biologically productive forested sites contain more trees per group and more groups per area. Openings typically range from 10 percent in more productive sites to 50 percent in the less productive sites. Tree density within forested areas generally ranges from 30 to 100 square feet basal area per acre. Denser tree conditions exist in some locations such as north-facing slopes and canyon bottoms.
- 8 The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages, including old growth. Groups of seedlings and saplings are maintained at sufficient levels to provide a reliable source of replacement as trees grow and progress into succeeding size and age classes. Occasionally small patches (generally less than 50 acres) of even-aged forest structure are present. Disturbances sustain the overall age and structural distribution.
- 9 Snags are typically 18 inches or greater at d.b.h. and average 3 per acre. Downed logs (greater than 12-inch diameter at mid-point and greater than 8 feet long) average 3 per acre within the forested area of the landscape<sup>22</sup>. They are generally well distributed to meet the needs of species that use snags and to provide for future downed logs. Coarse woody debris (greater than 3-inch diameter), including downed logs, ranges from 5 to 15 tons per acre to maintain long-term soil productivity and provide important wildlife habitat.
- 10 Frequent low-severity fires (generally less than 25 percent mortality or topkill) occurring every 1 to 35 years are characteristic of this PNVT, including throughout the range of Mexican spotted owls and northern goshawks. Fires burn primarily on the forest floor but may result in single to group tree torching. Grasses, forbs, shrubs, and needle cast (e.g., fine fuels) maintain the natural fire regime with a greater proportion of the ground cover as grasses and forbs as opposed to needle cast.
- 11 While still remaining within the range of desired conditions, forest structure in the WUI may be composed of smaller and more widely spaced groups of trees and lower levels of snags, logs, and coarse woody debris than non-WUI areas in order to reduce fire intensity and to maintain the ability to control fire in WUI.
- 12 Basal area per acre for mid-aged to old tree groups in northern goshawk PFAs is 10 to 20 percent higher than northern goshawk foraging areas and the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with

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<sup>22</sup> Snags per acre and logs per acre are general measures of abundance at the fine scale and usually an average calculated from data collected at the mid-scale or higher.

relatively denser canopies than other areas in the dry mixed conifer type, consistent with current technical guides for northern goshawk in the southwestern U.S.

- 13 Where they naturally occur, all age classes of aspen and maple are present in groups or patches and are regenerating and vigorous. A diverse understory comprised of native herbaceous and shrub species has a variety of seral and age classes and is vigorous and regenerating.

***Fine Scale (10 acres or less)***

- 14 Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking. Old-growth groups are trees having similar characteristics and conditions. Such groups may include fairly similar tree ages and sizes or combinations of ages and sizes, limited amounts of dead and downed material, and dead trees and spike tops, but they are readily distinguished from adjacent groups having different characteristics (Kaufmann et al., 2007). In local areas, trees are randomly distributed. Openings surrounding tree groups and patches are variably shaped and comprised of a mix of graminoids, forbs, and shrubs. Some openings contain individual trees or snags.
- 15 Trees within groups are of similar or variable ages and one or more species. Size of tree groups typically is less than 1 acre. Groups at the mid-age to old stages consist of approximately 2 to 50 trees per group.
- 16 Dwarf mistletoe is an element of the forest landscape, including the ponderosa pine and mixed conifer forest types. There is a varied level of mistletoe across the landscape, comparable with historic conditions such that it does not impede achieving and sustaining uneven-aged forest structure. Witches brooms may form on infected trees, providing habitat for wildlife species.
- 17 Fine scale features such as rock piles and wet areas, which are necessary to support rare plant species, are well distributed and maintained within the capacity of this PNVT.

**Mixed Conifer with Aspen**

*FW-Veg-MC-MCA-DC*

***Landscape Scale (10,000 acres or greater)***

- 1 At the landscape scale, Mixed Conifer with Aspen is a mosaic of structural and seral stages ranging from young trees to old. The landscape arrangement is an assemblage of variably sized and aged groups of trees and other vegetation similar to historic patterns. Tree groups and patches are comprised of variable species composition depending on forest seral stages. An approximate balance of seral stages is present across the landscape, each seral stage is generally characterized by distinct dominant species composition and biophysical conditions. Old canopies are generally more closed than in Mixed Conifer with Frequent Fire. An understory consisting of native graminoids, forbs, and/or shrubs is present.

**Table 11. Desired proportion of seral stages for Mixed Conifer with Aspen**

State	Desired Percent Composition	Description, Size, and Cover Class
Early development	7%	Recently burned, grass/forb with aspen or oak ramets, 10–40% tree cover.
All aspen and evergreen-deciduous mix tree types	21%	Seed/saplings, small, medium, and very large – all cover classes. Aspen/mixed-aspen forest, >40% tree cover, dominated by aspen or oak, conifer understory.
Early, middle development	18%	Seed/saplings, small – all cover classes Seed/saplings–open, small–open Mixed conifer forest with regeneration, 20–60%+ tree cover (shade intolerant trees).
Middle, late development	14%	Medium – all cover classes Mixed conifer forest with regeneration, 20–60%+ tree cover (shade intolerant, intermediate, and tolerant trees).
Late development–closed	40%	Very large–closed Mixed conifer old forest with regeneration, 20–60%+ tree cover. Higher proportions can be expected for associations with longer stand replacement intervals (shade intolerant and tolerant trees).

- 2 Old growth structure generally occurs over large areas as stands or patches where old growth attributes are concentrated. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- 3 Mixed Conifer with Aspen is composed predominantly of vigorous trees, but older declining trees are a component. Declining trees are well distributed throughout the landscape and provide for snags; top-killed, lightning-scarred, and fire-scarred trees, and coarse woody debris. Number of snags and the amount of downed logs (greater than 12-inch diameter at mid-point and greater than 8 feet long) and coarse woody debris (greater than 3-inch diameter) vary by seral stage.
- 4 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances and climate variability. The forest landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g., insects, diseases, wind, and fire), including: snags, downed logs, and old trees. Mixed severity fire (Fire Regime III) is characteristic. High-severity fires (Fire Regimes IV and V) rarely occur. Natural and human disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Mosses and lichens are prevalent and function for recycling soil nutrients.

**Mid-Scale (100 to 1,000 acres)**

- 5 At the mid-scale, the size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary but are frequently in the hundreds of acres, with rare disturbances in the thousands of acres. Groups and patches of tens of acres or less are relatively common. A mosaic of groups and patches of trees, primarily even-aged, but variable in size, species composition, and age is present. Grass, forb, and shrub openings created by disturbance may comprise 10 to 100 percent of the mid-scale area, depending on the disturbances and on amount of time since disturbance.
- 6 Tree density ranges from 20 to 180 square feet basal area per acre depending upon time since disturbance and seral stages of groups and patches. Snags 18 inches or greater at d.b.h. average from 1 to 5 snags per acre, with the lower range of snags of this size associated with early seral stages and the upper range associated with late seral stages<sup>22</sup>. Snag density in general (greater than 8 inches d.b.h.) averages 20 per acre and provides wildlife habitat and future downed logs. Coarse woody debris, including downed logs, varies by seral stage, with averages ranging from 5 to 20 tons per acre for early seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late-seral stages. Coarse woody debris and logs provide for long term soil productivity.
- 7 Quaking aspen exists within the successional stage mosaic in this PNVN, providing habitat for those organisms dependent on it. Organisms present in aspen groves include native plant species such as Colorado blue columbine and Rusby milkvetch, native animals such as woodpeckers, and a variety of fungi and microorganisms. Where they naturally occur, all age classes of aspen and maple are present in even-aged groups or patches, which collectively contribute to a variable-aged landscape, and are regenerating and vigorous. A diverse understory comprised of native herbaceous and shrub species has a variety of seral and age classes and is vigorous and regenerating.
- 8 Mixed (Fire Regime III) and high (Fire Regime IV) severity fires and other disturbances maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. High-severity fires generally do not exceed 1,000-acre patches of mortality. Other smaller disturbances occur more frequently. Forests in the WUI are dominated by early seral, fire-adapted species growing in a more open condition than the general forest. These conditions result in fires that burn primarily on the forest floor and rarely spread as crown fire.
- 9 Basal area per mid-aged to old tree group in northern goshawk PFAs is 10 to 20 percent higher than northern goshawk foraging areas and the general forest. Nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the Wet Mixed Conifer type.

**Fine Scale (10 acres or less)**

- 10 In mid-aged and older forests, trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages. Locally, patches of random tree distribution are present. Small openings (gaps) are present as a result of disturbances.
- 11 Openings that support grasses, forbs, and shrubs are periodically created by disturbance to provide habitat for species such as Rusby milkvetch.

- 12 Natural openings and meadows are well distributed throughout this PNVT. They provide habitat for rare species such as Colorado blue columbine, Rusby milkvetch, Oregon willow herb, and timberland blue-eye grass. These openings are maintained by natural processes and exist within this PNVT in quantities and qualities adequate enough to allow for the persistence of these species as members of the native plant community. Fine scale features, such as rock piles and wet areas which are necessary to support these rare plant species, are well distributed within the capacity of this PNVT.

### **Objectives for Mixed Conifer Types<sup>23</sup>**

#### **Mixed Conifer with Frequent Fire**

##### *FW-Veg-MC-MCFF-O*

- 1 Mechanically thin using methods such as group selection and free thinning 14,000 acres during the 10 years following plan approval.
- 2 Use prescribed fire on at least 8,000 acres (low-severity fire only) of Mixed Conifer with Frequent Fire during the 10 years following plan approval. Treatment priorities should move forest priority 6<sup>th</sup> code watersheds toward satisfactory conditions.
- 3 Use naturally ignited fires (i.e., lightning-caused fires) to treat at least 7,500 acres with low-severity fire during the 10 years following plan approval.

#### **Guidelines for Mixed Conifer Types**

##### **Mixed Conifer with Frequent Fire**

##### *FW-Veg-MC-MCFF-G*

- 1 To retain structural diversity, existing and developing old-growth forest structures should be protected from uncharacteristic disturbances. Methods of protecting existing old growth may include thinning, prescribed fire, and the use of wildfire with resource objectives in adjacent areas, especially those areas that are situated upwind or are topographically lower.
- 2 To promote structural diversity, the development of old-growth structural components should be encouraged in areas where lacking. Vegetation treatments should be designed such that replacement structural stages and age classes are proportionally present to assure continuous representation of old-growth characteristics across the landscape over time.

#### **Related Plan Content for Mixed Conifer Types**

See the following: [Soil](#); [Wildlife, Fish, and Plants](#); [Fire Management](#)

#### **Spruce-Fir**

See appendix A, map 12.

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<sup>23</sup> Objectives for Mixed Conifer Frequent Fire move the PNVT toward desired conditions and indirectly maintain and improve habitat for the Mexican spotted owl, a management indicator species.

### General Description and Background for Spruce-Fir

Spruce-Fir covers approximately 13,946 acres of the Coconino NF and is generally found between 8,400 and 12,000 feet in elevation. Spruce-Fir is often dominated by Engelmann spruce, but contains other species depending on elevation. The understory commonly includes currants, maples, honeysuckle, common juniper, alpine clover, and sedges. Spruce-Fir occurs within Kachina Peaks Wilderness and represents some of the coldest, wettest, and highest elevation sites on the forest.

Spruce-Fir can be subdivided into lower elevation (Spruce-Fir Mix) and upper elevation (Subalpine Spruce-Fir), each with differing fire regimes and subdominant species composition. The lower elevation subtype typically occurs between 9,500 and 10,500 feet; while the upper elevation subtype typically occurs between 10,500 and about 11,500 feet and is bounded by Alpine Tundra vegetation above 11,500 feet.

The lower elevation subtype resembles Mixed Conifer with Aspen except with a different composition of tree species, due to colder and wetter conditions, and it is a transition zone between Mixed Conifer with Aspen and the upper elevation Spruce-Fir subtype. In the lower elevation subtype, the common tree species are aspen, Douglas-fir, white fir, and southwestern white/limber pine. The climax forest is dominated by Engelmann spruce, white fir, and occasionally blue spruce. Subdominant species may include corkbark/subalpine fir, white fir, and bristlecone pine. In the upper elevation subtype, the dominant tree species are Engelmann spruce and corkbark fir (subalpine fir). Patches of aspen are occasionally present but are usually absent. Disturbances in these subtypes typically occur at two temporal and spatial scales; large-scale, infrequent disturbances (mostly fire) and small-scale, frequent disturbances (e.g., fire, insect, disease, and wind).

Nine percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

### Desired Conditions for Spruce-Fir

#### FW-Veg-SF-DC

#### *Landscape Scale (10,000 acres or greater)*

- 1 Spruce-Fir has a mosaic of trees with varying age classes and understory vegetation which infiltrates water, protects soils, and provides structure and composition that is resilient to the frequency, extent, and severity of disturbances and climate variability.
- 2 Spruce-Fir is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, fire, avalanches, and wind), including old trees, downed logs, and snags. Spruce-Fir is a mosaic of structural and seral stages ranging from young trees to old and is composed of multiple species. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation similar to historic patterns. An understory consisting of native grass, forbs, sedges, mosses, liverworts, and/or shrubs is present.

**Table 12. Desired proportion of seral stages for Spruce-Fir**

State	Desired Percent Composition	Description, Size, and Cover Class
Early development	9%	Grass/forb seedling/sapling with aspen, Douglas-fir, spruce, fir, 10–40% tree cover.
Early forest	13%	Seed/saplings, small, medium, and very large – all cover classes. Grass/forb seedling/sapling with aspen, Douglas-fir, spruce, fir. Aspen/mixed – aspen, 0–10%.
Early, middle development	22%	Seed/saplings, small – all cover classes Seed/saplings – open, small-open Conifer early forest, 10–20%. Grass/forb seedling/sapling with aspen, Douglas-fir, spruce, fir. Aspen/mixed – aspen early forest, 0–10% (shade intolerant, intermediate and tolerant trees).
Young forest with regeneration	15%	Medium – all cover classes (shade intolerant, intermediate, and tolerant trees)
Mature/old forest with regeneration	44%	Very large–closed Mature/old forest with regeneration (shade intolerant and tolerant trees)

- 3 Old-growth characteristics generally occur over large areas as stands or patches where old-growth components are concentrated. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old-growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).
- 4 Spruce-Fir is composed predominantly of vigorous trees, but older declining trees are a component. Declining trees are well distributed throughout the landscape and provide for snags; top-killed, lightning-scarred and fire-scarred trees; and coarse woody debris. The number of snags and amount of downed logs (greater than 12-inch diameter at mid-point and greater than 8 feet long) and coarse woody debris (greater than 3-inch diameter) vary by seral stage.
- 5 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances and to climate variability. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. In the lower elevation subtype, mixed-severity fires (Fire Regime III) infrequently occur. In the upper elevation subtype, high-severity fires (Fire Regime IV and V) occur very infrequently. Natural and human-caused disturbances are sufficient to maintain desired overall tree density, structure, species composition, spongy coarse woody debris, and nutrient cycling.
- 6 Natural openings and subalpine meadows are present throughout this PNVT. They provide habitat for rare species such as Colorado blue columbine, graceful buttercup, spider saxifrage, and timberland blue-eye grass. Openings are maintained by natural processes and exist within the PNVT in quantities and qualities adequate enough to allow for the persistence of these species as members of the native plant community. Natural openings and subalpine meadows are well distributed throughout this PNVT. Fine scale features such

as rock piles and wet areas, which are necessary to support these rare plant species, are well distributed within this PNVV.

**Mid-Scale (100 to 1,000 acres)**

- 7 At the mid-scale, the size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary but are mostly in the hundreds of acres, with rare disturbances in the thousands of acres. There may be frequent small disturbances resulting in groups and patches of tens of acres or less. A mosaic of groups and patches of trees, primarily even-aged, that are variable in size, species composition, and age is present. Grass, forb, and shrub openings created by disturbance may comprise 10 to 100 percent of the mid-scale area following major disturbance and depending on time since disturbance.
- 8 Aspen is occasionally present in large patches providing habitat for those organisms dependent on it. Organisms present in aspen groves include native plant species such as the Colorado blue columbine and Rusby milkvetch, native animals such as woodpeckers, and a variety of fungi and microorganisms.
- 9 Tree density ranges from 20 to 250 square feet basal area per acre, depending upon disturbance and seral stages of the groups and patches. Snags 18 inches or greater at d.b.h. range from 1 to 3 snags per acre, with the lower range of snags this size associated with early seral stages and the upper range associated with late seral stages<sup>22</sup>. Snag density in general (greater than 8-inches d.b.h.) averages 20 per acre with a range of 13 to 30 and provides habitat for wildlife species and future downed logs. Coarse woody debris, including downed logs, averages vary by seral stage, ranging from 5 to 30 tons per acre for early seral stages; 30 to 40 tons per acre for mid-seral stages; and 40 tons per acre or greater for late-seral stages and provide for long term soil productivity.
- 10 Mixed (Fire Regime III) and high (Fire Regimes IV and V) severity fires and other disturbances maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. Localized, accelerated soil erosion occurs following high-severity fires, but it does not occur to the extent that it risks long-term impairment to connected waters downstream or causes loss of soil productivity over major portions of the 5<sup>th</sup> or 6<sup>th</sup> code watershed.
- 11 The WUI is comprised primarily of grass/forb/shrub vegetation. Structures in the WUI are surrounded by grassy openings with very few or no trees. These conditions result in ground fires.
- 12 Forest conditions in goshawk post-fledgling family areas (PFAs) are similar to general forest conditions except PFAs contain 10 to 20 percent greater tree density (basal area) than goshawk foraging areas and the general forest. Nest areas in Spruce-Fir have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas.
- 13 Soil and vegetation disturbance from management activities occur in confined, localized areas where impacts to long term soil and vegetation condition are minimal.

***Fine Scale (10 acres or less)***

- 14 Mid-aged to old trees grow tightly together with interlocking crowns. Trees are generally of the same height and age in early group/patch development but may be multilayered in late development. Small openings (gaps) are present as a result of disturbances.
- 15 Invasive species are absent or present at minimum levels and do not degrade ecosystem integrity.

**Guidelines for Spruce-Fir**

**FW-Veg-SF-G**

- 1 Soil and vegetation disturbance from management activities should occur in confined, localized areas where impacts to soil condition and vegetation is minimized to maintain long term soil productivity and continue moving the majority of the 6<sup>th</sup> code watershed towards a functioning Class 1 watershed.

**Related Plan Content for Spruce-Fir**

See the following: [Soil](#); [Wildlife, Fish, and Plants](#); [Fire Management](#)

**Alpine Tundra**

See appendix A, map 12.

**General Description and Background for Alpine Tundra**

Alpine Tundra covers approximately 941 acres of the Coconino NF. Found within Kachina Peaks Wilderness, it begins around 10,300 feet in elevation and continues to the top of Humphreys Peak, the highest point in Arizona. This is the only area of Alpine Tundra and the only area containing bristlecone pines located on National Forest System lands in Arizona; it is also one of the southernmost extents of Alpine Tundra in the continental U.S.

Alpine Tundra consists of three main habitat associations: boulder fields, talus slopes, and alpine tundra meadows. Krummholz (i.e., areas of dwarfed, wind twisted trees) occurs near tree line where trees transition to Alpine Tundra vegetation. This PNVF typically has sparse vegetation including grasses, forbs, lichens and low shrubs, and it supports a federally threatened plant—San Francisco Peaks ragwort—that is only found here, as well as other endemic plant species.

Vegetation is controlled by temperature and the presence of soil, wind, snow accumulation, slope, and aspect. Episodic weather related factors are the major natural disturbance processes and include extreme temperatures, solar radiation, high winds, avalanches, and moisture. Wildland fires and invasive or noxious weeds have had little to no effect on this habitat; however, off-trail recreation can trample plants and damage habitat.

Major human disturbances are developed recreation from the ski area and year-round dispersed recreation, mainly outside of winter. There is a popular trail leading to Humphreys Peak.

The Alpine Tundra vegetation zone is probably the most significant cultural area on the Coconino NF. One of the reasons is that it contains shrines that are the focal points of prayers for many tribes in the Southwest.

One percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

#### **Desired Conditions for Alpine Tundra**

##### **FW-Veg-AT-DC**

- 1 The plants, animals, and geological features which contribute to the ecological diversity and uniqueness of Alpine Tundra are maintained.
- 2 The ecosystem diversity of Alpine Tundra is maintained. In addition, it maintains the ecological attributes and processes that provide habitat for native biota, panoramic vistas, and/or solitude. The mountain maintains attributes that provide historic and cultural values. Alpine Tundra displays a diverse composition of native species and vegetation communities (including boulder fields, talus slopes, and meadows). Invasive species are absent.
- 3 Alpine Tundra provides habitat for San Francisco Peaks ragwort; is able to support and sustain rare or endemic species; and continues to be resilient to natural and human-caused impacts.
- 4 Tribal and recreational uses occur such that the uniqueness of the vegetation and ecological attributes are maintained.

#### **Standards for Alpine Tundra**

##### **FW-Veg-AT-S**

- 1 Recreation activities, including new route construction, shall avoid important habitat for the San Francisco Peaks ragwort and result in minimal disturbance to its habitat.

#### **Related Plan Content for Alpine Tundra**

See the following: [Soil; Caves, Cliffs, and Talus Slopes](#); [Wildlife, Fish, and Plants](#); [Dispersed Recreation](#); [Kachina Peaks Wilderness](#)

### **Wildlife, Fish, and Plants**

#### **General Description and Background for Wildlife, Fish, and Plants**

Species are dependent on the health of their habitats. Species viability is addressed in the plan by providing guidance to maintain and/or enhance habitat elements that are important for species found on the forest in addition to addressing species-specific threats. In that way, guidance to manage species is also found in the sections of this plan that relate to their habitats.

The wide range of habitats on the Coconino NF—extending from alpine tundra to lowland desert—creates a biologically rich landscape which supports a diversity of wildlife, fish, and plant populations. The forest is home to over 500 vertebrate species, including at least 300 species of birds; almost 100 species of mammals; a wide variety of amphibians and reptiles; 16 native fish species; invertebrates; as well as a variety of fungi, mosses, and plants.

Wildlife, fish, and rare plant resources have a valuable contribution within the Southwestern Region. Of the 11 national forests in the Southwestern Region, the Coconino NF has the second highest number of acres of lake habitat and the third highest number of miles of stream habitat. The forest contains Fossil Creek, the only stream in Arizona with a large assemblage of native

fish that is free of nonnative fish. Fossil Creek contains eight native fish species as well as the last robust population of lowland leopard frogs on the forest. The first bald eagle nest in Arizona was documented at Stoneman Lake in the late 1800s, and the largest concentration of bald eagles ever counted in Arizona (120 eagles) was documented in 1995 on the forest near Mormon Lake. Of interest, the forest contains Oak Creek, which supports the highest caddisfly species richness of any Arizona stream, including more than one-third of Arizona's entire caddisfly fauna.

The forest provides habitat for a large number of special status species. At the writing of this plan, there were 84 species listed as threatened, endangered, and sensitive species on the Coconino NF. Seventeen were federally listed under the Endangered Species Act as threatened, endangered, or proposed or were identified as candidate species. Sixty-seven species were classified as sensitive species on the Southwestern Region sensitive species list (Forest Service, 2007). Aquatic and riparian species dominated the list of special status species. Of note, 15 of 16 native fish species that occur and/or historically occurred on the forest were federally listed or classified as sensitive by the Southwestern Region at the time of plan approval.

People enjoy high-quality hunting, fishing, and wildlife viewing on the Coconino NF. Nine of the 10 big game species in the State occur on the forest, including: black bear, bighorn sheep, elk, javelina, turkey, mountain lion, pronghorn, mule deer, and white-tailed deer. Buffalo is the only big game species that does not occur. Seven of the nine small game species have abundant habitat on the forest, and there are also opportunities to hunt waterfowl, predators, and furbearers.

Fishing opportunities are abundant. The Arizona Game and Fish Department manages about 27 sport fish species in the State, and the Coconino NF provides angling opportunities for most of those species in stream and lake habitats. Of the 27 sport fish species, most have been introduced to the State from elsewhere, but Apache trout, desert sucker, and roundtail chub are native sport fish. Gila trout were native to the Verde watershed on the forest but have become extinct in these locations. The forest provides a unique opportunity to fish for native roundtail chub in portions of Fossil Creek.

Wildlife viewing is one of the most popular recreational activities on the forest. Three wildlife viewing areas on the forest are identified in the wildlife viewing publications for Arizona: Mormon Lake-Doug Morrison Overlook, Kendrick Park Watchable Wildlife Trail, and Upper and Lower Lake Mary. The National Audubon Society recognizes Anderson Mesa as a globally important bird area (IBA), Lower Oak Creek as a State IBA, and Mogollon Rim Snowmelt Draws as an identified but not yet designated IBA.

People also enjoy photography and aspen and wildflower viewing. Three botanical areas offer plant viewing.

### **Desired Conditions for Wildlife, Fish, and Plants**

#### **FW-WFP-DC**

- 1 Sustainable populations of native and desirable nonnative plant and animal species, including special status species, are supported by healthy ecosystems and ecologically responsible forest activities and reflect the diversity, quantity, quality, and capability of natural habitats on the forest<sup>24</sup>. Human-made or altered habitats may be necessary to support

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<sup>24</sup> See sections in the plan related to terrestrial and aquatic habitats for additional descriptions of desired conditions for habitats.

populations in the short term, but in the long term, species are enhanced and/or returned to natural habitat.

- 2 Habitats for special status species support viable, self-sustaining populations. Ecological conditions provide habitat for federally listed and other special status species. Habitat conditions contribute to the survival and recovery of listed species, allow for repatriation of extirpated species, contribute to the delisting of species under the Endangered Species Act, preclude the need for listing new species, improve conditions for Southwestern Region sensitive species, and keep common native species common.
- 3 Habitat conditions provide the resiliency and redundancy necessary to maintain species diversity and metapopulations. Habitats have the soil characteristics and native vegetation to support the species that are dependent on them.
- 4 Streams and other aquatic systems have sufficient clean water, substrates, bank structure, and other features to provide high quality species habitat which benefits survival, growth, reproduction, and migration of associated native species. Properly functioning stream ecosystems provide habitat for native and desirable nonnative species and are resilient to disturbances.
- 5 Habitats throughout the Coconino NF include the microclimate or smaller scale elements needed for rare plants and animals. The structure and function of the PNVTs and associated microclimate or smaller scale elements (e.g., special features, rock piles, specific soil types, and wet areas) exist in adequate quantities to provide habitat and refugia for narrow endemics, species with restricted distributions, and Southwestern Region sensitive species.
- 6 Vegetation and stream connectivity provide for wildlife, fish, and plant species movements and genetic exchange consistent with landforms and topography. Species are able to access adjoining habitat, disperse, migrate, and meet their life history requirements.
- 7 Ephemeral and intermittent stream courses function as nesting habitat and movement corridors for species.
- 8 Human-caused physical barriers or habitat alterations (e.g., temperature changes, loss of streamflow) do not exclude species from their historic habitat or exclude them from using stream courses. Barriers to movement are located where necessary to protect native fish from nonnative species until watershed restoration allows connectivity to be restored.
- 9 Old-growth attributes such as multistory structure; large, old trees; large trees with sloughing, exfoliating bark; snags; large downed logs; and other indicators of decadence are present in all forest and woodland vegetation types, providing habitat for the associated species.
- 10 All age classes of deciduous trees (e.g., aspen, maple, Gambel oak) within the forest PNVTs are well represented and provide habitat for wildlife and rare plants.
- 11 The forest is known for high quality hunting and fishing opportunities. There is more emphasis, interest, and opportunity to fish for native sport fish. Nonnative sport fish and habitats are managed in locations and ways that do not pose substantial risk to native species.
- 12 Residents and visitors have ample opportunities to experience, appreciate, and learn about the forest's wildlife, fish, and plant resources.

**Objectives for Wildlife, Fish, and Plants**

**FW-WFP-O**

- 1 Implement at least 20 actions for federally listed species that contribute to recovery or implement recovery plan actions during each 10-year period of the life of the plan.
- 2 Implement at least 10 actions to benefit sensitive species that contribute to positive trends to avoid the need for listing during each 10-year period of the life of the plan.
- 3 Restore/enhance at least 60,000 acres of terrestrial wildlife habitat during each 10-year period of the life of the plan.
- 4 Restore/enhance at least 70 miles of stream habitat during each 10-year period of the life of the plan.
- 5 Complete at least 30 products or activities that educate the public about wildlife, fish, and plant resources during each 10-year period of the life of the plan. Examples of products include: educational signs and brochures, Web site pages, species checklists, presentations, and field trips.

**Standards for Wildlife, Fish, and Plants**

**FW-WFP-S**

- 1 Direction for species listed as threatened, endangered, proposed, or candidate takes precedence over direction for species not listed by the U.S. Fish and Wildlife Service.

**Guidelines for Wildlife, Fish, and Plants**

**FW-WFP-G**

- 1 Habitat management objectives and species protection measures from approved recovery plans should be applied to activities occurring within federally listed species habitat to promote recovery of the species.
- 2 To improve the status of species and prevent Federal listing, management activities should comply with species conservation agreements, assessments, and strategies.
- 3 Fire suppression techniques that minimize disturbance impacts should be used where there are listed and Southwestern Region sensitive species.
- 4 Seasonal timing restrictions should be applied for threatened, endangered, and sensitive species; bats; and Golden eagles to protect known nests, roosts, and other special features from habitat alteration and/or disturbance from management activities to avoid disruption of species or their habitats that could affect survival or successful reproduction.
- 5 To provide for northern goshawk nesting habitat, post-fledgling areas (PFAs), and nest areas should be designated. A minimum of six nest areas (known or replacement) should be located per territory. Goshawk nest and replacement nest areas should include known nests and generally be located in drainages, at the base of slopes, and on northerly (northwest to northeast) aspects. Nest areas should generally be 25 to 30 acres in size. In order to provide habitat while young goshawks are maturing, goshawk PFAs of approximately 420 acres in size should be designated surrounding the nest sites. Nest areas and surrounding PFAs should be delineated to include the best available goshawk habitat and generally comprise about 600 acres. PFAs generally have higher basal areas than non-PFAs.

- 6 Native species populations and habitats, including downstream habitats, should be maintained or improved by using measures that prevent degradation of habitat and the incidental or accidental introduction of disease or nonnative organisms.
- 7 Where native frogs and toads occur, established protocols should be followed to prevent the introduction and spread of a chytrid fungus (*Batrachochytrium dendrobatidis*) that kills amphibians.
- 8 Aquatic species should not be transferred through management activities from one 6<sup>th</sup> code watershed, except for reintroductions or introductions of native species into suitable habitat.
- 9 All equipment should be cleaned, inspected, and dried before leaving any water body to remove plants, fish, or animals so organisms and disease are not transported among water bodies.
- 10 Fences should be designed, modified, or removed to minimize impacts on wildlife movement. For example, road right-of-way fences should be located one-eighth of a mile from roads and lay-down fences and should be designed to minimize restriction to pronghorn movement.
- 11 Construction of additional fences should be minimal. Fence maintenance should be prioritized in threatened, endangered, and sensitive species habitat and important movement corridors and should occur as needed. Fences that are no longer needed should be removed.
- 12 The use of pesticides, herbicides, or any chemicals should be avoided near bat roosting, foraging, or watering areas to minimize contamination of bats or their prey. If application is necessary, apply techniques to minimize effects (e.g., small-sized spray blocks, application of buffers around roosts and riparian or aquatic habitats).
- 13 In order to minimize the potential reduction of rare plant populations through accidental collection, seed collection and cuttings should be the preferred collection methods when forest product and research collection permits are issued, unless it is determined that whole plant removal is required to meet the needs of the permittee and would not have the potential to impact rare plant populations<sup>25</sup>.
- 14 Permits for cutting stalks off of agaves should not be issued, in order to protect stalks used as nesting and overwintering habitat for key pollinators of desert ecosystems such as carpenter bees. Exceptions may be made for limited research purposes.
- 15 Through discussions with American Indian tribes that collect plants for traditional cultural and ceremonial purposes, growth and regeneration of culturally important plants should be encouraged during forest restoration projects to promote their persistence.

#### **Management Approaches for Wildlife, Fish, and Plants**

Coordinate with the Arizona Game and Fish Department (AZGFD) regarding hunting recommendations to maintain and improve habitat elements such as vegetation and soil condition and productivity, particularly in montane meadows, riparian PNVTs, and aspen.

Coordinate with the AZGFD and U.S. Fish and Wildlife Service regarding listed and native species; reintroductions, introductions, or transplants of listed or native species; control or

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<sup>25</sup> This guideline does not apply to pre-cleared areas for wilding permits of specific species.

eradication of nonnative species; and the management of sport and native fishes, including the identification of refugia for native fish.

Coordinate with the AZGFD, the U.S. Fish and Wildlife Service, sportsman groups, the scientific community—including the Rocky Mountain Research Station—and other stakeholders about information, education, and knowledge gaps as they relate to promoting and improving wildlife, fish, and plant resources and management. Education opportunities could include collaboration with research partners to provide student and volunteer participation in scientific studies.

Maintain the native-fish-only status of Fossil Creek and streams free of nonnatives through public education, signage, and law enforcement.

Refer to the plan implementation guidebooks for plants and invertebrates for project-level guidance. These two guidebooks are intended to be living documents that are periodically updated with new information (Stevens and Ledbetter, 2012; Hodgson and Waring, 2012).

Coordinate with Northern Arizona Native Seed Association partners and Colorado Plateau Native Plant Partners regarding native plant materials, research, and development.

#### **Related Plan Content for Wildlife, Fish, and Plants**

See the following: [Aquatic Systems](#); [Biophysical Features](#); [Soil](#); [Vegetation](#); [Invasive Species](#); [Tribal Relations and Uses](#); [Roads and Facilities](#); [Land Adjustments](#); [Livestock Grazing](#); [Special Uses](#); [Recreation](#); [Research Natural Areas and Botanical and Geological Areas](#)

### **Invasive Species**

#### **General Description and Background for Invasive Species**

Executive Order 13112 defines an invasive species as any species that is nonnative (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species generally possess one or more of the following characteristics: aggressive and difficult to manage; poisonous; toxic; parasitic; a carrier or host of serious insect or disease; and being nonnative, new, or not common to the U.S. or parts thereof. Invasive species pose an increasing threat to the integrity of ecosystems by decreasing native plant and animal diversity, increasing soil erosion and sedimentation, and interfering with natural fires regimes. Reducing the threat of aquatic and terrestrial invasive species will allow the Coconino NF to better manage resilient landscapes and species populations that have a greater capacity to survive natural disturbances and uncertain future environmental conditions such as those driven by climate change and increasing human uses.

#### **Desired Conditions for Invasive Species**

##### **FW-Invas-DC**

- 1 Invasive species are absent or exist at levels where they do not disrupt ecological functioning or affect the sustainability of native and desirable nonnative species. Invasive species include plants, animals, diseases, and insects. Examples include diffuse knapweed, bullfrogs, white pine blister rust, and the exotic spruce aphid.
- 2 Desirable nonnative species such as elk, where they exist, are not having negative impacts on native species.

## Guidelines for Invasive Species

### FW-Invas-G

- 1 Measures should be incorporated into project planning, implementation, and monitoring to prevent, control, contain, and eradicate priority infestations or populations of invasive species. Priority infestations or populations have the greatest threats to native species populations, watershed condition, ecosystem health, and biological diversity.
- 2 [Integrated pest management approaches](#) and other treatments to control invasive species should be used to improve watershed condition and maintain ecosystem function while minimizing project impacts on native species<sup>26</sup>.
- 3 All equipment should be cleaned, disinfected, and inspected using current decontamination protocols to remove plants, fish, or animals so organisms are not transported among water bodies and healthy forest habitats and to maintain the integrity of native species populations and their habitats.
- 4 Weed-free plant material should be selected for all seeding and mulching projects to restore natural species composition and ecosystem function to the disturbed area. Plant or seed materials should be used that are appropriate to the site, capable of becoming established, and are not invasive.
- 5 Hay, straw, and mulch used for animal feed or bedding, applied control, soil stabilization and land rehabilitation, or other purposes by Forest Service personnel or their contractors should be certified as being weed free and weed-seed free by an authorized State department official or equivalent certification system to prevent unintentional introduction of invasive species.

## Management Approaches for Invasive Species

Maintain a current inventory of invasive species on forest lands. For plant inventories, prioritize areas of unique and rare habitats first, and areas of high use and disturbance second (e.g., material pits, trailheads, campgrounds, corrals, roads, boat ramps, and bridges).

For control of invasive species, prioritize areas such as wilderness, research natural areas, botanical areas, wild and scenic areas, and riparian areas to maintain the integrity of native species and ecosystems. Promote early detection of new populations of invasive species and rapid management response as an effective approach to minimize spread.

Coordinate with stakeholders and educate the public to reduce, minimize, or eliminate the potential introduction, establishment, spread, and impact of nonnative invasive species.

## Related Plan Content for Invasive Species

See the following: [Aquatic Systems](#); [Vegetation](#); [Wildlife, Fish, and Plants](#)

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<sup>26</sup> See “Design Features, Best Management Practices, Required Protection Measures and Mitigation Measures” in the “Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds” (Forest Service, 2005) and the “Hygiene Protocol for Control of Disease and Aquatic Organism Transmission” (Forest Service, 2011a), or more current direction.

## People and the Landscape

### Fire Management

#### General Description and Background for Fire Management

Wildland fire is any non-structure fire that occurs in the wildlands. That includes either unplanned human-caused fires, naturally caused fires, or prescribed fires (i.e., planned ignitions).

Most of the vegetation on the forest is adapted to recurrent wildland fires started by lightning from spring and summer thunderstorms. Frequent, low-intensity and low-severity<sup>27</sup> fire plays a vital role in maintaining ecosystem health. Fire—both prescribed and wildfire—if properly managed, is a tool for restoring the forest’s fire-adapted ecosystems.

#### Desired Conditions for Fire Management

##### FW-Fire-DC

- 1 Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation communities affected. High-severity fires rarely occur, except where this is part of the historical fire regime. See desired conditions for appropriate vegetation types.
- 2 Wildland fires do not result in the loss of life, property, or ecosystem function.
- 3 Wildland fires in the wildland-urban interface (WUI) are predominantly low intensity surface fires. Residents living within and adjacent to the forest are knowledgeable about wildfire protection of their homes and property, including providing for defensible space.
- 4 People understand that wildland fire is a necessary natural disturbance process integral to the sustainability of the forest’s fire-adapted vegetation communities.
- 5 Public and firefighter safety are the highest priority in managing fire.

#### Guidelines for Fire Management

##### FW-Fire-G

- 1 WUI areas should be a high priority for fuels reduction and maintenance to reduce the fire hazard.

#### Management Approaches for Fire Management

Manage wildland fires forestwide for multiple resource management objectives<sup>28</sup> where conditions permit.

Integrate fire with other management tools to treat and restore fire-adapted ecosystems.

Coordinate with other jurisdictions such as communities, service providers (infrastructure), and Federal, State, county, and local entities regarding prevention, preparedness, planned activities,

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<sup>27</sup> Low-severity fires refer to an area where a relatively uniform fuel type results in 0 to 25 percent top kill of vegetation when burned. See LANDFIRE Web site: [www.landfire.gov/fireregime](http://www.landfire.gov/fireregime)

<sup>28</sup> “Objectives” are used here in a general sense and do not refer to objectives that are plan components.

and responses to wildland fires. Notify the above regarding the upcoming and ongoing fire season and any prescribed fire activity.

Coordinate access for initial attack and suppression activities with responsible jurisdictions to reduce response times and address public and firefighter safety.

Encourage the development and implementation of community wildfire protection plans (CWPPs) to promote public safety and to reduce the risk of wildfire on non-Forest Service lands.

### **Related Plan Content for Fire Management**

See the following: [Air](#); [Soil](#); [Watersheds](#); [Vegetation](#)

## **Livestock Grazing**

### **General Description for Livestock Grazing**

Livestock grazing has occurred on the Coconino NF since the forest was established. This use has changed since the 1940s. During World War II and in the years following, there were substantially more livestock permitted to graze on the forest than there are today, and there were many more ranchers with permits on the forest.

### **Desired Conditions for Livestock Grazing**

#### **FW-Graz-DC**

- 1 Rangelands provide large areas of unfragmented open space. These open spaces sustain biological diversity and ecological processes and help to preserve the rural landscape and cultural heritage of central and northern Arizona.
- 2 Domestic livestock grazing management maintains the desired composition, structure, and conditions of plant communities. Forage, browse, and cover needs of wildlife and authorized livestock should be managed in balance with available forage. Areas that are grazed have satisfactory soils, functional hydrology, and biotic integrity.
- 3 Livestock waters allow for safe access by wildlife. Troughs and uncovered storage tanks are designed or modified to avoid wildlife injuries.

### **Standards for Livestock Grazing**

#### **FW-Graz-S**

- 1 Water developments shall incorporate escape devices to prevent animal entrapments.

### **Guidelines for Livestock Grazing**

#### **FW-Graz-G**

- 1 To protect riparian area function, the placement of salt, minerals, and/or other supplements for the purposes of livestock management should be located further than a quarter of a mile from riparian areas or seasonally present water that is not overland flow.
- 2 New and existing water developments, corrals, and other handling or loading facilities should not adversely affect occupied sensitive plant habitat.

## Chapter 2. Forestwide Management

- 3 Livestock salting should be located away from sensitive resources, such as known locations of Southwestern Region sensitive plant species and archaeological sites, so these resources are not affected by associated trampling.
- 4 Burned or mechanically treated areas should be given sufficient rest, especially during the growing season, to ensure plant recovery and vigor and to ensure that perennial plants would not be permanently damaged by grazing. Characteristics such as the following should be present on a majority of the perennial plants within the treated area: seed heads or flowers, multiple leaves or branches, and/or a root system that does not allow them to be easily pulled from the ground<sup>29</sup>.
- 5 Nonstructural and structural (e.g., fences, troughs, pipelines) range [improvements](#) should be used and/or located in a way that minimizes impacts to riparian functions, rare species, and archaeological sites, and should be relocated or modified when found incompatible.
- 6 New water developments, including stock tanks, should not be constructed in ephemeral or intermittent stream courses to avoid alteration of stream course [hydrology](#).
- 7 Intensity, timing, duration, distribution, and frequency of livestock grazing should provide for growth, reproduction, and retention of adequate residual cover of desired plant species.
- 8 Efforts should be made to prevent transfer of disease from domestic sheep and goats to bighorn sheep wherever bighorn sheep occur.
- 9 Converting grazing allotments from cattle grazing to domestic sheep should not be considered within occupied bighorn sheep habitat to prevent the spread of disease between domestic and wild sheep populations. As opportunities arise, allotments near bighorn sheep habitat, where introductions, reintroductions, or transplants occur, should be considered for conversion from domestic sheep grazing to cattle grazing in cooperation with affected parties.

### Management Approaches for Livestock Grazing

Collaborate with [permittees](#), tribes, educational institutions, other agencies, and stakeholders in achieving and maintaining desired conditions, including invasive species management.

Regularly review active [allotment](#) management plans.

Leave gates in waterlot fencing open to wildlife except when controlling livestock distribution.

Consider establishing forage reserves to improve flexibility and balance between restoring fire-adapted ecosystems and range management.

### Related Plan Content for Livestock Grazing

See the following: [Soil](#); [Wetland/Cienega and Reservoirs/Lakes](#); [Springs](#); [Vegetation](#); [Wildlife, Fish, and Plants](#); [Invasive Species](#)

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<sup>29</sup> These characteristics provide evidence of plant recovery, vigor, and reproductive ability.

## Forest Products

### General Description for Forest Products

National Forest System lands were reserved with the intent of providing goods and services to satisfy public needs over the long term. Among these goods is the production of a sustainable supply of forest products. The focus of the Forest Service has broadened over time, and the desired conditions for this plan are focused on outcomes rather than outputs.

Forest products fall into three categories: (1) timber, (2) special forest products, and (3) forest botanical products.

Timber products include, but are not limited to: firewood, wood pellets for home and industrial heating, structural panels, animal bedding, wood molding, pallets, structural lumber, posts and poles, sawtimber, pulpwood, non-sawlog materials removed in log form, cull logs, small roundwood, house logs, and biomass for electricity. Timber products can be measured in cubic or board feet of solid wood.

Special forest products include, but are not limited to: bark, berries, boughs, bryophytes (i.e., nonvascular plants), bulbs, burls (i.e., deformed tree growths), cactus, Christmas trees, cones, ferns, firewood, forbs, fungi (including mushrooms), grasses, mosses, nuts (including piñon nuts), pine straw, roots, sedges, seeds, transplants, tree sap, wildflowers, fence material, mine props, posts and poles, and rails. Special forest products do not include minerals, animals, animal parts, insects, worms, soil, and water.

Forest botanical products are a subset of special forest products but exclude timber products such as, but not limited to: Christmas trees, firewood, and fence materials. Forest botanical products include naturally occurring special forest products such as: bark, berries, boughs, bryophytes, bulbs, burls, cactus, cones, ferns, fungi (including mushrooms), forbs, grasses, mosses, nuts (including piñon nuts), pine straw, roots, sedges, seeds, shrubs, transplants, tree sap, and wildflowers. Like special forest products, forest botanical products do not include rocks, minerals, animals, animal parts, insects, worms, soil, or water.

Special forest products and forest botanical products do not have a common standard conversion to cubic or board feet of solid wood.

### Desired Conditions for Forest Products

#### FW-FProd-DC

- 1 The forest provides a sustainable supply of forest products within the capacity of the land to produce these goods, consistent with vegetative desired conditions and within applicable laws and regulations.
- 2 Silvicultural treatments reflect natural disturbance regimes and contribute to ecosystem sustainability. Silvicultural timber cutting techniques are designed to integrate considerations for socioeconomic values, water quality, soils, wildlife habitat, recreation opportunities, visual quality, and other values, while providing opportunity for a sustainable and appropriately scaled industry.
- 3 Timber products are available to businesses and individuals in a manner that is consistent with other desired conditions and on a sustainable basis consistent with vegetative desired

## Chapter 2. Forestwide Management

conditions. Timber products are available to local American Indian tribes for subsistence and traditional purposes, such as kiva beams.

- 4 Collection of forest botanical products is authorized by permit and only when information is available to ensure the product will persist on the forest. Collection of plant species recognized as rare, limited in distribution, threatened, endangered, or sensitive is discouraged except for scientific and cultural purposes. Traditional tribal uses for forest botanical products, such as the collection of medicinal plants, wild plant foods, basketry materials, and firewood, are facilitated. Boughs and herbaceous plant parts used for American Indian traditional and ceremonial purposes are available under conditions and procedures that minimize restrictions and are consistent with laws, regulations, and agreements with tribes.

### Guidelines for Forest Products

#### FW-FProd-G

- 1 Timber harvest activities should be carried out in a manner consistent with maintaining or making progress toward the desired conditions in this plan.
- 2 Harvesting systems should be selected based on their ability to meet desired conditions and not on their ability to provide the greatest dollar return.
- 3 On lands classified as not suited for [timber production](#), timber harvesting should only be used for making progress toward desired conditions or for salvage, sanitation, public health or safety, or improving wildlife habitat or other resource values.

### Management Approaches for Forest Products

Work with agencies, private organizations, and individuals to promote forest product use when forest products are available as a result of forest management activities.

Encourage use of forest products in lieu of onsite burning or chipping.

Ensure the continued sustainability of special forest products through observation of commercial sales and personal use permit harvest levels.

Recognize the rights of members of tribes whose aboriginal territories include the land now administered by the Coconino NF to collect forest materials for traditional, ceremonial, and subsistence purposes.

Encourage tribal members to engage in traditional activities relating to forest botanical products, such as the collection of medicinal plants, wild plant foods, basketry materials, and firewood for traditional and cultural purposes.

### Related Plan Content for Forest Products

See the following: [Ponderosa Pine](#); [Wildlife, Fish, and Plants](#); [Tribal Relations and Uses](#)

## Energy and Minerals

### General Description for Energy and Minerals

Mining activity on the Coconino NF falls into three legal and regulatory categories: (1) [locatable minerals](#) such as hard rock minerals like manganese (which is subject to claim); (2) [salable \(permitted\) mineral](#) activities such as sand, gravel, and common building stone; and (3) [leasable minerals](#) which includes geothermal resources and oil and gas. The Forest Service's role in locatable mineral management is limited to overseeing rules and regulations applicable to surface resources. The Bureau of Land Management is the responsible authority for managing locatable minerals on public lands, including the national forests. Several areas across the forest have been withdrawn from mineral entry.

### Desired Conditions for Energy and Minerals

#### FW-EngyMin-DC

- 1 Opportunities for environmentally sound minerals development are available. Important wildlife and plant habitats, visually sensitive areas, archaeological sites, and areas with large capital investments are protected through surface occupancy restrictions, mitigation measures, and operating plan requirements imposed on mineral activities. Adverse surface resource impacts are minimized through the appropriate administration of mineral laws and regulations. Past and present mine facilities are reclaimed to provide for public safety and minimize impacts to cultural and natural resources.
- 2 Use and development of mineral material sources occurs where needed for forest purposes such as road aggregate, fill, and riprap (i.e., large rocks used to armor road fills, streambanks, and bridge abutments). [Mineral materials](#) are available to State, county, and city agencies, where feasible, available, and consistent with other resource values.

### Standards for Energy and Minerals

#### FW-EngyMin-S

- 1 Mineral operations and activities must avoid archaeological sites that have been determined to be eligible or may be eligible for the National Register of Historic Places.

### Guidelines for Energy and Minerals

#### FW-EngyMin-G

- 1 To protect social, cultural, and ecological values and where management direction is not compatible with mineral development, the following areas should be considered for withdrawal for locatable minerals:
  - Properties with a substantial Forest Service investment in facilities such as [administrative sites](#) and campgrounds.
  - Traditional cultural properties where historic preservation laws alone do not adequately protect the cultural resource.
  - Established research natural areas not located in wilderness.
  - Geological and botanical areas.

## Chapter 2. Forestwide Management

- Habitat of species having a very limited range and specific habitat requirements not found elsewhere where law and regulation alone do not adequately protect the resource.
- 2 To protect social, cultural, and ecological values, the existing mineral withdrawal<sup>30</sup> on the San Francisco/Mount Elden Recreation Area and Oak Creek Canyon Recreational Area should be maintained.
  - 3 To protect social, cultural, and ecological values, the following areas should be considered for [no surface occupancy](#), no leasing, or other leasing stipulations for leasable minerals in:
    - Designated and eligible wild and scenic rivers.
    - Research natural areas not located in wilderness.
    - The foreground of State and national scenic byways and national trails.
    - Areas of very high scenic integrity not located in wilderness, wild and scenic rivers, or other withdrawals.
    - San Francisco Peaks/Mount Elden Recreation Area withdrawal.
    - Areas of very high archaeological site density (greater than 60 sites per square mile) and potentially eligible for the National Register of Historic Places.
    - Areas with threatened, endangered, or sensitive species.
    - Traditional cultural properties where historic preservation laws alone do not adequately protect the cultural resource.

### Management Approaches for Energy and Minerals

Consider withdrawal from locatable minerals entry and operations for congressionally designated areas that are not specifically withdrawn by the legislation establishing them.

Existing [mineral withdrawals](#) should be recommended to the Department of the Interior for retentions, revocations, and modifications.

Incorporate BMPs and stipulations from the “Final Programmatic Geothermal Leasing Programmatic Environmental Impact Statement for Geothermal Leasing in the Western U.S.” (Bureau of Land Management, 2008), or more current direction, into future leases as appropriate to the location.

### Related Plan Content for Energy and Minerals

See the following: [Special Uses](#)

### Heritage Resources

#### General Description for Heritage Resources<sup>31</sup>

The Coconino NF has some of the highest archaeological site densities in the Southwest, ranging from 1 to over 65 sites per square mile, with an average site density of 15 sites per square mile.

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<sup>30</sup> Expires in year 2020.

<sup>31</sup> Heritage resources are buildings, sites, areas, architecture, memorials, and objects having scientific, prehistoric, historic, or social values.

About 30 percent of the forest has been archaeologically inventoried and approximately 10,000 archaeological sites have been recorded. They represent 12 prehistoric and 10 historic/modern cultural traditions ranging from the Clovis period of the Paleoindian tradition to historic and recent sites of the Hopi, Navajo, Basque, Mexican, and Euroamerican cultures.

One of the most important aspects of the forest's cultural sites is that most of the sites representing the prehistoric Sinagua tradition are contained within the forest. Sites of the prehistoric Cohonina tradition and the Archaic period are also quite abundant but are found outside of the forest as well. The most numerous site types are 1- to 2-room field houses and artifact scatters, followed by lithic scatters, historic sites, and pit house sites. Less common are petroglyph and pictograph sites, pueblos of 4 to 20 rooms, pueblos of 20 or more rooms, and agricultural sites.

About 2,700 sites have been determined to meet the criteria of eligibility for the [National Register of Historic Places](#), meaning they: are considered culturally important because they are associated with important events or important people, are an outstanding example of a type of site or architecture, or have the potential to contribute important information to history or prehistory.

Sites of particular significance are formally nominated to be listed on the National Register, either as individual sites, a district, or as one of a number of significant examples of a class of sites. One hundred fifty-nine sites have been listed on the National Register, either individually or as part of six National Register districts.

Ten National Register sites on the forest have been determined of particular importance and were consequently designated as national historic landmarks. One of these sites is the C. Hart Merriam Base Camp and the other nine national historic landmark sites are within the Winona Village. Merriam's significant life zones concept was conceived in 1889 while he studied the different vegetation zones on the San Francisco Peaks. Winona Village is a complex of sites that was partially excavated in the 1930s, and it was the influence for many of the archaeological concepts for the prehistory of the Flagstaff area.

Several tribes, particularly the Hopi and Zuni, recognize many of the sites on the forest as ancestral villages, where many of the ceremonies and traditions of their cultures originated. Pilgrimages to some of these sites are still made, with offerings of prayers and other items.

The recreational, educational, cultural, and scientific values of the archaeological sites on the forest have been recognized as a recreational and scientific niche that the forest can provide to the public. Promoting and developing that niche, while respecting cultural and scientific values through research and conservation, is a goal of the heritage program of the Coconino NF.

## **Desired Conditions for Heritage Resources**

### **FW-Hrtg-DC**

#### **Site Conservation and Evaluation**

- 1 Historic and prehistoric sites, including known American Indian sacred places and traditional cultural properties, are preserved and protected for their cultural importance. They are generally free from adverse impacts or impacts are minimized through consultation with those tribes who are descendants of the prehistoric people who have used the area in historic times. Site integrity and stability is protected and maintained on sites that are

## Chapter 2. Forestwide Management

susceptible to imminent risks or threats, or where the values are rare or unique. Priority heritage assets, the forest's cultural resource "crown jewels," are all stable and their significant values are protected. Vandalism, looting, theft, and human-caused damage to heritage resources are rare. Site significance and integrity are maintained through conservation and preservation efforts and receive minimal impact from visitors.

- 2 Cultural and scientific values are continually enhanced through research and partnerships with tribes, universities, and museums. Through interpretation and public involvement in archaeological activities, appreciation and respect of cultural values and a sense of stewardship for our common heritage is increased.

### **Collections**

- 3 Archaeological collections and associated records are curated at museums, organizations, and other institutions that meet professional standards for the purpose of scientific research, public education, and interpretation. Collection of additional items occurs when necessary to mitigate project impacts or for cases of scientific or educational value.

### **Enhancement and Interpretation**

- 4 Heritage resources provide educational opportunities that connect people, past and present, to the land and its history. Through positive heritage experiences provided by interpretive sites, historic standing structures, and other materials, the public develops an appreciation for the region's history and develops an awareness of preservation efforts. In some cases, historic routes (e.g., railroad grades, General Crook Road, Beale Road) are used for recreation trails with interpretation of their history and some historic features. Heritage-based recreation opportunities are connected, where practical, with other recreation opportunities such as trails.
- 5 Public enjoyment is enhanced by opportunities to visit interpretive heritage resource sites. Archaeological site etiquette information is readily available to national forest visitors. Interpretation of the human history of the Coconino NF promotes greater public understanding of the communities that have depended on this landscape for their livelihood, recreation, and spiritual well-being and provides connections between prehistoric, historic, and modern people.
- 6 Opportunities exist for volunteers to participate in heritage resource conservation activities such as research, site stabilization, conservation, and interpretation. Heritage programs, interpretive presentations, or publications are available to provide the public with opportunities to learn about, understand, and experience the Coconino NF's prehistory and history.
- 7 Cultural resource findings are synthesized and shared with the scientific community and public through formal presentations, publications, and educational venues.
- 8 The forest's historic documents (e.g., photographs, maps, records) are available to the public for research and interpretation.

## **Objectives for Heritage Resources**

### **FW-Hrtg-O**

#### **Site Conservation and Evaluation**

- 1 Complete an analysis of at least 3 study units or site types every 10 years following plan approval to determine their rarity or ubiquity, potential significance for a range of archaeological questions, information gaps, and cultural values<sup>32</sup>.
- 2 Non-project related archaeological surveys are conducted in areas of moderate to very high archaeological site density on 1,000 acres every 10 years during the life of the plan.

## **Guidelines for Heritage Resources**

### **FW-Hrtg-G**

#### **Collections**

- 1 Primary archaeological site and survey records should be maintained and updated on the forest. Associated records may be shared and maintained at institutions that meet professional standards (e.g., 36 CFR 79, American Museums Association accreditation) and have research interests on the Coconino NF.

#### **Enhancement and Interpretation**

- 2 To protect the cultural setting of the site and visitor experiences, commercial use of heritage-based interpretive sites should be limited to activities that enhance the public's understanding of the resource, protect and preserve the resource, and are consistent with tribal interests.

## **Management Approaches for Heritage Resources**

Heritage program activities should maximize opportunities for partnerships and volunteerism in all program elements. Efforts should be made for cooperation with local, State, and private agencies and institutions in accomplishing program goals and objectives.

### **Site Conservation and Evaluation**

Develop a prioritized list of sites that need stabilization or documentation in order to be preserved to maintain their information potential and significant values. Focus on sites at risk from vandals, natural conditions, and structural stability. Monitoring of sites is prioritized in high visitation areas such as near roads, campgrounds, and trails. Also prioritize sites for their ability to contribute to significant research issues at local, national, and international levels.

Divide the forest into archaeological study units (i.e., geographic areas that are meaningful units of analysis with which to examine and interpret the prehistory of that area) and site types (i.e., such as field houses, flaked stone scatters, small pueblos, large pueblos, pit house clusters, and rock art that have cohesiveness and can be studied as individual classes and/or can be compared between archaeological study units). When planning and implementing property class surveys,

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<sup>32</sup> Understanding the scientific, cultural, and educational values of individual site types can provide a better basis for allocating them to management categories and for prioritizing them for scientific study, development, and preservation. See the first two management approaches for "Site Conservation and Evaluation" for more information on how to prioritize and conduct study unit and site type analysis.

## Chapter 2. Forestwide Management

give priority for identification and documentation to site types that are most subject to damage by expected project activities. Wooden structures and rock art, for example, can be more seriously damaged by fire-related activities than other site types.

Work with partners such as the Arizona Site Stewards program, Arizona Archaeological Society, National Park Service, and Museum of Northern Arizona to study, protect, and monitor sites.

Protect cultural and biological resources in the vicinity of Hartwell Canyon through partnerships and collaboration with organizations such as The Nature Conservancy and The Archaeological Conservancy.

Achieve a balance between activities that ensure historic resource management projects are in compliance with legal requirements to evaluate and protect archaeological sites (i.e., National Historic Preservation Act (NHPA) Section 106) and activities that focus solely on the cultural resources themselves (i.e., NHPA Section 110) by:

- Studying, documenting, and preserving sites; and
- Conducting a program of “public archaeology” to educate and inform people about heritage resources through site interpretation and hands on involvement in the archaeological process.

### **Site Stabilization**

Site stabilization and restoration work should occur based on prioritization of the relative importance, information potential, tribal concerns, and uniqueness of a site. Monitoring should be conducted and documented after sites have been stabilized. Maintenance should be planned for and performed before it becomes critical<sup>33</sup> to the condition of a site.

### **Collections**

Develop agreements with forest approved repositories to curate records and artifacts. Periodically inspect collections and repository facilities to ensure they continue to meet professional standards.

Leverage funding for analysis and curation of collected artifacts.

Retain physical records at Forest Services offices when they need to be accessed regularly for management and evaluation purposes. Maintain electronic records, including maps, letters, and other documents of historic importance. Maintain an annotated index of historic photographs and documents that briefly describes the image or content of each item.

Primary site records, survey records, photographs, and historic records should be scanned and indexed for use, with primary records receiving archival care. Protocols for accessing digital information, both informally and externally, should be developed. Provisions for curation of materials confiscated from Archaeological Resources Protection Act of 1979 prosecutions should be made as part of the deliberation process.

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<sup>33</sup> Critical deferred maintenance is defined as a potential health or safety risk or imminent threat of loss of significant resource values (Forest Service Manual 2360.5).

### **Enhancement and Interpretation**

Emphasis should be given for “self-discovery” developments to minimize the need for onsite staffing. Interpretation should include messages on individual responsibility to protect forest resources, with specific messages targeted to children. NHPA Section 110 survey and site stabilization requirements should be based on the findings of the archaeological site type planning studies and reflect current archaeological issues at local, national, and international levels. Tribal interests should be considered when planning interpretive projects.

Cooperate with private industry, museums, secondary schools, universities, organizations, and other Federal, State, and local governmental agencies to provide for heritage tourism that enhances the overall experience of visitors to the forest, results in preservation and protection of those resources, and is consistent with tribal interests and desires.

Encourage partnerships with American Indians, commercial ventures, volunteers, museums, and universities for documenting, preserving, interpreting, and managing sites and to evaluate and develop creative management opportunities.

Update the [cultural resources overview](#) as archaeological study units are defined and [property classes](#) are analyzed.

Partner with the Rocky Mountain Research Station on education opportunities, collection, and displays with respect to Fort Valley Experimental Forest, a site listed on the National Register of Historic Places.

### **Related Plan Content for Heritage Resources**

See the following: [Paleontological Resources](#), [Tribal Relations and Uses](#); [Roads and Facilities](#); [Recreation](#)

### **Tribal Relations and Uses**

#### **General Description and Background for Tribal Relations and Uses**

American Indian tribes have lived for centuries on the land that is now the Coconino NF, and the forest recognizes and respects those relationships to the land. Some tribes consider the prehistoric sites to be the homes of their ancestors or recognize particular sites and places to be of historical, cultural, and religious significance. The Forest Service and federally recognized American Indian tribes have a special and unique government-to-government relationship (i.e., one sovereign nation to another) based on the U.S. Constitution, treaties, and statutes. The Coconino NF is adjacent to the Yavapai-Apache Nation near Camp Verde and is about 6 miles from the Navajo Nation Reservation boundary. The forest regularly consults with 13 American Indian tribes: Fort McDowell Yavapai Nation, Hopi Tribe, Hualapai Tribe, Havasupai Tribe, Navajo Nation, Pueblo of Acoma, Pueblo of Zuni, San Carlos Apache Tribe, San Juan Southern Paiute Tribe, Tonto Apache Tribe, Yavapai-Apache Nation, Yavapai-Prescott Tribe, and the White Mountain Apache Tribe.

## **Desired Conditions for Tribal Relations and Uses**

### **FW-Trbi-DC**

- 1 The Coconino NF recognizes American Indian needs and viewpoints and fosters a robust relationship with federally recognized American Indian tribes and related groups with which it consults. In addition to the official tribal government with which Federal agencies are required to consult, forest personnel also consult and talk with tribal historic preservation officials, traditional religious practitioners, tribal members, and other tribal organizations. The Coconino NF tribal consultation process notifies tribes about proposed activities on the forest that may be of interest, encourages face-to-face dialogue about proposed activities that are of interest, and provides information about how tribal input received during consultations is used in decisionmaking processes. The Coconino NF consultation processes and tribal interactions are compatible and consistent with its neighboring national forests.
- 2 Tribes work with the forest to identify traditional cultural properties so those areas can be protected from impacts by forest activities and public visitors, preserved, or restored for their cultural properties.
- 3 Tribal practitioners have access to areas that provide them an opportunity to practice traditional activities, such as plant gathering and ceremonial activities that are essential in maintaining their cultural identity and the continuity of their culture with reasonable limitations, consistent with public safety and multiple uses by other forest users. Forest products used by American Indians, organizations, and communities with ancestral or historic ties to the Coconino NF continue to be available for traditional practices. Collection of culturally important plants by American Indians does not negatively affect the presence and distribution of those species on the forest.
- 4 The forest provides a setting for the education of tribal youth in culture, history, and land stewardship and for the exchange of information between tribal elders and youth.

## **Management Approaches for Tribal Relations and Uses**

Recognize the importance of a strong relationship with American Indian tribes and groups, and ensure Coconino NF personnel continuously cultivate those relationships. In addition, one person should be formally designated as a tribal relations coordinator to facilitate the tribal consultation process and maintain a record of tribal consultations.

Develop memoranda of agreement (MOA) between the forest and those consulting American Indian tribes with which a MOA does not currently exist to guide consultation processes and reflect the tribes' particular perspectives and interests.

Meet regularly with consulting tribes to better understand their needs and viewpoints.

Partner with consulting tribes in the management of cultural sites so that cultural resources are preserved and interpreted for the enjoyment of all visitors.

Work with the Kaibab National Forest and local tribes to develop a consistent forest products collection policy and tribal firewood program for use on both national forests.

Provide training to forest employees about the trust responsibilities Federal agencies have for tribes and the specific ways in which the Coconino NF honors and implements those responsibilities.

Continue to manage the land in a spirit of shared stewardship with the tribes.

Enhance tribal relationships and communications through volunteer opportunities with tribal members.

### **Related Plan Content for Tribal Relations and Uses**

See the following: [Alpine Tundra](#); [Forest Products](#); [Heritage Resources](#); [Kachina Peaks Wilderness](#)

## **Roads and Facilities**

### **General Description and Background for Roads and Facilities**

#### **Roads**

The road system provides access to private land, recreational opportunities, research sites, management activities and facilities that support resource management.

#### **Facilities**

The forest manages administrative [facilities](#) and sites for a variety of purposes, from office buildings and storage facilities to lookout towers and fire facilities. The forest uses administrative facilities and sites for the implementation and management of the natural resource.

### **Desired Conditions for Roads and Facilities**

#### **FW-RdsFac-DC**

##### **Roads**

- 1 The transportation system (roads) expands and contracts commensurate with use and needs, and it balances the desire for public access with potential for ecological impacts. An economical system of sustainable, well maintained, and marked roads provides diverse opportunities to safely explore the forest and minimizes impact to watershed conditions, rare plants, fisheries, and wildlife habitat and movement.
- 2 Permanent and temporary roads systems minimize stream crossings. Bridges and culverts allow for safe passage for aquatic organisms.
- 3 Travel restrictions are clearly understood by forest visitors. Roads to private property provide reasonable access but do not necessarily provide for comfort or all-weather access. Roads that are under [easement](#) or special use permit are maintained to Forest Service standards by the permittee or easement holder.
- 4 Temporary roads that support ecosystem restoration activities, fuels management, or other short-term projects are rehabilitated promptly after project completion. Unneeded roads are closed and naturalized<sup>34</sup> to reduce human disturbance to wildlife and to reduce soil erosion.

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<sup>34</sup> Naturalization may include decommissioning or obliterating system roads or rehabilitating user-created roads and trails.

## Chapter 2. Forestwide Management

Some closed roads are converted to motorized trails or nonmotorized trails for recreational use.

- 5 The minimum road system necessary for public, administrative, and private access is managed within designated municipal watersheds or areas that affect municipal water sources, such as the Inner Basin and Upper and Lower Lake Mary, in order to prevent impacts to water quantity and quality from sedimentation and runoff. Temporary increases in roads are appropriate for projects associated with watershed protection and restoration.

### Facilities

- 6 Recreation sites, administrative buildings, dams, and other infrastructure operate as intended and provide a safe environment for people, while avoiding or minimizing negative impacts to natural resources. Energy efficient and economical facilities incorporate emerging technologies and are placed where they can be used effectively while making sustainable use of natural resources.
- 7 Forest facilities that are eligible for the National Register of Historic Places continue to be available for forest administration, public recreation and interpretation, tribal events, and other uses, unless prevented by concerns for health and safety. These sites retain their importance in American history through historic preservation and adaptive reuse and continue to contribute to the historical significance of the community.

## Objectives for Roads and Facilities

### FW-RdsFac-O

#### Roads

- 1 Naturalize or decommission 200 to 800 miles of unauthorized roads and system roads to create a more cost effective road system and to restore natural resources impacted by roads during the 10 years following plan approval.

## Guidelines for Roads and Facilities

### FW-RdsFac-G

#### Roads

- 1 To minimize disturbance to wildlife, road maintenance activities should avoid or minimize noise disturbance where disturbance sensitive threatened and endangered species are present.
- 2 Existing roads should be used or realigned before new roads are constructed in areas where disturbance sensitive threatened and endangered species are present. Where new roads are needed for projects that do not create a permanent facility or require long-term access, temporary roads should be used and rehabilitated or naturalized as soon as the project is completed to minimize impacts to natural resources.
- 3 The BMPs for watershed and water quality in road construction (e.g., the 2005 Draft FSH 2509.25 Non-Point Source Management or later versions) should be used to protect resources while constructing or relocating new and existing roads and to make decisions about their driving condition, location, or operational level. In particular, permanent and temporary road construction and relocation should:

- Occur outside of stream courses and identified streamside management zones, except to cross.
  - Avoid wetlands, seasonally wet meadows, and montane meadows.
  - Be minimized on soils that are unstable and highly erodible.
- 4 Stream crossings on permanent roads should be designed to provide the most cost efficient drainage structure consistent with resource protection, including safe passage of native aquatic organisms, and consider infrastructure needs and legal obligations.
- 5 To maintain an efficient and sustainable road system, unneeded roads should be decommissioned. Factors in prioritizing the naturalization of decommissioned and unauthorized roads should include the following:
- Watershed Condition
    - Soils that are receiving, or are expected to receive, damage to the extent that soil productivity is or will be significantly impaired outside of the road prism.
    - Riparian areas (e.g., springs, wetlands, or stream reaches) that are impaired due to sedimentation or alterations to hydrology related to the road.
    - Meadows at the TES montane meadows polygon map unit scale that are likely to be or being damaged.
    - Poorly located, designed, or maintained roads connected to downstream impaired waters, where potential for increased runoff and sedimentation is high.
  - Wildlife, Fish, and Plants
    - Habitats for threatened, endangered, or sensitive species that are susceptible to roads as barriers or roads as mortality hazards.
  - Social and Cultural Values
    - Areas of high or very high scenic integrity.
    - Roads that provide undesirable access to archaeological sites and areas of traditional cultural use by local tribal members.
    - Areas where user conflict must be resolved or to ensure public safety.
    - Semiprimitive nonmotorized [ROS](#) objectives as set through environmental analysis.
    - Roads where use levels or road maintenance causes adverse noise effects to wildlife during key periods in their life cycle or to recreational experiences.
    - Redundant roads.
    - Roads that are not identified on the [motor vehicle use map \(MVUM\)](#), which are not needed for administrative purposes.
    - Roads that continue to be used for public access despite motorized restrictions.
- 6 To reduce spread of invasive species, road closures or other appropriate methods to reduce dispersal should be used in areas that are a source for spreading plant and aquatic invasive species until the source of spread has been eliminated.

## Chapter 2. Forestwide Management

- 7 New roads, pullouts, and parking areas should be developed away from water courses and be designed to intercept surface-derived pollutants (e.g., oils, fuels, radiator fluid from vehicles), prioritizing protection of perennial water sources.
- 8 Roads deemed necessary should not follow water courses, and crossings should be as direct as possible to minimize erosion and sedimentation.
- 9 Roads should be located in other areas, realigned, or reconstructed to avoid accelerated soil erosion, loss of vegetation, and long-term impacts to soil productivity and soil condition such as compaction and the ability of the soil to infiltrate water outside of the road prism.
- 10 To facilitate navigation and improve enforcement, roads open on the motor vehicle use map or for administrative use should be signed.
- 11 Within [inventoried roadless areas](#), roadless character should be maintained.

### Facilities

- 12 The Forest Service's "Built Environment Image Guide" (Forest Service, 2001), or subsequent guides for facility design, should be used for public and commercial facilities on National Forest System lands in order to provide for consistency in design of facilities.

## Management Approaches for Roads and Facilities

### Roads

Cooperate with the National Park Service (NPS) to identify Forest Service roads near boundaries with national monuments that should be closed or decommissioned from the system to prevent trespass onto NPS land.

Consider wildlife and plant habitat needs early in the transportation and development planning process.

Work closely with the Arizona Game and Fish Department, Arizona Wildlife Linkages Working Group, Arizona Department of Transportation, and others to identify linkages and potential barriers to wildlife movement and to mitigate such threats during project design.

Take advantage of opportunities to work with the Federal Highways Administration to improve safe wildlife movement across interstate highways.

Encourage private landowners who use forest roads to take maintenance responsibility for roads that serve primarily private uses.

Collaborate with local and regional governments and transportation agencies to meet future local and regional transportation needs such as the design and location of [roadway](#) improvements and routes and alternative modes of transportation.

### Facilities

Design narratives that provide criteria to determine the appropriate location, capacity, and type of facility required to meet user needs in the context of the forest setting.

Consult with archaeology staff on adaptive reuse and historic significance of structures that are older than 50 years. Reference the current facility master plan required by FSH 7300 to address

reuse and historical significance of structures. Consult the master plan for historical status, condition, and recommendation categories.

Evaluate outdated facilities and sites for current and future needs, potential reuse, and the ability to update or retrofit in order to meet the Agency's mission in an economical manner.

Native plants are protected to the extent possible by site design and mitigation measures during construction.

### **Related Plan Content for Roads and Facilities**

See the following: [Aquatic Systems](#); [Soil](#); [Wildlife, Fish, and Plants](#); [Heritage Resources](#); [Dispersed Recreation](#)

### **Land Adjustments**

See appendix A, map 13.

### **General Description for Land Adjustments**

Land adjustments are the real estate transactions on the forest including sale, purchase, exchange, conveyance, and rights-of-way. [Land exchange](#) and [land purchase](#) have been, and will continue to be, the means by which the Coconino NF acquires key wildland resources and open space areas.

### **Desired Conditions for Land Adjustments**

#### **FW-LndAdj-DC**

- 1 The Coconino NF has a mostly contiguous land base that provides for biologically diverse public lands with minimal impacts from adjacent land uses. Most of the forest has a natural-appearing landscape that has not lost its wildland character. Open space values are retained, including those related to naturally appearing landscapes, wildlife habitat, riparian/wetland character, and recreational opportunities.
- 2 Easement rights-of-way help provide adequate access to the forest. Appropriate trail access through private lands is identified and managed or acquired through the private land development process, in cooperation with local governments. Reasonable access is provided to private inholdings.

### **Guidelines for Land Adjustments**

#### **FW-LndAdj-G**

- 1 To better promote the mission of the Agency, lands that the forest considers for acquisition should have one or more of the following qualities:
  - Contains habitat for threatened or endangered species and sensitive species.
  - Contributes to the continuity of wildlife and plant habitat.
  - Contains or influences wetlands, riparian areas, or other water-related features
  - Provides needed access, protects public lands from fire or encroachment, or prevents damage to resources.

## Chapter 2. Forestwide Management

- Contributes to areas of high or very high scenic integrity.
  - Improves the ability to manage a designated special area.
  - Contains significant sites with cultural, scientific, or recreational values.
- 2 To retain the forest's setting and contribution, lands that the forest is willing to exchange or sell should have one or more of the following qualities:
- Isolated from other NFS lands.
  - Without unique cultural, scientific, or ecological resources.
  - Managed for a single commercial or other special use, for which it is being exchanged or sold.
  - Has lost its wildland characteristics.
  - Lands needed to meet the needs of communities and the public such as land for a water treatment plant.
- 3 When responding to requests for new access permits or easements, easements should be granted in reciprocity to ensure administrative and public access to the forest unless they are inappropriate because of the physical situation of the site or because they would conflict with the areas desired conditions.

### **Management Approaches for Land Adjustments**

Consult with local governments about land adjustment proposals the forest plans to take forward into the NEPA process. Public input on land exchange begins at the time a site-specific land exchange is proposed.

If acquisition cannot occur, collaborate with private landowners and county governments in the land development process to protect unique resources such as scenery, adjacent wilderness, archaeological values, and threatened and endangered species habitat. Encourage local governments or agencies, private landowners, and/or other appropriate entities (e.g., The Nature Conservancy, Trust for Public Land, Archaeological Conservancy, and local land trusts) to protect the resources and character of the national forest through methods such as conservation easements, land trust management, deed restrictions, or public acquisition of adjacent, high-priority parcels.

Work with landowners and local and regional governments to encourage policies and development practices that conserve open space, reduce wildfire risk, and retain ecosystem benefits. Provide input to the design requirement of new developments (especially when they are adjacent to the forest) and participate in community growth planning efforts. Participate as a government liaison concerning open space issues. Continue linking city and county trails to Forest Service trails. Share public outreach and education tools and information about future plans.

Support open space designations adjacent to the forest to minimize conflicts between residents and other forest users. Review and participate in local government plans to encourage open space objectives that are consistent with national forest management direction and policies.

Work with local and regional governments and road agencies to develop transportation solutions that reduce traffic and vehicle impacts on national forest lands.

Work with homeowner associations and homeowners in the Flagstaff and Sedona Neighborwoods Management Areas to plan and implement measures that reduce wildfire threats to life and property such as:

- Providing reasonable road ingress and egress for emergency evacuation of personnel.
- Providing reasonable road access suitable for use by fire engines, including places to turn engines around.

### **Related Plan Content for Land Adjustments**

See the following: [Scenic Resources](#); [Flagstaff Neighborwoods Management Area](#); [Sedona Neighborwoods Management Area](#)

## **Special Uses**

### **General Description for Special Uses**

#### **Land Special Uses**

[Special use](#) permits authorize a large variety of activities on the national forest. Lands special uses are not related to recreation special uses and may include activities such as utility lines, road use, communication sites, research, and wind energy development. Utility and energy transmission corridors, along with communication sites, are generally long-term commitments of NFS lands. Increased demand is expected for utility lines; renewable energy sources; community infrastructure; private land access; and local, State, and Federal public transportation systems to serve the growing populations of Arizona and the Southwest.

#### **Recreation Special Uses**

Recreation special use permits authorize services that support the Forest Service mission and meet the needs of the public. These permits are a partnership between the Forest Service and private businesses and individuals to provide services and facilities such as outfitter-guide services, skiing, and special events.

### **Desired Conditions for Special Uses**

#### **FW-SpecUse-DC**

##### **Land Special Uses**

- 1 Infrastructure on national forest lands associated with private land needs (e.g., utilities, water lines, roads, and bridges) meets scenic goals, particularly as viewed from the highways, concern level 1 travelways, and recreation sites. New utility construction and reconstruction of existing utility lines uses existing rights-of-way to the extent practical to provide utility access and services to private land and communities. Rights-of-way and authorization for road construction occur at locations and with plans and specifications that effectively protect national forest and other affected ownerships' lands and resources.
- 2 Utility lines, such as pipelines, power lines, fiber optic lines, and telephone lines, are buried unless there are overriding environmental or technical concerns that would prevent burial. Vegetative clearing for utility and energy transmission corridors provide an aesthetic edge effect. The location of new, large linear infrastructure such as power lines has minimal effects to wildlife and minimizes habitat [fragmentation](#).

## Chapter 2. Forestwide Management

- 3 Existing communication sites and utility corridors are used to their maximum capacity with compatible utilities where additions are environmentally and visually acceptable before considering new routes and sites. New corridors avoid research natural areas, geological and botanical areas, and environmental study areas. New communication sites occur only when a broad public need is demonstrated. Power lines and towers are built (construction or reconstruction) to specifications compatible with raptor use.
- 4 Information about the screening process for special use permits is available and understandable to the public.
- 5 The forest supports alternative energy production and facilitates its development while mitigating impacts to resources and public values. Alternative energy developments, such as wind energy, are designed to minimize impacts to other uses and resources, in particular wildlife and scenic integrity.
- 6 Research permitted on the national forest is focused on improving the scientific understanding of natural and social systems. Research projects conducted under special use permits:
  - Help realize and understand the scientific potential of the abundant cultural and natural resources found on the Coconino NF.
  - Are clearly related to the mission of the Forest Service.
  - Provide needed data or other resources for future forest management.
  - Expand the knowledge of rare species on the forest.

### Recreation Special Uses

- 7 Special use activities blend into the landscape and do not draw attention to the activity or equipment. Commercial tours are focused on main roadways and vistas as well as selected recreation locations. They support the Forest Service mission by providing high quality outdoor recreational, educational, and interpretive opportunities. If the need can be demonstrated, commercial tours are allowed to provide opportunities for scenic viewing, natural history education, wildlife viewing, and other activities that are compatible with resource protection, user experiences, and forest direction.
- 8 Commercial and recreational activities are consistent with other direction for the location including Recreation Opportunity Spectrum (ROS) objectives, resource protection, and community goals.
- 9 Livestock used in special use activities does not negatively impact areas where forage is limited.
- 10 Outfitter/guide permits or permit use does not cause a significant change for the ROS social or managerial setting such as allowing airboats or seaplanes on lakes that are at a less developed ROS setting. Motor vehicle use for outfitter-guide activities occurs on roads and trails displayed on the motor vehicle use map or on roads specifically authorized under their permit.
- 11 Large group gatherings and recreation event sites provide a range of opportunities from a natural, “outdoor” experience to commercial amenities for visitor comfort. These pre-analyzed sites are generally areas that are compatible with use by the general public and are identified based on their ability to support large group activities with minimal resource

impacts. They do not have long-term evidence of erosion or invasive species as a result of special use activities. In general, events occur where they will not disrupt the general public's use of the land.

- 12 Recreation residences and commercial facilities on the forest meet State and county health and safety standards. Their footprints are stable with some exceptions to accommodate improvements that address health, safety, and environmental issues. Organization camps managed under special use permits are focused on natural resource values, conservation education, and emphasize nonmotorized recreation opportunities.

### **Objectives for Special Uses**

#### **FW-SpecUse-O**

##### **Recreation Special Uses**

- 1 Identify 4 preapproved sites for recreation events and large group gatherings within 10 years of plan approval.

### **Standards for Special Uses**

#### **FW-SpecUse-S**

##### **Recreation Special Uses**

- 1 Prohibit motorized aircraft landings and takeoffs associated with outfitter-guide activities on National Forest System lands and waters, except for emergencies and rare administrative support activities.
- 2 Require permit holders to rehabilitate user-created trails and other impacted areas created by their activities that were not authorized under their special use permit.

### **Guidelines for Special Uses**

#### **FW-SpecUse-G**

##### **Land Special Uses**

- 1 In accordance with scenery desired conditions and landscape character, utility rights-of-way should be located and maintained to conform with natural-appearing patterns of native vegetation.
- 2 New overhead utility lines and support towers should be located to minimize adverse ecological and scenic impacts through screening and other mitigations.
- 3 Structures, such as communication sites and utilities, should be designed to reduce contrast with the [desired landscape character](#) in accordance with scenic integrity objectives.
- 4 Equipment of a comparable scale should be allowed for expansion of existing utility corridors before creating new sites or corridors in order to minimize scenic and ecological impacts.
- 5 To minimize the proliferation of roads on the forest while meeting legal obligations to owners of inholdings, only one access road should be approved to a parcel of private property whether there are one or many owners.

## Chapter 2. Forestwide Management

- 6 To optimize use of existing sites and minimize negative scenic and ecological impacts, expansion of existing communications sites as allowed by existing or updated communication site plans should be considered before creating new sites. The number of towers should be minimized by approving designs capable of collocating multiple communication carriers/services.
- 7 Where environmental or technical concerns prevent the burial of utility lines, scenic integrity objectives should be maintained through appropriate site and design mitigation for aboveground lines.
- 8 Aircraft activities related to commercial filming should be restricted to protect threatened, endangered, and sensitive species from noise disturbance.
- 9 Diversion ditches permitted across NFS lands should be maintained in a way that minimizes disturbance of vegetation and hydrological conditions.
- 10 To prevent publicizing the location of cultural sites, commercial filming at cultural sites should be prohibited.
- 11 Research projects should:
  - Not interfere with recreation opportunities for the general public.
  - Not introduce new invasive plants or animals.
  - Not negatively impact long-term vegetation structure and composition or vegetation management objectives for the vegetation type.
  - Be colocated with other research activities, when possible.

### Recreation Special Uses

- 12 In order to maintain the recreation setting, outfitter/guide use, when combined with unguided use, should not exceed encounter levels as described in the designated ROS class. Where higher encounter levels are determined to be reasonable, an ROS class inconsistency or exemption is described in the plan (list of exemptions are found under “Sedona/Oak Creek Management Area,” “Desired Conditions,” “Dispersed Recreation”).
- 13 Outfitter-guide motor vehicle use and camping activities should be excluded from areas with sensitive resource issues, such as a high density of archaeological sites, sensitive wildlife areas (including riparian areas or areas with sensitive or rare plants), and adjacent to urban areas, in order to prevent compaction of soils and overutilization of popular areas.
- 14 To protect riparian vegetation, special use permits should generally not be given for activities proposed to occur within 200 feet of perennial streams, springs, or sensitive waters. Exceptions will be for hardened or slickrock sites or for activities in support of approved research, to improve safety, or to provide for site rehabilitation.
- 15 Commercial and recreational activities should occur during times and in locations that are consistent with the needs of national forest users and area residents.
- 16 Commercial use travel should be limited to roads and trails on the motor vehicle use map, or to sites designated in an operating plan for such use. Exceptions include activities that require very limited access over a short period of time, such as hot air balloon retrieval and similar activities, where this access is specified in the permit.

- 17 Commercial uses should use non-National Forest System lands for their activities when their proposed use is not consistent with national forest goals and can be accommodated on non-National Forest System lands.
- 18 Large group gatherings and recreation events should occur in areas that have already been analyzed for resource issues or suitably developed sites, unless such sites have not yet been identified on a district. Applicants are encouraged to use non-National Forest System land for staging when possible.
- 19 Commercial tours at high interest archaeological sites—such as Honanki—should be consistent with site protection and visitor experience objectives.
- 20 Air tour companies and rock climbing activities should not disturb occupied eyries between March 1 and August 31, to protect the area during the peregrine falcon breeding season and to protect other raptor species sensitive to noise disturbance.
- 21 Additional outfitter/guide activities or group activities should generally not occur in Deadman Wash, Dry Lake Hills, Walnut Canyon from Fisher Point east, and Pumphouse Wash except to improve safety or protect natural resources.
- 22 Special use events should occur on Snowbowl Road infrequently and should not interfere with use of the area by the general public or permittees near the Snowbowl Ski Area in order to preserve public access to the mountain and facilities.
- 23 Where forage is limited, overnight campers with recreational livestock should carry cubed, pelleted, or rolled feed to prevent overgrazing of camping areas. Feeds should be free of viable noxious weed seeds to prevent introduction of noxious plants.
- 24 Sites preapproved for special use activities should be rated/designed to accommodate a specific number of people in order to provide for resource protection and prevent overutilization.

## **Management Approaches for Special Uses**

### **Land Special Uses**

Encourage proponents to involve the forest early in the special use permit proposal development process.

Work to ensure that all communication sites have a communication site plan in place.

Consider management area specific scenery desired conditions, when determining whether a permit would be consistent with the scenic integrity objectives. For instance, astronomical facilities in the Pine Belt and Anderson Mesa Management Areas would be permitted given the desired conditions for these management areas.

Consider processing right-of-way grants by priority; first priority being the public interest and national forest needs.

Collaborate with the Rocky Mountain Research Station in assessing research needs, opportunities, and methods relevant to current and future forest management.

Coordinate with the research community to identify and manage long-term research locations with the intent of balancing research and management needs.

### **Recreation Special Uses**

Priority is given to permit applications received in response to a prospectus issued by the Forest Service. Unsolicited proposals will be evaluated on a case-by-case basis as workload allows.

Outfitter-guide and recreation event permits may be prevented in areas with heavy recreation use by the general public until an appropriate determination of need and capacity is completed.

Develop a forestwide or districtwide management plan for administering special use permits, as appropriate.

Before permitting outfitter-guides in areas adjacent to national monuments, contact the National Park Service (NPS) for coordination. Outfitter guiding might also help meet the mission of the NPS in the national monuments or on adjacent national forest lands. Work cooperatively with the NPS for special use requests that occur on both Forest Service and NPS lands.

Coordinate wildlife viewing permits with the Arizona Game and Fish Department.

### **Related Plan Content for Special Uses**

See the following: [Wildlife, Fish, and Plants](#); [Energy and Minerals](#); [Roads and Facilities](#); [Recreation](#); [Scenic Resources](#)

## **Recreation**

### **General Description for Recreation**

Coconino NF provides public access to central Arizona settings that accommodate a wide range of opportunities for outdoor, nature-based recreation. Interstates 40 and 17 connect the Coconino NF with several urban populations including Phoenix, Tucson, Flagstaff, Las Vegas, and Albuquerque. Smaller rural towns and communities utilize parts of the Coconino NF as local recreation areas and tourism attractions. Scenic rivers, creeks, and lakes create unique mountain settings for water-based activities such as fishing, swimming, and motor boating. Several rivers have sections of whitewater for kayaking, canoeing, and rafting. Remote back-country areas of the forest accommodate dispersed recreation activities like backpacking, mountain biking, horseback riding, and hunting.

### **Desired Conditions for Recreation**

#### **FW-Rec-DC**

- 1 Recreation programs, infrastructure, and services are useable by all people to the greatest extent possible without separate or segregated access for people with disabilities. Information on what conditions recreation visitors will encounter on trails is well advertised at the trailhead. Trails and facilities incorporate principles of universal design.

### **Dispersed Recreation**

See appendix A, maps 2, 3, 14, and 17.

### **General Description for Dispersed Recreation**

Dispersed recreation consists of activities that take place outside of developed camping or concessionaire-operated facilities. This may include dispersed camping in designated sites or corridors that lack substantial improvements. The types of uses considered dispersed recreation generally include: hiking, camping, horseback riding, mountain biking, rock climbing, geo-caching, and motorized vehicle recreation. Some of these activities can also occur in developed camping or concessionaire-operated facilities but this section of the plan only refers to their occurrence in less improved settings.

### **Desired Conditions for Dispersed Recreation**

#### **FW-Rec-Disp-DC**

- 1 The diverse landscapes of the Coconino NF offer a variety of settings for a broad range of recreational opportunities in all seasons and a place for visitors to escape into natural, wild places. Landscapes range from primitive settings that provide opportunities for solitude, to more developed, rustic settings that provide opportunities for social interaction and greater human comforts such as sources of drinking water, trash disposal, and boat docks at lakes. Recreation opportunities exist for people with a variety of abilities. As development and population in the region continue to grow and new forms of recreation emerge, recreation settings on the Coconino NF are stable, retaining their natural character. Loss of remote, undeveloped settings does not occur in semiprimitive and primitive settings. Recreation activities are balanced with the ability of the land to support them and create minimal user conflicts. The Coconino NF fulfills a unique and vital role as a place of learning and caring about the environment.
- 2 Growing demand for recreation is balanced with other forest desired conditions, unless increasing capacity results in unacceptable negative effects on natural resources. Managed recreation use stays within this capacity with the exception of holiday weekend use levels that may exceed capacity on a short-term basis so long as resources can recover from short-term increases in use. Recreation on the Coconino NF enhances the quality of life for residents and provides tourist destinations, which contribute to local economies.
- 3 Dispersed recreation activities on the Coconino NF include driving, hiking, wildlife viewing, hunting, fishing, horseback riding, camping, and hunting, among others. Recreation activities do not significantly detract from the natural character of the forest; impact resources such as aesthetics, soils, vegetation, and wildlife; or contribute to user conflicts. Non-recreation activities that take place have minimal effect on recreation activities. For example, thinning projects do not result in slash piles that block trails, and projects that temporarily impact trails are followed up with trail restoration.

#### ***Motorized Recreation***

- 4 Motor vehicle use is a legitimate use of National Forest System lands. Motorized vehicle use only occurs as identified on the motor vehicle use map (MVUM), except as authorized by permit or for administrative uses. A motorized trail system provides a variety of trail widths and levels of challenge for a diversity of users. This system offers opportunities to enjoy scenery, wildlife viewing, a variety of terrain and conditions, and dispersed camping. Multi-use trails are more common than those available for only one class of vehicle and may interconnect with roads to make loops. Motorized routes are easily identified on the ground and on the motor vehicle use map. Single-track motorized vehicle trails emphasize solitude

## Chapter 2. Forestwide Management

from wider types of motorized vehicles and challenge to the extent practical. Motorized trail opportunities provide long distance connections between motorized recreation hubs.

- 5 The boundaries of the Cinder Hills Off-Highway Vehicle (OHV) Area are clearly delineated and prevent off-road driving outside of the designated area. Intrusion on Sunset Crater National Monument is eliminated. Clear signage and information are provided to off-highway vehicle drivers to make clear distinction between driving rules in the Cinder Hills OHV area and rules that apply to the cinder cones outside of the OHV area. Connectors provide access to the motorized trails within this area from a number of nearby access points and adjacent motorized trails.
- 6 Adequate signage is provided to advise the public of where motorized vehicles are permitted. Information kiosks are located at main entryways onto the forest with pertinent motorized recreation information. Information is provided for OHV recreationists and trail users, including maps and signs that provide road and trail information and explain national forest regulations for such activities as OHV travel and camping and trail opportunities. Orientation information and interpretation is provided at sites that receive high levels of visitation.
- 7 Resource damage from unauthorized motorized trails is minimal and unauthorized trails are rehabilitated to prevent future access by the public and to mitigate long term soil and water impacts. Motorized trails are located with minimal impact to sensitive resources such as cultural sites, highly erodible soils, water, and wildlife and botanical resources. Poorly located trails are redesigned or relocated.

### *Interpretation and Education*

- 8 Forest Service communication and interpretive messages show respect for the diverse backgrounds and needs of visitors. The Forest Service communicates accurately and conveys a land ethic to visitors. Visitors are well informed and interpretation emphasizes a land ethic that explains how to reduce their impacts on ecosystems and support the Coconino NF's efforts to protect natural resources and wilderness values. Low impact recreation principles are promoted and widely practiced by the visiting public. There is little human litter as a result of effective enforcement, patrols, and use of refuse and recycling facilities. Through a variety of interpretive efforts, people learn about geology, botanical communities, biodiversity, and heritage site etiquette, and they will be motivated to practice careful stewardship.
- 9 Information kiosks minimize visual clutter by concentrating messages and eliminating the need for multiple signs. Coconino NF information boards provide regional recreation maps and information, site-specific interpretation, trip preparedness, ethics, and seasonal information or closures.
- 10 Interpretation and communication results in residents adjacent to national forest lands understanding the natural environment and cultural resources and are partners in managing the neighboring forest lands for public use and resource protection.
- 11 The national forest educational mission underlies all resources, including vegetation management, rare plant communities, fire, wildlife, fisheries, and heritage resources. Through an increased effort to provide learning-based recreation, the Coconino NF provides strong local and regional support as sustainable nature-based tourism continues to grow into the 21<sup>st</sup> century.

*Camping*

- 12 Forestwide, dispersed recreation sites have minimal evidence of human waste and litter and resource damage. Where resource damage has occurred in high traffic locations, sites are rehabilitated to discourage expansion of the impacts.
- 13 Dispersed camping with recreational vehicles and campers occurs in designated motorized camping corridors or designated spur roads as shown on the motor vehicle use map. There is a range of choices available for dispersed camping. Most motorized dispersed camping areas are not overcrowded, and their naturalness is maintained. In both nonmotorized and motorized dispersed camping areas, trees are intact, and soil erosion, impacts to understory vegetation, and evidence of human waste are minimal. Invasive plants and animals are not introduced or spread by activities.

*Trails and Trailheads*

- 14 A system of well-marked and well-maintained trails provides opportunities for visitors to explore the forest. Access roads to trailheads are open and maintained, and trailheads provide adequate parking and vehicle turnaround space. Trailheads minimize conflict with private land and avoid impacts to ecological and cultural resources. Trails provide access to scenic and wildlife viewing opportunities. Trailheads and trails are designed to be sustainable; erosion is well controlled and, therefore, maintenance needs are minimized. Damage to resources from trailheads and trails is minimal and within the ability of the forest to mitigate or restore. Trail level of development is appropriate to the site conditions and ROS setting. Trail use remains on the established tread, especially in high traffic or sensitive areas such as the Verde Valley Botanical Area.
- 15 Meadows and riparian areas are visually appealing and free from evidence of physical, mechanical, or vegetative damage due to recreation and other forest activities. Physical impacts to meadows and riparian areas are confined to specified road crossings, trail crossings, and access points. These structures are designed to minimize damage to meadows and riparian areas.
- 16 Historic trails, such as Beale Wagon Road, Chavez Road, and logging railroad grades, are preserved and adapted for contemporary use. National Forest System trails adjacent to urban areas sometimes connect to urban trail systems to expand the recreation opportunity. Markers on winter sports trails are visible in winter. Mountain biking occurs on multiuse trails which provide adequate opportunities for different levels of skills and a variety of settings.
- 17 Unplanned social trails are rare and off trail nonmotorized use is discouraged in ecologically sensitive and high traffic areas. Trails in areas with resource concerns, such as sensitive soils that may result in accelerated erosion and loss of soil productivity, rare plant or riparian impacts, or where high user conflicts occur, are prioritized for closure, rehabilitation, and mitigation. Recreation uses, including some mountain biking trails that provide a high level of challenge, are located where their impact to soil and vegetation resources is minimized.
- 18 Trailheads are easily accessible and do not interrupt the traffic flow along main roads. Infrastructure at trailheads is durable, sustainable, and appropriate for the setting. Boundaries of trailhead parking areas are clearly defined to prevent parking outside of the trailhead. Trailhead interpretive information is appropriate for the uses of the trail and provides information on low impact trail use. The level of development at trailheads is

## Chapter 2. Forestwide Management

appropriate for the ROS setting<sup>35</sup>. Trailheads that are needed for multiseason recreation access are designed to accommodate snow removal. Ample access to year-round recreation activity areas is available. Trailheads intended to accommodate horse trailers are wide enough for vehicles with trailers to turn around and have a firm, stable surface to prevent resource damage in wet conditions.

### *Water-Based Recreation*

- 19 Recreation opportunities at waterways and lakes emphasize day-use, nature-based activities such as hiking, picnicking, wildlife viewing, photography, boating, swimming, fishing, and interpretation. These activities in and near riparian areas do not contribute to bank erosion, trash, water quality, or sanitation issues. Camping is discouraged where recreation activities have damaged riparian, shoreline, or aquatic resources. Angling opportunities are available at remote sites, with a semiprimitive or primitive character and in a natural setting.

### *Snow-Based Recreation*

- 20 Snowplay activities occur where conflict between motorized and nonmotorized activities is mitigated through signage and design considerations.

### *Wildlife-Based Recreation*

- 21 The Coconino NF provides for a diverse range of hunting, fishing, and wildlife viewing opportunities. Blinds, stands, cameras, and other structures brought in by the public are temporary and portable and do not have long-term effects on vegetation and wildlife. [Quiet areas](#)<sup>36</sup> provide opportunities for nonmotorized hunting experiences with minimal disturbance of wildlife. Wildlife viewing takes place in natural areas without disturbance to wildlife.

## **Objectives for Dispersed Recreation**

### **FW-Rec-Disp-O**

- 1 Develop 2 to 8 systems of designated bike trails, equestrian trails, and/or motorized trails to adequately provide for these user groups and reduce conflicts between user groups within 10 years of plan approval.

## **Standards for Dispersed Recreation**

### **FW-Rec-Disp-S**

- 1 Prohibit motor vehicle use beyond the [designated system of roads, trails, and areas](#), as defined on motor vehicle use maps, except for those uses authorized by law, permits, and orders in connection with resource management and public safety.

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<sup>35</sup> For example, an area that is providing access into a semiprimitive nonmotorized or primitive setting uses natural materials for the parking area and has signing that is minimal but provides adequate information for the recreation experience. Trailheads in more developed settings may have constructed fencing, gravel or pavement, and other developed features more consistent with developed campgrounds and picnic areas as appropriate under the ROS objectives for that level.

<sup>36</sup> Quiet areas are areas closed to motor vehicle traffic seasonally to provide for a nonmotorized hunting experience. These areas have existed since the 1987 plan was instated. They are designated by the Forest Service and Arizona Game and Fish Department jointly (See “Dispersed Recreation Standards” for closure periods).

- 2 Motorized vehicle use shall be restricted in the following areas<sup>37</sup> during the specified seasons of the year<sup>38</sup>:
  - Nordic Ski Center Seasonal Closure – closed to motor vehicle use from December 1 to March 31.
  - Wing Mountain Cross Country Ski Area Seasonal Closure – closed to motor vehicle use from December 1 to March 31.
  - Pine Grove Seasonal Closure – closed to motor vehicle use from August 15 to December 31. Roads within the area are closed, but the roads along the perimeter are open to motorized travel. The purpose of the closure is to provide opportunities for recreation in areas undisturbed by vehicles.
  - Rattlesnake Seasonal Closure – closed to motor vehicle use from August 15 to December 31. Roads within the area are closed, but the roads along the perimeter are open to motorized travel. The purpose of the closure is to provide opportunities for recreation in areas undisturbed by vehicles.
  - Woods Seasonal Closure – closed to motor vehicle use from December 15 to April 1. Roads within the area are closed, but the roads along the perimeter are open to motorized travel. Schnebly Hill Road and Forest Road 153 are not affected by this closure. The purpose of the closure is to minimize disturbance to big game winter habitat.
  
- 3 Horse and pack stock<sup>39</sup>, except for limited administrative use, are not allowed on these trails:
  - Elden Lookout Trail;
  - Oldham Trail, the portion between Buffalo Park and the El Paso natural gas pipeline;
  - Humphreys Trail and Weatherford Trail above Doyle Saddle;
  - Fay, Wilson Mountain, West Fork of Oak Creek, and Devil's Bridge;
  - Boynton Canyon Trails within Red Rock-Secret Mountain Wilderness; and
  - Inner Basin Trail above the watershed cabin.

### **Guidelines for Dispersed Recreation**

#### **FW-Rec-Disp-G**

- 1 Trails should be built, rerouted, or maintained utilizing current best practices to promote sustainable trends while meeting desired user experiences.
- 2 Trail access to springs should be limited to minimize erosion, trampling, compaction, and inadvertent introduction of invasive and undesirable plants, animals, and disease while still allowing access by wildlife.
- 3 On trails that provide for horseback riding opportunities, equestrian friendly gates should be

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<sup>37</sup> These seasonal closures were carried forward from the 1987 plan (revised May 1991), and they are identified on map 3 in appendix A.

<sup>38</sup> These closures are incorporated into the MVUM and associated closure orders. Other closures may not be reflected if they are authorized by separate NEPA and/or are temporary.

<sup>39</sup> This standard is carried forward as-is from the 1987 plan. See [Watersheds](#) and [Wildlife, Fish, and Plants](#) for associated desired conditions.

## Chapter 2. Forestwide Management

used instead of barbed wire pass-through areas to allow for easier passage unless it interferes with range management and resource protection needed for the pasture.

- 4 To minimize impacts to sensitive resources, new designated motorized dispersed camping access routes should be located away from flood plains and environmentally sensitive areas.
- 5 Interpretation should follow the themes established in the forest's interpretive strategy with district priorities for implementation to provide consistent interpretive messages and mediums.
- 6 Where necessary to protect and promote soil and plant restoration, national forest visitor activities should be restricted from entry into soil and plant restoration sites.
- 7 In designated dispersed camping sites and corridors, mature overstory should be retained to provide shade and screening around hardened sites in order to preserve the recreation setting.
- 8 To minimize negative resource impacts, dispersed sites should be closed, rehabilitated, or otherwise mitigated when:
  - Campsite condition has deteriorated to be heavily or severely impacted;
  - Site occupancy exceeds the area's scenic integrity objective;
  - There are social use conflicts; and
  - Unacceptable environmental damage is occurring.
- 9 Where forage is limited, overnight campers with recreational livestock should carry cubed, pelleted, or rolled feed to prevent overgrazing of dispersed camping areas. Feeds should be free of viable noxious weed seeds to avoid introduction of noxious weeds.
- 10 Except in the Long Valley MA, dispersed camping should be provided near but not within 200 feet of riparian, shoreline, or aquatic resources (per Leave No Trace principles) to provide overnight dispersed recreation opportunities.
- 11 Recreation in the city of Flagstaff municipal watershed (draining into the Inner Basin) should be limited to day-use foot traffic. The area may be closed if unacceptable damage occurs as determined by degradation of water quality.
- 12 Dispersed downhill snowplay activities, (e.g., sledding) should not occur within a quarter of a mile of paved roads and along the Interstate 17 corridor unless the site-specific conditions (e.g., the slope of hill or hills are oriented away from the road) do not pose a serious hazard.
- 13 No new trails should be constructed where trail density is contributing to unacceptable disturbance to wildlife. Unacceptable disturbance would be determined at the project- and area-specific level and could include consequences (e.g., roost or nest abandonment, reproductive failure, increased susceptibility to predators, or displacement of populations normally common to the area).

### **Management Approaches for Dispersed Recreation**

Establish long-term partnerships with recreation organizations to help the forest establish, construct, and maintain motorized trails and foster a low impact conservation ethic.

Develop a management plan for the Cinder Hills OHV Area. Within the Cinder Hills OHV Area, work with and establish interpretive messages and programs with the adjacent national monument and volunteers of OHV users, including improved signage, information kiosks, and interpretive messages. Provide signage and information aimed at the following objectives: to prevent lost

riders, to show opportunities of where to ride, to identify dangerous and/or closed areas, to teach riding ethics, and to reduce user conflicts.

Work with partners such as the Arizona Game and Fish Department (AZGFD), Arizona State Parks, and user groups to provide information and education to foster a low impact conservation ethic among OHV riders.

When developing motorized trails, consider their suitability as multiple user trails for nonmotorized recreation.

Recognize new activities that occur on forest lands, while upholding the responsibility to protect the natural environment and the multiple use rights of other visitors.

Work with the Great Western Trail Association and associated groups to maintain the long-distance trail opportunity the Great Western Trail provides.

Provide leadership to coordinate recreation, visitor information, and trail planning among major recreation providers such as the National Park Service, Arizona State Parks, AZGFD concessionaires, chambers of commerce, city and county governments, volunteers, and nonprofits.

Update the [memorandum of understanding \(MOU\)](#) between the National Park Service and Coconino NF. The MOU sets up: (1) how the agencies communicate when management concerns arise and (2) what criteria will be used to make decisions together. For the Flagstaff area national monuments, some considerations may be included for: American Indian access for traditional uses; law enforcement cooperation; plant gathering for personal uses; outfitter-guide parameters; commercial filming parameters; boundary management; fire management; location and management of NPS facilities on Coconino NF lands; National Historic Preservations Act (Section 106); National Environmental Policy Act and Endangered Species Act compliance coordination; shared services for monitoring; and cooperative efforts in managing interpretation and visitor services.

Consider single-use trails (as opposed to multiuser trail designs) to accommodate varying user experiences where trail design features cannot be provided to mitigate user conflicts or provide for a sustainable recreation setting.

Include discussions and input from county trails coordinators and local groups, as well as local citizens, when conducting trail planning. Consider needs for nonmotorized and motorized trails and provide opportunities for both.

Coordinate trailhead parking with future development on adjacent lands so as to be proactive in designing trails and trailheads to maintain access to public lands and protect resources.

Cooperate with local governments to provide for snow removal and safe conditions for travel to and from winter outdoor activities.

Coordinate with the AZGFD and other stakeholders to provide a network of wildlife viewing opportunities.

Cooperate with the AZGFD to stock fish and provide fishing access to meet goals and objectives of the Arizona Cold Water Fisheries Strategic Plan.

## Chapter 2. Forestwide Management

Adopt design standards and best management practices for emerging recreation activities as they become available. Adopting management policies for new forms of recreation may be considered as time allows and in accordance with the desired interest these new forms attract in relation to other known recreation uses.

For trail system analyses and decisions, include consideration of universal design for all new construction or rehabilitation proposals.

Provide visitor information and guidelines to members of the public inquiring about dispersed recreation opportunities. Coordinate with city, county, and State law enforcement agencies to assist with the enforcement of Federal laws at known forest dispersed recreation areas on holiday weekends.

### **Related Plan Content for Dispersed Recreation**

See the following: [Aquatic Systems](#); [Soil](#); [Wildlife, Fish, and Plants](#); [Invasive Species](#); [Heritage Resources](#); [Roads and Facilities](#); [Special Uses](#); [Scenic Resources](#); [Designated Wilderness Areas](#); [Recommended Wilderness Areas](#); [Wild and Scenic Rivers](#); [National Trails and Scenic Byways](#)

### **Developed Recreation**

(See appendix A, maps 2, 3, and 14.)

### **General Description for Developed Recreation**

Developed facilities are sites where the Forest Service provides multiple amenities for the purpose of visitor comfort and convenience.

### **Desired Conditions for Developed Recreation**

#### **FW-Rec-Dev-DC**

- 1 Developed recreation facilities such as campgrounds and picnic areas are clean, energy efficient, and maintained to standard. Sites are accessible for persons of multiple abilities, reflecting current [accessibility](#) guidelines. Developed sites blend with the natural setting, and uses at these areas do not cause damage to ecologically or culturally sensitive areas. Potable water is provided in high-use areas. Developed recreation opportunities are available for both families and groups, with a multitude of recreation experience types.
- 2 Developed camping facilities provide a level of amenities appropriate for their recreation opportunity spectrum (ROS) setting (see appendix A, map 14) while providing climatic relief and escape from urban life. Developed campgrounds are located outside of flood plains and away from areas prone to flash flooding. Most campgrounds are part of a centralized strategy which consolidates developed recreation opportunities and protects resources. Trails in developed sites connect users to a variety of dispersed recreation opportunities.
- 3 Developed sites near riparian areas are predominantly day use. Amenities in sites adjacent to water protect water quality and prevent vegetation damage and soil erosion and compaction from fishing, boating, swimming, and other activities. Invasive weeds and aquatic organisms

are not established or transported. There is little human litter as a result of effective enforcement, patrols, and use of refuse and recycling facilities.

- 4 Group sites in a variety of settings are provided across the forest. Group sites may vary in capacity, including providing space for groups of more than 75 people<sup>40</sup>. Group sites offer users a place to gather near towns and communities and provide adequate sanitation and amenities. Group sites may be colocated with developed campgrounds or day-use facilities, such as Elden Pueblo. Group sites are strategically located to protect resources and minimize the need for large group gatherings in dispersed recreation areas.
- 5 Information facilities provide places where visitors can find information and learn about natural and cultural resources on the Coconino NF. They are located in strategic locations and are open on days of high visitation (e.g., holidays such as Memorial Day weekend) to best serve the public.
- 6 Where there are high levels of visitor use, most national forest visitor activities occur at developed sites and on trails designed for high levels of use. High levels of developed recreation use occurring along Upper and Lower Lake Mary and in Oak Creek Canyon are accommodated by facilities that balance resource protection with recreation demand. Recreation sites within these corridors emphasize safety and minimize user conflict along highways. Designated parking spots are provided along highways to prevent resource damage and erosion into nearby waterbodies. The site-specific combination of recreation facilities, services, public information, and enforcement minimize wildlife access to human food and trash.

#### **Guidelines for Developed Recreation**

##### **FW-Rec-Dev-G**

- 1 To promote a natural appearing landscape, use of native plant species should be emphasized during planning activities (e.g., design of new sites or improvements to existing sites). Invasives should be removed or treated on existing sites before they become widespread within recreational sites.
- 2 The Forest Service's "Built Environment Image Guide" (Forest Service, 2001), or subsequent guides for facility design, should be used for public and private facilities across the forest in order to provide for consistency in design of recreation facilities.
- 3 To protect human health and safety, snowplay areas should be managed to industry standards.

#### **Management Approaches for Developed Recreation**

Patrol areas regularly for things such as public safety, facility/resource protection, and fee compliance. The operation or closure of a site is determined by the season's volume of use and operating costs. Sites are operated to the current standards, such as those outlined in the Forest Service publication "Cleaning Recreation Sites" (Forest Service, 1995b) or more recent technical report.

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<sup>40</sup> Groups of 75 people or more must apply for a special use permit under the Forest Service's noncommercial group regulations.

## Chapter 2. Forestwide Management

Facilities and infrastructure are maintained and replaced as needed using a sustainable mix of Federal funds, other funds, and partners. Through a facilities master planning process and appropriate NEPA, some facilities may be closed or decommissioned as the public's needs change.

Design narratives that provide criteria to determine the appropriate location, capacity, and type of facility required to meet user needs in the context of the forest setting.

Fee areas and concessionaires may be used to maintain and manage developed facilities, particularly in high-use areas. Ensure that Forest Service rules are enforced consistently through contract administration.

Area-specific built environment image guides may be developed to manage specific design issues associated with special areas or unusual circumstances.

Consider mitigation of heavy recreation congestion along U.S. Highway 180 with future development of developed recreation facilities, particularly for winter recreation, along the U.S. Highway 89 corridor (and/or other locations).

Adaptively manage recreation facilities and opportunities as needed to shift limited resources to those opportunities.

### **Related Plan Content for Developed Recreation**

See the following: [Aquatic Systems](#); [Soil](#); [Wildlife, Fish, and Plants](#); [Invasive Species](#); [Heritage Resources](#); [Roads and Facilities](#); [Special Uses](#); [Scenic Resources](#); [National Trails and Scenic Byways](#)

### **Scenic Resources**

See appendix A, maps 15 and 16.

### **General Description for Scenic Resources**

The forest is divided into four levels of desired [scenic integrity](#): very high, high, moderate, and low. These levels set objectives for the amount of variation from the existing landscape character that is permissible within the scenic integrity level, according to Agriculture Handbook Number 701, "Landscape Aesthetics: A Handbook for Scenery Management." Buildings and structures are not always considered a negative in terms of existing scenic integrity. When they add to the sense of place or reflect the cultural legacy of an area, they contribute to scenic integrity. For instance, well-designed campgrounds can enhance recreation opportunities and enjoyment of scenery.

Scenic integrity objectives (SIOs) are defined by degrees or levels of alteration from the desired landscape character and the intent to achieve the highest possible scenic integrity. Some areas of the forest may require restoration in order to move toward the conditions described in the desired landscape character.

Direction for the forest's desired landscape character is found under each management area (see chapter 3) and may be very similar to the existing landscape. Even though the management area boundaries are distinct, where a desired landscape character applies on the ground is not always distinct and may vary over time with changes from natural disturbance and climate change.

Management areas around the boundaries may exhibit or blend with the landscape character of the adjacent management area. On-the-ground interpretation of these desired landscape character descriptions is acceptable based on site-specific knowledge.

## Desired Conditions for Scenic Resources

### FW-Scenic-DC

- 1 The scenic values of the Coconino NF are conserved and enhanced. Visitors see that the forest is being actively managed through visual cues such as seeing firebreaks with native wildflowers, grasses, and forbs; some fire effects; and tree thinning to frame views from trails and developed recreation sites.
- 2 Vegetation treatments contribute to the scenic integrity of the desired landscape character (see chapter 3, “Management Areas”), especially in highly sensitive areas. Management-created debris, such as slash along [Concern Level 1](#) and 2 travel routes, are located and arranged to minimize their visual disturbance in the [immediate foreground](#) (up to 300 feet)<sup>41</sup>, and slash piles in that immediate foreground are not evident once they are burned or scattered. Openings and stand boundaries are naturally shaped and are oriented to contours and existing vegetation patterns to blend with existing landscape characteristics, except where other natural resource concerns require minimal treatment along powerline corridors.
- 3 [Constructed features](#), facilities, and management activities closely follow the form, line, color, texture, and pattern common to the desired landscape character to remain visually subordinate to the surrounding landscape, except where the size or design of a structure is impossible to subordinate. For those exceptions, the structures complement the desired landscape character.
- 4 Structures required for serving public use of scenic and recreation resources include viewing platforms such as developed sites, roads, parking areas, trails, trailheads, buildings, decks, and observation points. To be functional, these facilities are normally visible in the immediate foregrounds. These structures are part of the expected image of the public being served; however, allowable limits of contrasts do not exceed the structure’s functionality. Travel route structures need to be clearly distinguishable for a distance commensurate with normal speeds or intended use of such routes. Structures exempted from meeting high SIOs in the immediate foreground includes those associated with interstates, major state highways, and regional travelways and associated structures. This exception does not apply to segments that are designated State or Federal scenic byways. These structures harmonize with the surrounding features to the extent possible without compromising safety standards for the type of travel route.
- 5 Long term soil and plant productivity, proper functioning ecosystems, and clean water are considered important components of [scenic quality](#). Rock pits, borrow areas, [open pit](#) mines, and restored gullies have very low scenic integrity and are not seen from visually sensitive travelways and viewing points to the extent possible<sup>42</sup>. Cultural and historic features, young cinder cones, and lava flows are recognized for their inherent scenic values. Native plant rehabilitation is carried out in disturbed areas to speed scenic quality recovery. Natural land

<sup>41</sup> The immediate foreground may be less than 300 feet as determined by site-specific visibility modeling.

<sup>42</sup> These locations are not mapped on the Scenic Integrity Objective Map but may be determined through appropriate site-specific NEPA without a plan amendment.

forms and vegetation are used, to the extent possible, to screen facilities from important viewing locations such as scenic trails and byways.

## Objectives for Scenic Resources

### FW-Scenic-O

- 1 Rehabilitate<sup>43</sup> at least 25,000 acres that do not meet the desired scenic integrity objective (SIO) by at least one level within 15 years of plan approval.

## Guidelines for Scenic Resources

### FW-Scenic-G

- 1 To maintain SIOs, management activities that are inconsistent with the SIO and whose effects persist in the long term should not occur unless a decision is made to change the SIO<sup>44</sup>. Site-specific exceptions can be made based on lower site productivity, soil conditions, and climate without changing the SIO. Additional mitigation measures may be needed in these cases.
- 2 To maintain consistency with the Scenery Management System in the long-term:
  - Deviations<sup>45</sup> in areas with high SIO should not be evident even if they are present.
  - Deviations in areas with moderate SIO should be allowed but remain visually subordinate to the landscape being viewed.
  - Deviations in areas with low SIO should borrow valued attributes from the landscape being viewed, even though the deviations may begin to dominate the views.
- 3 In areas of high and moderate scenic integrity, new infrastructure should, when safety and logistical constraints allow:
  - Use natural contours to minimize the appearance of structures.
  - Use neutral, nonreflective colors and repeat line, form, texture, pattern, and scale to blend structures into their surroundings.
  - Make use of existing infrastructure to camouflage new structures that are not part of the valued landscape.
- 4 Visually attractive live and dead trees, some large woody debris, and understory shrubs<sup>46</sup> should be favored when leaving vegetation in the foreground (half a mile or less)<sup>47</sup> of Concern Level 1 and 2 travel routes in order to enhance the desired landscape character.

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<sup>43</sup> In the context of scenery management, rehabilitation is a short-term management goal used to return a landscape with existing visual impacts and deviations to a desired level of scenic quality formerly found in the natural landscape.

<sup>44</sup> A decision to change the scenic integrity objectives will be documented in a project-level NEPA decision document and in the plan Desired Scenic Integrity Objective Map.

<sup>45</sup> Deviations apply to the long term and at a landscape scale and are not intended to restrict short-term impacts to scenery from construction, fire management, drilling rigs, or other short-term activities. The timeframe for “long term” and “short term” will be defined in the project-level analysis based on the potential effects of the proposed activities.

<sup>46</sup> Visually attractive trees are those that are pointed out for particular scenic value in the management area desired conditions.

- 5 Stems should be flush cut, if possible, or cut less than 6 inches above ground (uphill side) in the immediate foreground (300 feet or less) of Concern Level 1 and 2 travel routes where topography and operational safety allows in order to minimize the scenic impact of management activities.
- 6 When possible, new log landings, roads, and designated skid trails should be located out of view of Concern Level 1 and 2 travel routes to avoid observation of bare mineral soil. When avoiding these locations is not possible, the evidence of these activities should be restored following completion of the activity to harmonize with the surrounding landscape.
- 7 To minimize disruption of the visual landscape, straight lines and geometric shapes should be avoided at the edges of openings and stand boundaries.
- 8 Evidence of fire activities<sup>48</sup> should be dominant for no more than 3 years after burning in areas of high scenic integrity and 5 years in moderate scenic integrity in order to maintain SIOs.
- 9 In order to maintain the SIO, powerlines in areas of moderate scenic integrity should not be widened but may accommodate additional capacity within the existing corridor.
- 10 In situations where wildlife needs require built structures to protect habitat or enhance connectivity (e.g., highway overpasses), the structures should be designed to harmonize with the landscape without compromising functionality. When mitigation is not sufficient to retain the SIOs, these projects are exempted from the need to amend the plan.

### **Management Approaches for Scenic Resources**

Priorities for rehabilitation of sites and facilities that do not meet SIOs consider the following:

- The relative importance of the area and the amount of deviation from the SIOs; “foreground” of high public use areas has highest priority.
- The length of time it will take natural processes to reduce the visual impacts and meet the SIO.
- The length of time it will take rehabilitation measures to meet the SIOs.

Cooperate with other entities, such as the Arizona Department of Transportation, local governments, and commercial and private entities to protect scenic integrity on and adjacent to the national forest.

Collaborate with State and local partners on the management of scenic resources in the immediate foreground of State and Federal recognized scenic byways.

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<sup>47</sup> The foreground may be less than half a mile as determined by site-specific visibility modeling.

<sup>48</sup> Evidence of fire activities includes constructed line, reopened roads, helipads, large unburned piles and other manmade features that are used in wildfire management and prescribed fire. It does not refer to evidence of fire that is within the natural range of variability, such as an appropriate amount of burned standing trees, charred needles, and tree trunks. In areas where uncharacteristic wildfire has occurred, recovery to high or moderate scenic integrity objectives may exceed these timeframes.

## Chapter 2. Forestwide Management

Consider the use of forest product or vegetation management permits to make vegetation transition at the edge of powerline rights-of-way less abrupt or visible, where it is necessary to clear the right-of-way boundary to meet national standards for powerline safety.

Any changes to SIOs should be updated on the plan SIO map.

### **Related Plan Content for Scenic Resources**

See the following: [Aquatic Systems](#); [Soil](#); [Vegetation](#); [Wildlife, Fish, and Plants](#); [Fire Management](#); [Forest Products](#); [Energy and Minerals](#); [Roads and Facilities](#); [Land Adjustments](#); [Special Uses](#); [Recreation](#)

# Chapter 3. Management Areas and Special Areas

## Introduction

This chapter sets forth plan decisions and other content that apply to specific areas on the forest as delineated by management areas. Plan decisions can be visually distinguished and referenced easily in this chapter by a coding system (described in detail in chapter 1 and figure 2) that identifies: (1) where a plan decision is applicable; (2) what resource area is affected by the decision; and (3) what type of plan decision is being made.

Management areas (MAs) are areas that have similar management intent and a common management strategy that is more specific than the forestwide guidance provided in chapter 2. The direction for management areas does not substitute for or repeat forestwide direction, but rather it provides additional direction for the applicable area. In the event that a plan decision in this section and the forestwide component in another section conflict, the more restrictive plan decision generally prevails. A project- or activity-level evaluation, however, may be required to resolve the conflict. See chapter 1 for descriptions of plan decisions (e.g., desired conditions, objectives, guidelines, and standards) and other content (e.g., general description and background, and management approaches).

Some management areas are special areas that have been designated by Congress or an office of the Executive Branch. They are managed to protect the special features or character for which they were designated and must be managed in accordance with relevant law, regulation, policy, and any area-specific management plan (e.g., the “Verde River Comprehensive River Management Plan”).

There are two management areas that overlay the Sedona/Oak Creek MA. The Oak Creek Canyon MA and House Mountain-Lowlands MA are both subject to direction for the Sedona/Oak Creek MA and have unique direction that applies only to those specific overlay areas. There are several guidelines in the Sedona/Oak Creek MA to which the House Mountain-Lowlands MA is an exception.

Scenery desired conditions (i.e., desired landscape character) for wilderness, wild and scenic rivers, and other special areas are described in the management area direction.

Several of the management areas are designated special areas such as wilderness. These are places that have been designated by statute or through past administrative process because of their unique or special characteristics. In addition, there are two categories of preliminary administrative recommendations that occur as separate management areas: recommended research natural areas and recommended wilderness. Those areas recommended for designation are managed to protect their special characteristics until a decision on the designation is made.

## Management Areas

See appendix A, map 1.

## **Pine Belt**

### **General Description and Background for Pine Belt Management Area**

The Pine Belt MA is the largest on the forest. It extends from the northwestern forest boundary then continues southeast where it splits around the Long Valley MA and then ends at the northern boundary of the Upper Clear Creek 5<sup>th</sup> code watershed. The western edge of the management area is defined by the Mogollon Rim and features of this management area may extend down its slope and into adjacent management areas. On the eastern boundary is Anderson Mesa MA. The transition between these two management areas is defined by the presence of piñon-juniper and Great Basin grasslands. The transition is gradual, and there may be areas that have a mixed character. This management area is a portion of the largest ponderosa pine landscape in Arizona.

The desired conditions for scenery from this management area may also apply to the Fort Valley-Mount Elden and the Flagstaff Neighborwoods MAs if the site being analyzed at the project level fits the landscape character described for this management area<sup>49</sup>. The desired conditions for scenery from this management area apply within the Long Valley MA north of State Highway 87. All desired conditions for this management area apply within the Walnut Canyon MA.

The Arizona Trail crosses this management area.

### **Desired Conditions for Pine Belt Management Area**

#### **MA-PineBelt-DC**

##### **Scenery – Desired Landscape Character**

- 1 The Pine Belt MA itself is flat to gently sloping with scattered, steeper landforms including Mormon Mountain, lands around Kendrick Peak, the West Clear Creek drainage, Walnut Canyon, Pumphouse Wash, Fry Canyon, Saddle Mountain, a number of prominent hills and mountains in the northern portion of the management area and various escarpments throughout. On the northern end, evidence of volcanic geology is more common.
- 2 This area is valued for its continuous stands of uneven-aged ponderosa pine, old-growth “yellow-belly” ponderosa pine stands, and beautiful lakes for boating and fishing. This management area is comprised of Ponderosa Pine and Piñon-Juniper Woodlands vegetation types which cluster around broad expanses of grassy openings and picturesque lakes. Ponderosa pine is all-aged and includes large trees with open, well-formed crowns. The forest is generally open and parklike with a diverse understory of grasses and shrubs. Tree conditions in places such as north-facing slopes and canyon bottoms are sometimes more dense. The distribution and class of trees across the landscape corresponds with the ecological desired conditions for this vegetation type. Old growth ponderosa pines as groups or as individual specimens provide a valued landscape feature that adds to the sense of diversity and discovery in this zone. Snags, top-killed trees, down logs, and other evidence of fire and wind disturbance occur individually and in patches of varying sizes. They provide an intriguing feature whose distribution on the landscape varies over time. Standing dead

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<sup>49</sup> Scenery desired conditions for Pine Belt MA may be used for projects taking place in Flagstaff Neighborwoods MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

trees provide character and wildlife habitat and some are retained (see the desired conditions for the ponderosa pine vegetation type for more information).

- 3 Small natural and artificial lakes and wetlands are scattered throughout this management area. They are highly valued for their recreation opportunities, especially boating, fishing, and scenic attributes. Lakes provide a viewing platform for mountains and hillsides in the vicinity and some provide views of the San Francisco Peaks. The presence of water provides for ecological and visual diversity and wildlife viewing.
- 4 Gambel oak and aspen provide a desirable visual contrast to the evergreen pine in fall. In winter, this management area provides recreationists a white, snow-covered landscape that contrasts with evergreen trees. In the summer, it provides cool shady areas for a variety of recreation activities. Arizona walnut trees in Walnut Canyon provide a valued scenic feature in this management area that contributes an interesting bark and texture against the winter sky and yellow fall color.
- 5 Clear, dark night skies are valued for stargazing and as a professional astronomy resource. Astronomical facilities are present and visible in defined areas.
- 6 Trails and recreation use are located and managed to reduce impacts to woody riparian vegetation and riparian habitat in Pumphouse Wash.

### **Guidelines for Pine Belt Management Area**

#### **MA-PineBelt-G**

- 1 In Pumphouse Wash, road and trail rehabilitation work should be focused on decreasing erosion and sedimentation that flow down canyon and into Oak Creek Canyon to improve and maintain watershed conditions and fragile and rare plant communities.

### **Volcanic Woodlands**

#### **General Description and Background for Volcanic Woodlands Management Area**

The Volcanic Woodlands MA is largely defined by the north and northeast extents of the San Francisco Peaks volcanic field associated with more recent volcanic activity. Volcanic features associated with Sunset Crater National Monument on National Forest System lands are an interface of overlapping management concerns.

A number of cinder cones and mountains in this management area are important cultural and religious places for several tribes. They are the sources of spiritual power with shrines that are the focal point for prayers of several religious societies. There is a very high cultural site density in this management area.

#### **Desired Conditions for Volcanic Woodlands Management Area**

##### **MA-VolcanWd-DC**

##### **Scenery – Desired Landscape Character**

- 1 This management area is characterized by gently rolling topography with sudden inclusions of youthful black, red, and gray cinder cones; volcanic craters and vents; and rugged lava flows. Areas with these volcanic features have open growing ponderosa pines which may

have unique forms and shapes due to the harshness of the growing conditions. The forest understory is often sparse with patches of native grass or shrubs. Lava flow areas are distinctive and generally devoid of vegetation, being dominated by unique rock forms. Most of the management area is characterized by Piñon-Juniper Woodlands interspersed with grasslands on gently rolling to flat topography. Water is a rare but valued feature throughout this MA. The southwestern boundary of this management area blends gradually into the ponderosa pine characteristics of adjacent management areas.

- 2 The area is valued for its volcanic scenery and distinctive features such as Red Mountain (a designated geological area), Cochrane Hill, and other cinder cones and lava flows. Volcanic features such as cinder cones and lava flows are recognized for their cultural and religious importance to several tribes. Located in this MA are Sunset Crater National Monument, Cinder Hills OHV Recreation Area, and Painted Desert Vista. Outside of the Cinder Hills OHV area, cinder cones are generally undisturbed by management activity and the volcanic features maintain their integrity, form, and process. Designated motorized recreation opportunities are valued for their scenic views, even though motorized recreation areas can impact the scenery where they occur.

#### **Roads**

- 3 Deadman Wash provides large tracts of unroaded landscape for disturbance-sensitive species and remote recreation experiences.

#### **Management Approaches for Volcanic Woodlands Management Area**

Coordinate with the Flagstaff area monuments to provide for compatible management of scenic resources within the area that is geologically related to Sunset Crater.

Consult with tribes to identify volcanic features of cultural importance in project planning.

#### **Painted Desert**

##### **General Description and Background for Painted Desert Management Area**

The Painted Desert MA is predominantly a transition between Ponderosa Pine and Piñon-Juniper Woodlands vegetation types and the Painted Desert itself. Views of the Painted Desert are in the background from this area, but it lacks some of the Painted Desert characteristic ecological features in the foreground.

##### **Desired Conditions for Painted Desert Management Area**

###### **MA-PntdDsrt-DC**

###### **Scenery – Desired Landscape Character**

- 1 Topography is relatively flat with the exception of Deadman Wash and lands around Doney Picnic Area. Vegetation is comprised of grasslands and Piñon-Juniper Woodlands opening onto a vast, largely undeveloped, desert landscape in the background. Cultural features and evidence of prehistoric habitation are the most predominant scenic attractions in this management area. Panoramic views of volcanic fields and the characteristic Painted Desert land formations are visible from this management area.

## San Francisco Peaks

### General Description and Background for San Francisco Peaks Management Area

The San Francisco Peaks MA is characterized by distinctive mountains with steep slopes and alpine peaks, including the highest point in Arizona, Humphreys Peak. The San Francisco Peaks—including Kachina Peaks Wilderness—are sacred to many American Indian tribes as a significant religious landmark and traditional cultural place that contains many shrines and sacred places. For the Hopi, the San Francisco Peaks are the single most important place central to their religious beliefs. It is an icon that gives them their identity as a people. The San Francisco Peaks are one of several mountains that demarcate the boundaries of the traditional and sacred heartland of the Hopi, Navajo, Zuni, Acoma, Apache, Havasupai, and Hualapai. Many tribes continue to conduct centuries-old religious observances on the San Francisco Peaks that are central to their culture and religion.

The desired conditions for scenery from this management area may also apply to the Fort Valley-Mount Elden and the Flagstaff Neighborwoods MAs if the site being analyzed at the project level fits the landscape character described for this management area<sup>50</sup>.

The Arizona Trail crosses this management area.

### Desired Conditions for San Francisco Peaks Management Area

#### MA-Peaks-DC

##### Scenery – Desired Landscape Character

- 1 The San Francisco Peaks are a distinctive volcanic mountain with several alpine peaks and steep slopes, and it is a focal point of background views from adjacent management areas up to 80 miles away, including Grand Canyon National Park and the Verde Valley. The middleground of views from the peaks is dominated by sky, air, and clouds with background views of dry steep canyons and expansive forests.
- 2 Vegetation varies along the elevation gradient from open ponderosa pine stands with views of the surrounding landscape to sun-dappled shade of Spruce-Fir and Mixed Conifer to rocky and sparsely vegetated alpine communities. Within these vegetation types, steep, cool drainages, and fire disturbance create microclimates with a surprising diversity of landscape features such as high elevation mountain meadows, communities of bristlecone pine, and aspen that contrast with dark evergreen surroundings. Aspen and grasslands, in particular, create openings that provide a sense of the surrounding landscape. The lower slopes of this MA gradually flatten and blend into the surrounding plateau.
- 3 The San Francisco Peaks are highly valued for their scenic character year round. In autumn, aspen lights up the mountains with beautiful yellow, gold, and orange colors contrasted against dark conifer forests. Wildflowers provide dramatic splashes of color in mountain meadows in the spring and late summer. In winter, the snow-covered peaks can be viewed from great distances, and the area is a destination for snowplay.

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<sup>50</sup> Scenery desired conditions for San Francisco Peaks MA may be used for projects taking place in Flagstaff Neighborwoods MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

- 4 The San Francisco Peaks are sacred to many American Indian tribes and are a significant religious and traditional place. There are individual shrines and sacred places that are valued for their cultural setting on the mountain. The area is valued for its heritage resources and cultural importance, spectacular scenery and high scenic integrity, cool climate escape from desert heat, a diverse range of year-round recreation opportunities, and its distinctive landscape features.

## **Fort Valley/Mount Elden**

### **General Description for Fort Valley/Mount Elden Management Area**

The Fort Valley/Mount Elden MA is on the north side of Flagstaff and south of the San Francisco Peaks, and it provides a wide variety of motorized and nonmotorized recreation experiences that can be easily accessed from city parks and the Flagstaff Urban Trail System.

The desired conditions for scenery from the San Francisco Peaks and Pine Belt MAs may also apply to the Fort Valley-Mount Elden MA if the site being analyzed at the project level fits the landscape character described for those management areas<sup>51</sup>.

### **Desired Conditions for Fort Valley/Mount Elden Management Area**

#### **MA-FtVElden-DC**

##### **Dispersed Recreation**

- 1 The varied topography of the Fort Valley/Mount Elden MA and Dry Lake Hills Trail System offers a variety of trail experiences for hikers, mountain bikers, and equestrians. The Dry Lake Hills Trail System provides nonmotorized recreation trail opportunities. The trail system is stable and does not increase significantly in mileage. The base of Mount Elden is primarily used for nonmotorized recreation in order to protect deer winter habitat and cultural sites and to provide for high levels of nonmotorized recreation. Fort Valley provides a mix of motorized and nonmotorized recreation opportunities.
- 2 In the Fort Valley/Mount Elden MA, extensive signage, brochures, and patrols allow visitors to easily find trails and facilities. This area receives a great deal of day-use recreation, primarily due to the close proximity to Flagstaff. Throughout this area “hub” trailheads provide access to a variety of motorized and nonmotorized trails to control access and provide interpretive materials to the most visitors possible.

### **Guidelines for Fort Valley/Mount Elden Management Area**

#### **MA-FtVElden-G**

##### **Dispersed Recreation**

- 1 Waterline Road should be maintained as a high traffic nonmotorized recreation corridor in order to maintain the recreation setting and limit motorized intrusion into wilderness.

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<sup>51</sup> This means that the specialist could be working on a project in the Fort Valley/Mount Elden MA but looking at scenery that more closely matches the landscape character of the Pine Belt MA or for the San Francisco Peaks MA depending on the physical, biological, and cultural attributes of the viewshed. In those cases, the scenery desired conditions from the management area that best matches the setting should be applied.

- 2 The El Paso Natural Gas line should be used as a trail in conjunction with the Mt. Elden/Dry Lake Hills Trail System in order to provide access for the permittee and the public.

## **Flagstaff Neighborhoods**

### **General Description for Flagstaff Neighborhoods Management Area**

The Flagstaff Neighborhoods MA is the area that surrounds Flagstaff and provides a great deal of recreation and access for the community; it was known as the Urban-Rural Interface under the 1987 plan.

The desired conditions for scenery from Anderson Mesa, San Francisco Peaks, and Pine Belt MAs may also apply to the Flagstaff Neighborhoods MA if the site being analyzed at the project level fits the landscape character described for those management areas<sup>52</sup>.

### **Desired Conditions for Flagstaff Neighborhoods Management Area**

#### **MA-FlagN-DC**

##### **Scenery**

- 1 Natural landscape is highly valued by local residents and visitors. National Forest System lands provide the backdrop for the community's character while accommodating features that are more typical of an urban or rural setting. Infrastructure and developments that serve a broad public interest are sometimes evident but still subordinate to the landscape. Recreation developments contribute to the area's unique sense of place through use of native materials; mimicking line, form, color, and texture of the surrounding landscape; or use of identifiable Forest Service symbols and historic features.

##### **Dispersed Recreation**

- 2 Recreation opportunities near Flagstaff emphasize day and overnight dispersed recreation opportunities with few developed facilities, except in established developed campgrounds. Trails are accessed through strategically located access points with an interconnected trail system. The National Forest System trail system connects to the Flagstaff Urban Trail system to provide continuous access to urban recreation opportunities. Many trails in this area provide easy to moderate recreation opportunities with well-defined trails and clear signage for easy way-finding.
- 3 Along Woody Ridge, there are large tracts of unfragmented habitat and back-country recreation opportunities. Remote characteristics are maintained as new residential development occurs on the west side of Flagstaff. Woody Ridge has semiprimitive nonmotorized recreation opportunities that are compatible with walk-in hunting.

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<sup>52</sup> This means that the specialist could be working on a project in the Flagstaff Neighborhoods MA but looking at scenery that more closely matches the landscape character of the Pine Belt MA or for the San Francisco Peaks MA depending on the physical, biological, and cultural attributes of the viewshed. In those cases, the scenery desired conditions from the management area that best matches the setting should be applied.

**Motorized Recreation**

- 4 Passthrough corridors for vehicles, off-highway vehicles (OHVs), and motorcycles lead to separate motorized trails or to secondary forest system roads, except where this is inconsistent with the desired ROS.

**Objectives for Flagstaff Neighborwoods Management Area**

**MA-FlagN-O**

**Dispersed Recreation**

- 1 Within 10 years of plan approval, create 3 additional connections with the Flagstaff Urban Trail System, Flagstaff Loop Trail, and/or Coconino County trails.
- 2 Within 7 to 10 years of plan approval, complete construction of the portions of the Flagstaff Loop Trail on the Coconino NF.

**Management Approaches for Flagstaff Neighborwoods Management Area**

Elden Pueblo public program provides one-on-one, hands-on, experiential archaeology for school children and the public in partnership with the Flagstaff School System, Arizona Natural History Association, Arizona Archaeological Society, and Museum of Northern Arizona.

**Walnut Canyon**

**General Description for Walnut Canyon Management Area**

Walnut Canyon dominates this MA, running from the end of Lower Lake Mary to Fisher Point and turning east toward Winona. Cultural sites are numerous, and the canyon holds religious value for American Indian tribes. The scenery is spectacular. The stark backdrop of the cinder cones provides a dramatic contrast to the canyon depths. The steepest section of the canyon with the most archaeological sites is located within Walnut Canyon National Monument. The canyon itself supports a multitude of vegetation types and habitats from steep north facing mixed conifer to riparian vegetation at the canyon bottom. Disturbance sensitive wildlife species occur in secluded portions of the canyon and along the canyon rim. Lands outside of the canyon are ponderosa pine with Gambel oak understory and some piñon and juniper. There are National Forest System trails, including the Arizona National Scenic Trail, in the canyon itself and along the rim. Fisher Point is a popular destination for hikers, mountain bikers, and outfitter-guided horse trips. Canyon Vista is popular for climbing. The area north and west of Walnut Canyon provides dispersed recreation opportunities and receives heavy use adjacent to private land and Lake Mary Road. Activities include hiking, horseback riding, and mountain biking.

No paved roads or utility corridors occur except on the boundaries. Major roads provide access and other areas are closed to vehicles. Walnut Canyon and its major side drainages are closed to motorized vehicles. The areas south and east of Walnut Canyon provide more remote dispersed recreation opportunities including motorized travelways.

The desired conditions for this area are in addition to those described for the Pine Belt MA.

## **Desired Conditions for Walnut Canyon Management Area**

### **MA-Walnut-DC**

#### **Roads**

- 1 Improvements to meadows and stream channels degraded by road construction or unauthorized roads increase herbaceous ground cover and litter and reduce soil erosion. National Forest System roads and trails are maintained so that accelerated soil erosion is minimal. Non-National Forest System roads are rehabilitated, and poorly located roads are relocated.

#### **Developed Recreation**

- 2 The Canyon Vista area provides parking, day-use trails, and overnight camping in developed campgrounds for individuals and groups. Facilities at the site limit resource impacts and provide a camping experience at the less developed end of the spectrum for developed campgrounds.

## **Standards for Walnut Canyon Management Area**

### **MA-Walnut-S**

#### **Lands Special Uses**

- 1 No paved roads or utility corridors occur except on the boundaries of the Walnut Canyon MA.

#### **Lands Adjustment**

- 2 In the Walnut Canyon MA, national forest jurisdiction will be maintained for all National Forest System lands. No land exchanges will occur unless the purpose is to acquire land within this management area through exchange of national forest lands elsewhere.

## **Guidelines for Walnut Canyon Management Area**

### **MA-Walnut-G**

#### **Lands Special Uses**

- 1 Research projects within rock shelters and archaeological site caves should require a permit in order to protect the associated resource. Permits are issued on a case-by-case basis.

#### **Roads**

- 2 Road construction activities should be designed to maintain or improve soil condition and watershed function.

## **Anderson Mesa**

### **General Description and Background for Anderson Mesa Management Area**

Anderson Mesa MA's major vegetation types are Piñon-Juniper and Great Basin Grasslands. The western and southern parts of this management area transition gradually to Ponderosa Pine. This area provides a background to Winona and areas east of the forest. The Arizona Trail also crosses this management area.

Anderson Mesa is the location of six large pueblos that are the last archaeological expression of the prehistoric Sinagua culture as it transformed into the nascent Hopi and Zuni cultures in the 1400s. Anderson Mesa is also the location of early 20<sup>th</sup> century homesteads of several families that continue to practice traditional cattle ranching in the region today.

The desired conditions for scenery from this management area may also apply to the Flagstaff Neighborwoods MA if the site being analyzed at the project level fits the landscape character described for this management area<sup>53</sup>.

The Arizona Trail crosses this management area.

### **Desired Conditions for Anderson Mesa Management Area**

#### **MA-AMesa-DC**

##### **Scenery – Desired Landscape Character**

- 1 The Anderson Mesa MA has mostly gently sloping to flat topography. The basalt that caps the mesa forms steep escarpments along the boundary of the mesa. Distinctive steep canyons are interspersed along the eastern forest boundary, particularly Padre Canyon, Jacks Canyon, and Upper Clear Creek Canyon. These canyons are distinctive inclusions in this management area which is otherwise dominated by grasslands and Piñon-Juniper Woodlands. The Great Basin Grasslands of the mesa provide large open landscapes with individual trees surrounded by Piñon-Juniper and Ponderosa Pine forests. Grasslands are a valued component of the landscape character where they naturally occur. Anderson Mesa is a destination for hunting and wildlife viewing because of its outstanding wildlife habitat. Other distinctive features in this management area are wetlands such as Marshall Lake and lakes, such as Ashurst Lake, Hay Lake, and Long Lake, which contribute to recreation settings and wildlife habitat (see [Aquatic Systems](#) for more details).
- 2 Roads and trails do not dominate any portion of the landscape and are only provided where necessary for access to the area.
- 3 Clear, dark night skies are valued for stargazing and as a professional astronomical resource. Astronomical facilities are present and visible in defined areas. In spring and late summer, blankets of yellow wildflowers may dominate the grasslands.
- 4 The presence of large prehistoric pueblos and historic ranches that are still operating contribute to the sense of history and place that Anderson Mesa provides to the families of several Hopi and Zuni clans as well as Euroamerican ranching families today.
- 5 Wildlife viewing and hunting opportunities are emphasized in this area. The Anderson Mesa pronghorn herd has a sustainable population, is able to move freely across the grasslands and open areas of the forest and woodlands, and can easily access winter range. Functioning wetlands provide nesting and migratory habitat for waterfowl and shorebirds; foraging habitat for peregrine falcons, ferruginous hawks, and other raptors; and water for a variety of species, consistent with type of wetland.

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<sup>53</sup> Scenery desired conditions for Anderson Mesa MA may be used for projects taking place in the Flagstaff Neighborwoods MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

## **Long Valley**

### **General Description for Long Valley Management Area**

Long Valley is a corridor of intensive recreation use on the Mogollon Rim Ranger District. At its center is Clint's Well and Happy Jack and includes C.C. Cragin (Blue Ridge) Reservoir and Knoll Lake Recreation Area. The area receives heavy weekend use from dispersed campers, boaters, anglers, and motorized recreationists. Commercial businesses in the area provide a hub to visitors for staging, resupplying, and gathering information about the forest, which supports long-term camping throughout the management area.

The desired conditions for scenery in the portion of the Long Valley MA north of State Highway 87 are the same as those described for the Pine Belt MA, and in the portion of the Long Valley MA south of State Highway 87, they are the same as those described for the Upper Clear Creek MA.

### **Desired Conditions for Long Valley Management Area**

#### **MA-LongV-DC**

- 1 Long Valley provides a unique mix of well preserved, semiprimitive settings interspersed with a landscape that trends toward a rural or roaded natural setting with developed roads and trails and a variety of camping opportunities. The evidence of an actively managed forested landscape is common and consistent with the recreation setting in the more developed parts of the management area. Reservoirs, highways, and private property and associated improvements contribute to the more managed setting and sense of community in the area.
- 2 Long Valley has many opportunities for motorized dispersed camping and associated recreation uses. Dispersed camping corridors along maintained roads are common in proximity to highways and Forest Road 300. Developed campgrounds, rental cabins, recreation residences, and reservoirs provide developed recreation opportunities in a roaded natural setting.
- 3 Managed recreation opportunities are provided year round in some locations. Solitude and nonmotorized opportunities are available on trails mostly in the ridges and canyon country. Canyons provide less managed settings with low disturbance that support wildlife and nonmotorized recreation. Recreation in proximity to meadows and wetlands is primarily nonmotorized, and camping does not negatively impact this resource. The management area provides diverse venues for water-based recreation, particularly fishing on rivers and streams, boating on lakes (motorized and nonmotorized), and other lakeside recreation activities. Special use sites are available in this area for events and large groups.
- 4 Cabins, lookouts, and guard stations provide insight into local Forest Service history and are managed for their functional purposes and as points of interest for visitors in some locations. Some cabins are considered for recreation rental opportunities.
- 5 Land encroachment issues are resolved as opportunities arise.

## **Guidelines for Long Valley Management Area**

### **MA-LngVal-G**

- 1 Dispersed camping within 200 feet of riparian shoreline and aquatic resources should occur only where designated sites are provided<sup>54</sup>.

## **Management Approaches for Long Valley Management Area**

Coordinate with local commercial businesses to disperse information to the local public and visitors.

Inventory dispersed recreation sites and evaluate future management options for managing dispersed recreation opportunities in the management area.

## **Upper Clear Creek**

### **General Description and Background for Upper Clear Creek Management Area**

The Upper Clear Creek MA was formerly known as the East Clear Creek watershed until the Natural Resource Conservation Service changed the name.

The Mogollon Rim makes up the southern boundary of the Coconino NF and the southern limit of the Colorado Plateau, draining north into Upper Clear Creek. It is part of the traditional homeland of the Western Tonto Apache, the scene of numerous skirmishes during the Apache Wars of the 1860s to 1880s, and a passageway for many pioneering families who settled central Arizona in the latter part of the 19<sup>th</sup> and early 20<sup>th</sup> centuries.

The desired conditions for scenery from this management area may also apply to the Long Valley MA south of State Highway 87.

The Arizona Trail crosses this management area.

## **Desired Conditions for Upper Clear Creek Management Area**

### **MA-UppClr-DC**

#### **Scenery – Desired Landscape Character**

- 1 This management area is characterized by the Mogollon Rim, a rugged escarpment with steep, rocky drainages and narrow canyons and ridges alternating from east to west. This canyon setting provides opportunities for quiet and solitude. Canyons provide less managed settings with low disturbance that support wildlife and nonmotorized recreation, except along designated roads. Vegetation is composed mostly of Ponderosa Pine and Mixed Conifer forests with inclusions of maples, aspen, and other deciduous trees offering variety year round. In autumn, magnificent yellows, golds, and reds contrast against a dark conifer forest background. Distinctive features in this management area include: C.C. Cragin Reservoir; Knoll Lake; Potato Lake; and scenic drainages including Upper Clear Creek, Barbershop Canyon, Dane Canyon, and Leonard Canyon, to name a few. Leonard Creek and Upper Clear Creek have perennial flowing water in a steep canyon setting.

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<sup>54</sup> This is an exception to the forestwide guideline under dispersed recreation.

- 2 The Apache wars and prehistoric and historic settlement are recognized as culturally significant features related to the General Crook National Recreation Trail, which partly follows the “Palatkwabi Trail,” an ancient travel route from the Hopi Mesas to the Verde Valley that was used by the Spanish, American military, and early settlers. The Arizona National Scenic Trail provides long distance hiking, biking, and equestrian riding opportunities. Forest Road 300 along the Mogollon Rim provides views into adjacent mountain ranges, forest lands, and communities below. Areas with evidence of wildfires along the rim create views to distant vistas. The Apache-Sitgreaves National Forests to the east are similar in character to this management area. North of Upper Clear Creek, the terrain starts to become more gradual and blends into the Pine Belt MA.

## Verde Valley

### General Description and Background for Verde Valley Management Area

The Verde Valley Landscape MA is located within the Tonto Transition Ecological Section. The vegetation is predominantly Semidesert Grasslands, Desert Communities, and Riparian. The Verde Valley has a continuous history of human occupation, beginning with Clovis Paleoindian mammoth hunters of 12,000 years ago. The Verde Valley comprised the southern Sinagua culture area until A.D. 1400, as highlighted by Montezuma Castle, Montezuma Well, and Tuzigoot National Monuments and the Clear Creek Ruins, Red Tank Draw, Sacred Mountain, and V-V Rock Art Heritage Sites of the Coconino NF. About A.D. 1250, the northeastern Yavapai entered the Verde Valley, and later, the Tonto Apache. Both groups continue to live in the Verde Valley as the Yavapai-Apache Nation. Euroamerican miners, farmers, and ranchers spread into the Verde Valley starting in the 1860s, and several of those pioneering families still work in the Camp Verde and Sedona areas. Fort Verde State Park; the towns of Camp Verde, Cottonwood, and Clarkdale; General George Crook Road; 13 Mile Rock; and scattered ranches represent the historic period growth of the Verde Valley. The Verde Valley has a long history of prehistoric and historic settlement as highlighted by national monuments and historic trails within the forest’s administrative boundary.

The desired conditions for scenery from this management area may also apply to House Mountain-Lowlands MA if the site being analyzed at the project level fits the landscape character described for this management area<sup>55</sup>.

### Desired Conditions for Verde Valley Management Area

#### MA-VerdeV-DC

##### Scenery – Desired Landscape Character

- 1 This management area is defined by the large Verde Valley and Semidesert Grasslands and Desert Communities. Broad valleys with lonely rounded hills are common in the north and western portion of this MA and steep drainages characterize the eastern portion. The Verde River, designated as a wild and scenic river, separates the Prescott and Coconino National Forests on the southwest boundary of the forest and provides a lush source of perennial

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<sup>55</sup> Scenery desired conditions for Verde Valley MA may be used for projects taking place in House Mountain-Lowlands MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

water and riparian vegetation. Oak Creek, Sycamore Creek, West Clear Creek, Wet Beaver Creek, and the Wild and Scenic Fossil Creek emerge from deep cottonwood and mixed broadleaf lined canyons which cut into the Mogollon Rim and continue as ribbons of riparian vegetation across the Piñon-Juniper and Semidesert Grasslands before merging with the Verde River. Canyons along the Mogollon Rim show evidence of past flooding and are periodically flooded. Cool shady pools of water in and along the rivers provide an ideal setting for water-based recreation activities and a refuge from the dry hot landscape that surrounds them. Escarpments, rocky outcrops, and mesas provide a diversity of landforms and lead to unexpected changes in vegetation. Deciduous trees along riparian areas in the late fall provide some scenic benefits. Some of these riparian areas also have Arizona walnut, which contributes an interesting bark and texture against the winter sky and yellow fall color.

- 2 Recreation opportunities in the Verde Valley are abundant and cover a wide range of development levels. In some places, recreation on National Forest System lands are not discernibly different to the public than recreation on county and State managed public lands.
- 3 The prehistoric, historic, and settlement history of the Verde Valley is an integrated part of interpretive programs throughout the area. The relationship between the landscape of the forest and nearby national monuments is highlighted.

## **Sedona/Oak Creek**

### **General Description for Sedona/Oak Creek Management Area**

The Sedona/Oak Creek MA encompasses the Oak Creek Canyon, Sedona Neighborwoods, and House-Mountain Lowlands MAs. Unless explicitly stated, the direction in this management area applies to all three of the overlapping areas in addition to the direction listed under their section of the plan.

The Sedona/Oak Creek MA lies within Coconino and Yavapai Counties in Arizona. This management area encompasses all of Red Rock Country, Oak Creek Canyon, and the communities of Sedona and the village of Oak Creek. A variety of vegetation types can be found within the Sedona/Oak Creek MA, including riparian, grasslands, forest, and desert vegetation types.

This management area has a long history of human habitation and a remarkable natural environment rich with plants and wildlife. Unique features within this management area include: Oak Creek Canyon; Red Rock Secret Mountain and Munds Mountain Wilderness areas; Palatki, Honanki, and V-V Heritage Sites; Crescent Moon Ranch Cabin; hundreds of miles of recreation trails; the Red Rock All-American Road and Sedona/Oak Creek Scenic Byway; and the Wilson Mountain National Recreation Trail.

These desired conditions, objectives, standards, and guidelines from this management area also apply in addition to the Oak Creek Canyon, Sedona Neighborwoods, and House Mountain-Lowlands MAs plan direction.

## Desired Conditions for Sedona/Oak Creek Management Area

### MA-SedOak-DC

#### Scenery - Desired Landscape Character

- 1 The Red Rock Country surrounding Sedona provides a truly distinct landscape where monumental buttes, soaring multihued cliffs, fantastic towering spires, and rugged canyons bombard the eye and the senses, and vast sweeps of greenery refresh and inspire the spirit and fill the viewer with expectation. Unified by Oak Creek, the vital riparian link between the Mogollon Rim and Verde Valley, the landscape is a museum of life, a living crossroads connecting people in time and space. There is no other region on earth exactly like it. This landscape has long been celebrated nationally and internationally as a year-round destination. This management area is valued for its world renowned, high and very high scenic integrity, lush riparian areas and perennial streams, historic and prehistoric resources, and primitive and developed recreation experiences. The landscape is defined by bright and vibrant variations in color and form such as blue water and skies juxtaposed with red rocks and dark green trees. The rolling terrain in the piñon-juniper forest provides a variety of visual experiences and panoramic views of the rock formations. The contrast created between the red rocks and soil and the gray-green piñon-juniper forest enhances the visual character of the landscape in terms of color, texture, and form.
- 2 Scenic views from primary viewing areas such as highways, recreation sites, trails, and residential areas are maintained as natural and naturally appearing landscapes. High-quality opportunities are provided and maintained for people to enjoy the Red Rock's many scenic and aesthetic qualities including unaltered vistas of red rock cliffs.
- 3 From an aerial perspective, the landscape is coarse textured and has a vegetation pattern that varies from sparse to dense areas of trees and shrubs that range from dark evergreen to gray-green. The light red and reddish brown soil colors contrasts with the vegetation and rock outcrops to create a mottled appearance to the land surface. The large sandstone formations have a smooth appearance, with vegetation dotting the surface of the rocks in an irregular pattern.
- 4 With its intriguing human history and remarkable natural environment rich with plants and wildlife, Red Rock Country offers individuals and families the gifts of discovery, inspiration, and solitude. Elements of prehistoric agricultural landscapes and historic ranching are retained. When wandering the management area, the visitor is free to imagine, explore, and reconnect with the land. Clear, dark night skies are valued for stargazing and as a professional astronomical astronomy resource.
- 5 Some red rock formations are particularly distinctive such as Bell Rock, Cathedral Rock, and Courthouse Butte. Certain locations, such as Crescent Moon Ranch/Red Rock Crossing, Airport Mesa/Airport Saddle, West Fork of Oak Creek, Call of the Canyon, and Oak Creek Vista provide exceptional views of the red rock formations and are particularly valued by photographers, artists, and visitors. The area is rich in prehistoric and historic cultural landscapes, including ranches, orchards, cliff dwellings, and rock art and sacred sites. Along the escarpment that divides Red Rock–Secret Mountain Wilderness from the lower country, there are several notable cliff dwellings of high scenic and interpretive value such as Palatki and Honanki.

- 6 Riparian areas are a destination for fall color viewing. In summer, they offer a respite from heat along shady banks. In winter, snow-covered red rock is a strong feature. During the monsoon season in late summer, rainbows are common across the red rock sky.
- 7 Riparian areas, in particular Oak Creek, provide a lush dark green environment with perennial water, which begins in a narrow rich canyon and opens into Piñon-Juniper and Semidesert Grasslands. Interior Chaparral vegetation adds to the diversity and interest in the area.
- 8 Evidence of fire disturbance generally does not detract from visitor experiences.
- 9 Visitors are drawn to the Chapel of the Holy Cross for its distinctive architecture and for the panoramic vistas of the surrounding red rock landscape. From the adjoining Chapel of the Holy Cross plaza, one can see several prominent rock formations including Eagle Head Rock, the Two Nuns, and the Madonna and Child. To the Yavapai and Tonto Apache people, the Red Rock formations and canyons are recognized as the locations of legendary events that relate to their origins in the Verde Valley/Red Rock Country. The unique geology and local rock formations of Red Rock Country make it a multicultural landscape that has been recognized for centuries. The unique geology and local rock formations of Red Rock Country, combined with the distinctive architecture and historic significance of the Chapel of the Holy Cross, make it and the surrounding area a cultural landscape.

#### **Developed Recreation**

- 10 Day-use activities are emphasized across the management area, with a few campgrounds in the Oak Creek Canyon area. Facilities serve large numbers of people at main vista and trail access points, while sustaining the natural environment and protecting and providing views of outstanding scenery in an atmosphere where the natural environment prevails and opportunities exist for quiet and contemplation.

#### **Dispersed Recreation**

- 11 A variety of self-directed, day-use activities which emphasize trail use, scenic viewing, and learning about the natural and cultural history of the Sedona/Oak Creek ecosystem are encouraged. There is a range of nature and culturally-based recreation opportunities that provide a wide array of benefits by meeting people's needs and preferences while sustaining the Sedona/Oak Creek ecosystem. High-quality opportunities are provided and maintained for people to enjoy the red rocks' many scenic, aesthetic, and historic qualities. Recreation opportunities are primarily nature based, and they exist for individuals, families, or small groups. There are opportunities for experiencing solitude, scenic beauty, and natural quiet. Both short and long visits are available. National forest camping continues to be an important recreation experience.
- 12 Appropriate degrees of natural quiet are restored and maintained. Visitors have access to high-quality trail experiences designed for equestrians, hikers, and mountain bikers outside of wilderness and equestrians and hikers within wilderness. The area provides settings that support the strong demand for inspirational and contemplative benefits in the natural landscape. Most national forest visitor activities occur at developed sites and on trails designed for high levels of use. Some recreation sites and locations outside of wilderness receive high levels of use and meet the demands of day-use activities, emphasizing scenic viewing and trail use and experiencing and learning about the natural environment and cultural resources. Many locations provide an uncrowded setting. Roving and guided

interpretive activities are available in areas of high visitor use. Interpretation enhances the short duration, day-use experience with emphasis on orientation and natural history.

- 13 Many trails in this area provide easy to moderate recreation opportunities with well-defined trails and clear signage for easy way-finding.
- 14 Most national forest visitor activities occur at developed sites and on trails designed for high levels of use. Recreation site fees are maintained at an affordable level for families to access recreation opportunities in the Sedona and Oak Creek Canyon areas. Unneeded nonsystem trails are discouraged. Trails that duplicate system trails or cause damage—such as erosion or plant loss—are rehabilitated. A network of primarily nonmotorized trails provides opportunities at multiple development levels for hikers, OHV recreationists, mountain bikers, and equestrians while helping protect fragile natural resources and community relationships. Nonmotorized trails provide access to the landscape for the community, including people with disabilities.
- 15 In the Dry Creek Basin area, a variety of nonguided day-use recreational activities, featuring high-quality hiking, mountain biking, equestrian use, scenic viewing, contemplation, and opportunities to experience nature and solitude are available. Nonmotorized trail opportunities are available, providing a variety of challenge levels with emphasis on moderate to difficult access levels as defined in ROS accessibility guidelines.
- 16 Outstanding interpretive opportunities increase understanding of and appreciation for the management area with emphasis on geology, wildlife, plants, and natural history. Opportunities for contemplative reflection and scenic vistas for diverse visitors are provided, as well as access for older people and people with disabilities seeking opportunities for regenerative reflection.
- 17 Dispersed camping is limited to locations that protect resources, provide neighborhood security, and protect the national forest visitor’s quality of experience.
- 18 Information directs visitors to places that can sustain visitor use.
- 19 Opportunities for wildlife viewing are available.
- 20 The setting and values of cultural resources of high public interest, such as Palatki and Honanki, are protected through limited encounters with other visitors.
- 21 A high level of interpretation and personal contact is provided at cultural interpretive sites. Onsite personnel and interpretation provides opportunities for: interactive learning through protection, documentation, and restorative stabilization projects at archaeological sites; appropriate access to site etiquette information; appreciation for native cultures and history; and visitor education about prehistoric and historic cultural resources that fully protects those resources. Full-time hosts are located at interpretive sites.
- 22 Most of the Sedona/Oak Creek MA is consistent with the applicable desired recreation settings. There are some inconsistencies in social encounters and road access that are recognized and expected to continue:
  - Along Dry Creek Road, at or within half a mile of trailheads, where encounters with other people are expected to be high.
  - Near to and access from private lands in the Sedona area, such as Cockscomb/Tree Farm/Long Canyon.

- Future development of State Highways 179 and 89A south of Sedona and manage for a rural ROS setting classification immediately adjacent to the roadway.
- Cultural interpretive sites like Palatki.
- The area influenced by Forest Road 152C.
- Scheurman Mountain, Carrol Canyon, and the Cathedral Rock area because of their small size and adjacency to urban and rural development.
- Parking, roadway, and staging sites on Schnebly Hill for social encounters and road access.
- Manage parking and staging areas at Broken Arrow Basin for roaded natural ROS settings because of the area's high level of use. The level of use on the main four-wheel-drive road is higher than generally desired for semiprimitive motorized (SPM) areas, but the physical setting and maintenance level of the road should be managed as SPM.

#### **Motorized Recreation**

- 23** A network of roads at various challenge levels is available for off-highway-vehicle touring. Most motorized recreation opportunities are within the House Mountain-Lowlands MA and Schnebly Rim, although opportunities may be available in other management areas. Recreation in Neighborwoods, Oak Creek Canyon, and areas between the communities of Sedona and Oak Creek and nearby wilderness is largely nonmotorized, except for Casner Powerline Road, Broken Arrow, and Soldier Pass.

#### **Recreation Special Uses**

- 24** New outfitter-guide permits are issued for activities that have demonstrated public need, promote transportation services or public safety, or substantially increase protection of cultural or natural resources.
- 25** Commercial tours emphasize opportunities to experience scenic beauty, natural quiet, and contemplative reflection. Activities that vary from this condition, such as motorized tours, do not impact the ability of other forest users to have these experiences.
- 26** Recreation events emphasize nature-based activities and education. Proponents are encouraged to stage large events off-forest and hold only smaller group activities on National Forest System lands.

#### **Lands Special Uses**

- 27** Facilities that provide access to or occur near the cliffs remain visually subordinate to the cliffs and to the surrounding landscape. Views of the cliffs from the travel corridors are enhanced or maintained through various means such as: limiting the use of intervening areas for parking, camping, and/or utilities; limiting motor vehicle traffic between access corridors and the cliffs; or acquisition of intervening private properties with emphasis on undeveloped parcels.

#### **Facilities**

- 28** Facility design and location retains and enhances the visitor's sense of arrival at a special place. Facilities are visually subordinate to cliffs and the surrounding landscape. Roadside

facilities are designed and placed to provide safe scenic viewing and photo opportunities. They blend with and complement the surrounding landscape.

#### **Roads**

- 29 Opportunities are provided for motorists to stop along main roads to view the spectacular scenery and experience Red Rock Country. Visitors see a landscape characterized by uncluttered panoramic vistas of scenic features. The sight of other roads is rare to the traveler. There are safe pullouts for motorists to stop along main roads to view the spectacular scenery and experience Red Rock Country.
- 30 Road densities, conditions, and locations within the Oak Creek watershed reduce impacts on the flood plain, peak flows, and sediment routing.
- 31 Some forest roads are in a rough condition that keeps the challenging and narrow character of the roadway but allows access by the careful driver in a standard low-clearance vehicle.
- 32 Road maintenance and road improvement activities are limited in order to conserve semiprimitive motorized ROS characteristics. Road maintenance is consistent with management area direction and ROS objectives.
- 33 Schnebly Hill Road maintains its semiprimitive character with an unpaved surface to promote slow to moderate vehicle speeds and the desired recreation character. Minimum standards for Schnebly Hill Road's width, horizontal and vertical alignment, vegetation clearing, ditch definition, and surfacing are maintained. Improvements to Schnebly Hill Road as an alternative commuter route between Interstate 17 and Sedona are discouraged in order to maintain a more primitive roadway and recreational experience. The character of development and use remains low key, unhurried, and rustic; vehicle traffic speed is consistent with this character.

#### **Ecological**

- 34 The biological, physical, and human elements of the landscape sustain ecological processes, functions, and structures within a natural range of variability and conditions appropriate to the Sedona/Oak Creek ecosystem. Natural ecosystem disturbance patterns are conserved or restored consistent with human health and safety.

#### **Heritage Resources**

- 35 Stabilization and conservation programs are implemented at damaged sites. Unofficial trails that lead to archaeological sites are eliminated to protect sites from damage.

#### **Community**

- 36 Harmony exists between residents and visitors. Residents have a sense of security concerning National Forest System lands directly adjacent to residential development.
- 37 The community shares the forest's stewardship goals. Community members understand their stake in ecological health and collaborate in national forest decisions that are mutually beneficial to the national forest and the community.

## **Objectives for Sedona/Oak Creek Management Area**

### **FW-SedOak-O**

#### **Dispersed Recreation**

- 1 Within 10 years of plan approval, develop Schnebly Hill Vista as a viewpoint, interpretive site, and possibly a trailhead.

## **Standards for Sedona/Oak Creek Management Area**

### **MA-SedOak-S**

#### **Developed Recreation**

- 1 Prohibit dogs at developed heritage interpretive sites.

#### **Motorized Recreation**

- 2 Allow four-wheel-drive use along the Casner Powerline access road through a special use permit system consistent with ROS goals and adjacent wilderness, wildlife objectives, soil protection, and where such use does not interfere with APS powerline access needs.
- 3 Due to limited space, four-wheel-drive groups are not allowed to camp along the Casner Powerline Road between the two gates.

#### **Recreation Special Uses**

- 4 Do not permit commercial tours on Casner Powerline Road.
- 5 Do not permit new outfitter-guide permits in areas that are at or approaching capacity.

#### **Lands Special Uses**

- 6 Allow plant collection for commercial activities only in the House Mountain-Lowlands MA of the Sedona/Oak Creek MA, except for the legitimate purposes of federally recognized tribes.

#### **Land Adjustments**

- 7 Land exchanges that dispose of national forest land in the Sedona/Oak Creek MA will occur only if they result in acquisition of national forest lands in the Sedona/Oak Creek MA.
- 8 Land exchanges that dispose of national forest land in The Dells area will occur only if they result in acquisition of high priority private parcels elsewhere in the Sedona/Oak Creek MA. High priority private parcels total approximately 95 acres (see appendix A, map 13). High priority land acquisition parcels include: Lincoln Canyon (25 acres) and Hancock Ranch (70.3 acres).
- 9 [Base-for-exchange lands](#) are national forest lands located at: Chapel of the Holy Cross area (approximately 11 acres, Sedona Neighborwoods MA), Slide Rock area (approximately 13 acres, Oak Creek MA), Village of Oak Creek Golf Course area (approximately 5 acres, Sedona Neighborwoods MA), and The Dells area (up to 300 acres, Sedona/Oak Creek and House Mountain-Lowlands MAs).
- 10 Base-for-exchange lands at the Chapel of the Holy Cross area is intended for church acquisition only; base-for-exchange at Village of Oak Creek Golf Course is intended for golf course acquisition.

**Forest Products**

- 11 Removal of commercial national forest products is by permit at designated locations only.

**Guidelines for Sedona/Oak Creek Management Area**

**MA-SedOak-G**

**Scenery**

- 1 Natural landforms and vegetation should be used, to the extent possible, to screen facilities from important viewing locations such as scenic trails and byways.
- 2 The scenic integrity objective for public utilities should be no less than moderate when viewed from Concern Level 1 and 2 travelways.

**Dispersed Recreation**

- 3 Trails and trailheads should be installed so they do not impact rare and sensitive plant populations, such as Verde Valley sage and rare agaves.
- 4 Existing camping and campfire restrictions for the Dry Creek Bain, special areas, and near roadways and neighborhoods should be maintained to protect property and unique resources.
- 5 Although the ROS objectives at Palatki and Honanki are the same as those of the surrounding management area, the maximum desired number of encounters is three to four groups<sup>56</sup> per hour because of the lower capacity of these sites to handle visitation without damage to cultural values.

**Motorized Recreation**

- 6 A consistent design style should be used for interpretive and information signs and kiosks but also allow for individual site distinctiveness.
- 7 Vehicle crossings of Dry Creek should be prohibited unless appropriate water quality protection measures can be implemented.
- 8 Vehicular access to Oak Creek should be restricted by measures such as vehicle barriers.
- 9 Roads should be maintained at the lowest standard possible consistent with safety and the desired recreation experience.

**Recreation Special Uses**

- 10 Any statewide special use permits for the Sedona/Oak Creek MA should be issued by the Red Rock Ranger District. This will ensure compatibility with plan direction and appropriateness of the activity for the sensitive Sedona/Oak Creek MA.
- 11 Objectives<sup>57</sup> for social encounters<sup>58</sup> should be as outlined below in table 13 unless otherwise described under desired conditions for this management area.

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<sup>56</sup> A group is defined as six or fewer people.

<sup>57</sup> Objectives are for typical conditions in an area or on a road or trail. Typical conditions should capture the majority of the days or hours during the peak season.

<sup>58</sup> An encounter is defined as one vehicle or six or fewer people. For example, if you pass a group of 14 on the trail that would equal 3 encounters; if you pass 2 jeeps, that would equal 2 encounters.

**Table 13. Objectives for social encounters in the Sedona/Oak Creek Management Area**

ROS Setting	Social Encounters
Rural	No more than 15 per hour for Forest Service permitted commercial tour operations only. All other users are moderate to high contact frequency.
Roaded Natural	No more than 15 per hour for Forest Service permitted commercial tour operations only. All other users are moderate to high contact frequency.
Semiprimitive Motorized	No more than 15 per day for all users (commercial tours and self-guided).
Semiprimitive Nonmotorized	No more than 15 per day for all users (commercial tours and self-guided).
Semiprimitive – Wilderness or Primitive – Wilderness	No more than 15 per day for all users (commercial tours and self-guided)
Pristine	NA

<sup>1</sup> These objectives are not plan objectives.

**Lands Special Uses**

- 12 Commercial filming using aircraft should not be allowed in the Sedona/Oak Creek MA except within the House Mountain-Lowlands MA and along paved highways.

**Land Adjustments**

- 13 Priority parcels in the Sedona/Oak Creek Management Area<sup>59</sup> should be acquired from willing sellers through methods other than land exchanges, when possible.
- 14 National forest parcels less than or equal to 10 acres in size in the Sedona/Oak Creek MA could be disposed of under the Small Tracts Act of 1983 (P.L. 97-465), Townsite Act of 1958 (P.L. 85-569), or General Exchange Act of 1922 (U.S.C. 16 485,486) to resolve encroachment issues or provide lands needed for public purposes.
- 15 Slide Rock base-for-exchange land should be available for acquisition by Slide Rock State Park to better facilitate management of the creek and park.

(For land adjustment guidelines for the Sedona/Oak Creek MA, see forestwide direction on page 95.)

**Roads**

- 17 In areas where motorized recreation is emphasized (particularly semiprimitive motorized), roads should be maintained in the lowest standard possible consistent with safety and the desired primitive recreation experience.
- 18 Dry Creek Road (Forest Road 152) should be maintained in a rough condition that keeps the challenging and narrow character of the roadway but allows access by the careful driver of a standard low-clearance vehicle as a method of retaining the semiprimitive character of the lands being accessed from the road.

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<sup>59</sup> Priority parcels are those listed in the standards and guidelines for the Sedona/Oak Creek MA.

- 19 Miles of road should be reduced to the minimum roads required for public access and management, and remaining roads should be located so that, except for road junctions, the sight of other roads is rare to the traveler.
- 20 Scenic parkway characteristics should be maintained, including roadway features such as signs, guardrails, and landscaping, that contribute to the desired scenic character.
- 21 Parking and access areas should be strategically located to minimize disturbance and visual clutter associated with signage, parking areas, and trailheads.

### **Management Approaches for Sedona/Oak Creek Management Area**

#### **Recreation Special Uses**

Develop partnerships with outfitter-guides for Schnebly Hill Road and other roads and facilities that receive high use by commercial tour activities for the purpose of maintaining and protecting resources in these areas.

Provide a commercial guide training program. Such training should focus on national forest goals and regulations, Leave No Trace etiquette, and natural and cultural history. Training should occur annually or when new guides are hired. Collaborate with guides, where possible, to develop and implement the training program.

Work with local and regional governments and road agencies to develop transportation solutions that reduce traffic and vehicle impacts at high impact recreation areas on the forest.

Collaborate with Federal Aviation Administration, Sedona Airport Administration, and air tour operators to minimize aircraft effects on threatened, endangered, or sensitive animal species, particularly over suitable peregrine falcon nesting habitat and big game wintering habitat.

#### **Roads**

Develop partnerships with commercial tours for maintaining Schnebly Hill Road and other roads and adjacent facilities used for commercial tour activities.

#### **Dispersed Recreation**

Collaborate with Arizona State Parks to better meet visitor needs and protect resources in the vicinity of Slide Rock State Park, Deadhorse State Park, and Red Rock State Park.

Methods of creating and maintaining user-friendly trails include: providing well-defined trails that encourage people to stay on designated routes, providing orientation maps, designing trails that provide a reasonable degree of access, and having trail markers and defining trail edges.

#### **Community**

Collaborate with local governments, agencies, and residents to protect resources and address residents' concerns.

## **Sedona Neighborwoods**

### **General Description for Sedona Neighborwoods Management Area**

The Sedona Neighborwoods MA is a submanagement area of the Sedona/Oak Creek MA. In addition to the direction for the Sedona/Oak creek MA, the direction in this section applies. The desired conditions for scenery from [Sedona/Oak Creek](#) and [Oak Creek Canyon](#) MAs may also apply to the Sedona Neighborwoods MA if the site being analyzed at the project level fits the landscape character described for those management areas<sup>60</sup>.

The Sedona Neighborwoods MA is known as “Sedona’s Backyard” as it is next to many residential areas, urbanized sections of Sedona and the Village of Oak Creek, sections of State Highways 170 and 89A, and a several mile stretch of Oak Creek south of Sedona. The boundaries of Red Rock-Secret Mountain Wilderness from Capitol Butte to Steamboat Rock form the MA’s northern perimeter. This MA is heavily used by visitors and residents who cherish the natural landscape so close to Sedona and frequently use the honeycomb of trails.

### **Desired Conditions for Sedona Neighborwoods Management Area**

#### **MA-SedN-DC**

##### **Scenery**

- 1 Natural landscape is highly valued by local residents and visitors. National Forest System lands provide the backdrop for the community’s character while accommodating features that are more typical of an urban or rural setting. Infrastructure and developments that serve a broad public interest are sometimes evident but still subordinate to the landscape. Recreation developments contribute to the area’s unique sense of place through use of native and naturally appearing materials; mimicking line, form, color, and texture of the surrounding landscape; or use of identifiable Forest Service symbols and historic features.

##### **Dispersed Recreation**

- 2 Relatively quiet, easily accessed national forest supports wildlife, scenic viewing, and experiencing nature. A system of trails and pathways surrounds the city of Sedona and the village of Oak Creek and provides trail recreation opportunities and a means of nonmotorized travel off busy streets. Damaged recreation sites are restored, with priority given to sites adjacent to Sedona and the village of Oak Creek. Local neighborhood concerns about the impacts of visitor use on residential quality of life are addressed by a variety of methods, including nighttime closures, improving signs, and limiting motorized access and the number of visitors. Volunteer partnerships have high resident participation and provide opportunities for exciting stewardship with a strong learning component.

##### **Recreation Special Uses**

- 3 Special use activities that access National Forest System land through neighborhoods address resident concerns for safety and minimize disturbance. Mitigations are identified in the authorized operating plans.

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<sup>60</sup> This means that the specialist could be working on a project in the Sedona Neighborwoods MA but looking at scenery that more closely matches the landscape character of the Oak Creek Canyon MA or for the Sedona/Oak Creek MA depending on the physical, biological, and cultural attributes of the viewshed. In those cases, the scenery desired conditions from the management area that best matches the setting should be applied.

## **Standards for Sedona Neighborwoods Management Area**

### **MA-SedN-S**

- 1 Camping and campfires are prohibited in the Sedona Neighborwoods MA except in designated places.

## **Guidelines for Sedona Neighborwoods Management Area**

### **MA-SedN-G**

#### **Dispersed Recreation**

- 1 To minimize traffic impacts to local residents, access at neighborhood national forest trailheads should be managed to discourage visitor parking along residential streets and to encourage alternative forms of transportation.

## **Management Approaches for Sedona Neighborwoods Management Area**

Strong community partnerships for stewardship of “Sedona’s backyard” support resident health, safety, and quality of life.

#### **Dispersed Recreation**

Collaborate with the Arizona Game and Fish Department (AZGFD) to educate residents about urban wildlife such as deer, snakes, raccoons, skunks, and coyotes. Special hunting and shooting regulations should be developed collaboratively with the AZGFD, Yavapai and Coconino County Sheriffs, and City of Sedona Police Department.

Use the “Redrock Trails Plan” and the “Sedona Urban Trails and Pathways Plan” (City of Sedona, 1996) as guides for future trail planning efforts. (Refer to map 6 in the Redrock Trails Plan.)

Expand partnerships with neighborhoods to promote trail and resource stewardship and to obtain assistance in trail maintenance and planned trail construction.

#### **Recreation Special Uses**

Work with commercial operators, filming groups, and homeowners to resolve safety and quality of life conflicts such as concerns about noise, safety, and facilities maintenance needs.

## **Oak Creek Canyon**

### **General Description for Oak Creek Canyon Management Area**

The Oak Creek Canyon MA is a submanagement area of the Sedona/Oak Creek MA. In addition to the direction for the Sedona/Oak Creek MA, the direction in this section applies. The desired conditions for scenery from this management area may also apply to the Sedona Neighborwoods MA if the site being analyzed at the project level fits the landscape character described for this management area<sup>61</sup>.

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<sup>61</sup> Scenery desired conditions for the Oak Creek Canyon MA may be used for projects taking place in the Sedona Neighborwoods MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

The Sedona area was settled by several families in the late 1870s to 1880s. Travel at that time was limited to horse trails. The first wagon road in Oak Creek Canyon was built along Oak Creek below Indian Gardens by pioneer Jim Thompson between 1876 and 1887. By 1930, the highway through Oak Creek Canyon was completed to provide easy transportation for campers, tourists, and fisherman lured by the trout stocked into Oak Creek. This stretch of State Highway 89A was formally designated as a scenic byway by the Arizona Department of Transportation on August 24, 1984. Oak Creek has been designated as an unique Arizona waterway.

## **Desired Conditions for Oak Creek Canyon Management Area**

### **MA-OakCrk-DC**

#### **Scenery – Desired Landscape Character**

- 1 The centerpiece of the canyon is the sparkling cool creek and the magnificent scenery as viewed along a winding two-lane highway that provides an eclectic setting with a wide variety of ecological niches among wilderness and interspersed with several pockets of developed private land. The elevation change within the canyon spans from ponderosa pine to piñon-juniper scattered among red and white sandstone cliffs and steep drainages. Basalt cap rocks, black talus slopes, rockslides, and large rockfall boulders overlying the older sedimentary formations expose the diverse geology and provide visual interest. Within these changes is wide variety of riparian vegetation, fir, and oak components. This diversity provides outstanding fall colors and the mix of deciduous and coniferous vegetation creates a unique winter landscape of snow, cliffs, and running water.
- 2 Remains of the historic homesteading activity are present in some locations including old cabins, irrigation ditches, fruit orchards, wooden water lines, trash dumps, and old roadbeds and contribute to the unique sense of place.
- 3 When treated for safe evacuation of Oak Creek Canyon, mid-slope Interior Chaparral has openings of a size and pattern that deviates from the desired landscape character but are not noticeable to visitors driving on the highway or traveling on trails.

#### **Recreation**

- 4 Oak Creek Canyon is an area of contrasting recreation settings, ranging from heavily used highway to highly developed recreation sites and resorts to primitive trails. Visitation at Oak Creek Vista is primarily for short duration, emphasizing interpretation and orientation to Oak Creek Canyon and Red Rock Country. Developed day-use areas and camping are present along Oak Creek Canyon. Recreation sites along Oak Creek are managed to protect soil condition and riparian vegetation and maintain water quality. Damaged sites are restored.
- 5 Visitors feel welcomed to Oak Creek Canyon and know where to go to enjoy the activities they seek. They sense that they are entering a special location with unique and remarkable characteristics. Visitor information services emphasize interpretation and orientation to Oak Creek Canyon and Red Rock Country.
- 6 Campfire smoke in Oak Creek Canyon is minimal to protect habitat conditions for bats, birds, and other wildlife species, and to improve air quality. The contribution of recreation users to air pollution (e.g., visibility and particulate matter) in Oak Creek Canyon is limited through such methods as requiring campers to burn only dry wood, prohibiting wood gathering, and prohibiting campfires at certain times.

- 7 Trails in Oak Creek Canyon allow for creek access while protecting the riparian community, wildlife habitat, and sensitive plants. Opportunities for interpretive trails and walking exist. Historic trails that access the rim of Oak Creek Canyon, such as Telephone, Purtyman, Harding Springs, Cookstove, Thomas Point, Thompson Ladder, and Casner Trails, are maintained even though parking may be limited for resource protection. The number of encounters on the north side of Oak Creek will be higher than the south, nonroaded side.

#### **Lands Special Uses**

- 8 Research, educational research, and educational activities are consistent with resource protection and recreation experience goals.

#### **Transportation**

- 9 Development and parking in Oak Creek Canyon is limited to minimize resource impacts. Private vehicle traffic and parking are minimized, while also considering scenic quality and safety. Alternative modes of transportation that reduce automobile dependency and traffic congestion are encouraged. The level of private recreation traffic in Oak Creek Canyon is consistent with a high quality recreation experience.
- 10 Trails and recreation use are located and managed to reduce impacts of woody riparian vegetation and riparian habitat in Pumphouse Wash.

### **Standards for Oak Creek Canyon Management Area**

#### **MA-OakCrk-S**

- 1 Camping and campfires are prohibited in the Oak Creek Canyon MA except in designated places.
- 2 Forest products are only removed from the Sedona/Oak Creek MA for commercial use when authorized by permit and collected in designated areas.

### **Guidelines for Oak Creek Canyon Management Area**

#### **MA-OakCrk-G**

- 1 Methods such as placing toilets in strategic locations, providing information about proper sanitation practices, installing shower and hand-washing facilities, and providing gray water disposal sites should be used to reduce recreation impacts on water quality.
- 2 To protect water quality and recreation settings, minerals materials operations should be limited in the Oak Creek Canyon MA, although some activities may be appropriate for the Arizona Department of Transportation and Forest Service administration needs if they are minor and consistent with area desired conditions, standards, and guidelines.
- 3 Road and trail rehabilitation work should be focused in the steep drainages—such as Pumphouse Wash—that flow into Oak Creek Canyon and contain fragile plants and rare species.

### **Management Approaches for Oak Creek Canyon Management Area**

Work with the Arizona Department of Transportation to block off unsafe parking adjacent to the road and to maintain a high standard of scenic quality in signage.

Develop a rock climbing management strategy for the Oak Creek Vista area that addresses climbing needs, visitor safety, and resource protection.

Encourage the use of native construction materials along the State scenic road.

Work with the Arizona Department of Environmental Quality to maintain the creek's status as a "unique water."

Partner with Slide Rock State Park to manage recreation and scenic resources.

## House Mountain-Lowlands

### General Description for House-Mountain Lowlands Management Area

The House Mountain-Lowlands MA is a submanagement area of the Sedona/Oak Creek MA. In the 1987 plan, the area was called the Savannah MA. All direction for the Sedona/Oak Creek MA applies to the House Mountain-Lowlands MA. There are two prohibited or limited activities in the Sedona/Oak Creek MA that are permitted within the House-Mountain Lowlands MA, per the following standard and guideline:

- **MA-SedOak-S-6:** Allow plant collection for commercial activities only in the House Mountain-Lowlands MA of the Sedona/Oak Creek MA, except for the legitimate purposes of federally recognized tribes.
- **MA-SedOak-G-12:** Commercial filming using aircraft should not be allowed in the Sedona/Oak Creek MA except within the House Mountain-Lowlands MA and along paved highways.

The desired conditions for scenery from the [Sedona/Oak Creek](#) and [Verde Valley](#) MAs may also apply to the House-Mountain-Lowlands MA if the site being analyzed at the project level fits the landscape character described for those management areas<sup>62</sup>.

### Desired Conditions for House Mountain-Lowlands Management Area

#### MA-HouseMtn-DC

##### Dispersed Recreation

- 1 Low-density human uses occur, including scenic viewing, OHV touring, hunting, wildlife viewing, and firewood cutting. A wide variety of semiprimitive motorized and nonmotorized trail uses are provided.

##### Roads and Facilities

- 2 There are few roads in the House Mountain-Lowlands MA. Existing roads are primitive, with only native surfacing and no road prism development. Facilities are few and the character of development is rustic and primitive.

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<sup>62</sup> This means that the specialist could be working on a project in the House Mountain-Lowland MA but looking at scenery that more closely matches the landscape character of the Sedona/Oak Creek MA or for the Verde Valley MA depending on the physical, biological, and cultural attributes of the viewshed. In those cases, the scenery desired conditions from the management area that best matches the setting should be applied.

## **Guidelines for House Mountain-Lowlands Management Area**

### **MA-HouseMtn-G**

#### **Roads**

- 1 Roads should be located to maintain adequate cover for animal shelter and foraging between roads, especially in locations with high road densities.
- 2 Only native surfacing should be used, and road prism development should not be used for lateral roads (i.e., off of main access roads) unless increased use and development of private property require improvement for resource protection.

## **Special Areas**

### **Designated Wilderness Areas**

See appendix A, map 17.

### **General Description for All Designated Wilderness Areas**

There are 10 existing wilderness areas on the Coconino NF. This plan provides direction for eight of them. Direction for the Kendrick Mountain and Mazatzal Wilderness areas is provided in the Kaibab and Tonto National Forests' plans, respectively. This ensures consistent management of these wilderness areas across forest boundaries. The Coconino NF's plan contains direction for Sycamore Canyon Wilderness, which also lies within the Prescott and Kaibab National Forests.

### **Desired Conditions for All Designated Wilderness Areas**

#### **SA-Wild-All-DC**

- 1 Wilderness and recommended wilderness areas provide their full range of social and ecological values for which these areas were recognized with special status.

#### **Wilderness Recreation**

- 2 Trail and trailhead development emphasizes wilderness recreation and watershed condition while maintaining wilderness resource values. Key wilderness trailheads provide sanitation, orientation, and interpretation to wilderness visitors. Directional guidance and information on minimum impact and archaeological site etiquette is provided at wilderness access points. Loop hikes are expanded in wilderness to encourage low-impact day use, where possible. Wilderness dependent recreation opportunities, such as backpacking, horse packing, and hunter guiding, are ongoing and trailheads provide appropriate facilities for them where these activities are consistent with resource and recreation opportunity setting objectives.
- 3 New structural improvements are rare and only constructed when necessary for proper management and/or protection of the wilderness resource. High traffic roadside facilities that provide a gateway to wilderness areas or vistas of wilderness inform and educate visitors about wilderness.
- 4 Permanent damage to the resource is limited by distributing visitor use in wilderness by permit system or other methods, where such damage is evident. Existing signs and facilities are maintained where public safety and resource protection require it.

- 5 Places within existing wilderness that have inconsistencies with the wilderness primitive character, such as at Bell Rock, West Fork, Boynton Canyon, Humphreys Trail, and some places near private land retain wilderness values to the extent possible. Infrastructure in these places is more developed and signs and cairns (i.e., trail markers made of stacked rocks) may be more frequent than normally associated with wilderness management to protect visitor experience and resources. In areas where the desired condition is a pristine or primitive wilderness opportunity, these types of developments do not exist.
- 6 Special use permits issued in wilderness provide for activities that facilitate protection of the wilderness character. These permitted activities do not interfere with the challenging and self-reliant recreation of other wilderness visitors and do not cause widespread negative impacts to wilderness character.
- 7 Wilderness recreation opportunity settings are maintained, recognizing several inconsistencies (with primitive) such as at Bell Rock, West Fork, Boynton Canyon, Humphreys Trail, and some places near private land.

#### **Wilderness Education**

- 8 Educational material and information is provided at all wilderness trailhead access points including information about the variety of trails and experiences available in nearby wilderness areas and information about personal safety, “Leave No Trace” etiquette, and pertinent regulations. Educational materials encourage widespread understanding of the philosophy of wilderness and support for its natural and social benefits. They also provide information to help users be prepared with appropriate equipment and information. Visitors learn about sensitive ecological features, know their responsibility, and act in a way that protects ecological systems.

#### **Ecological Management of Wilderness Areas**

- 9 Ecosystems within wilderness are functioning within their historic range of variability. Ecological conditions trend toward the desired conditions for the respective vegetation types within each wilderness. Other ecological features (e.g., biophysical features, geological resources, aquatic systems) achieve or are trending toward their desired conditions. Native species are present and supported by properly functioning habitat conditions. Disturbances, including fire and flooding, are able to play their natural role in vegetative succession, while accounting for public health and safety concerns. (For more information, see the direction in the forestwide ecological sections, including the appropriate vegetation types). Ecological conditions trend toward the desired conditions for the respective ecological resource within each wilderness. Invasive plants and animals do not occur at levels that disrupt ecological functioning. Plants used for traditional medicine and cultural purposes thrive here.

#### **Objectives for All Designated Wilderness Areas**

##### **SA-Wild-All-O**

- 1 Annually, rehabilitate one to five wilderness sites or areas that have been impacted by recreation in order to restore wilderness character.

### **Standards for All Designated Wilderness Areas**

#### **SA-Wild-All-S**

- 1 In wilderness, group size limit is 12 persons and livestock (combined) per group, except for wilderness based education events under special use permit.
- 2 Commercial activity is not permitted in wilderness areas, unless the activity is wilderness dependent and the activity cannot be conducted or replicated outside of wilderness. This would include activities by organizational groups and/or training classes.

### **Guidelines for All Designated Wilderness Areas**

#### **SA-Wild-All-G**

- 1 In order to maintain visitor experiences of solitude, large group activities (75 or more people) under special use permit, such as races and outdoor retreats, should not occur in wilderness unless they are specifically for the purpose of wilderness-based education and are designed to protect wilderness resources.
- 2 Signage in wilderness should be limited to those that are essential for resource protection and user safety to retain the wilderness experience of self-reliance and challenging recreation.
- 3 Trails should be designed to discourage bicycle access into adjacent wilderness and to otherwise minimize impacts on wilderness.
- 4 Signage and parking for wilderness access should concentrate parking in designated locations in order to provide appropriate visitor information. Casual wilderness use resulting from roadside parking along the highway should be discouraged in order to prevent social trails from being developed. Damaged parking sites should be restored using erosion control and revegetation to remove evidence of resource impacts.

### **Management Approaches for All Designated Wilderness Areas**

Implement corrective measures including, but not limited to, a wilderness permit system if overuse causes unacceptable resource damage. Overuse can be determined from: limits of acceptable change studies, range analyses, code-a-site inventories, or professional judgment. The Kachina Peaks, Red Rock-Secret Mountain, Wet Beaver, West Clear Creek, and Sycamore Canyon Wilderness areas may be closely monitored to determine whether or not corrective measures are needed.

Enforce the prohibition against bicycles in wilderness through methods such as ranger patrols, placement of bike racks near wilderness boundaries or portals, “wilderness ahead” signs located outside of the wilderness, improved trail design, and expanded trail opportunities outside of the wilderness.

Provide regular wilderness ranger patrol in wilderness areas to the degree necessary to meet the levels of acceptable change or other appropriate standards for each area. If funding is limited, use volunteers to accomplish as much of this work as possible via the Wilderness Information Specialist (WIS) program. Standard level trail maintenance is defined in the implementation schedules for each wilderness.

Expand partnerships such as the resort Wilderness Ranger Program to increase awareness of wilderness values and etiquette. Increase residents' awareness of the wilderness near them by providing them with information about wilderness. Use volunteers as much as possible, particularly during peak season to patrol, pick up litter, break up fire rings, restore damaged sites, contact the public, and maintain trail condition logs.

Coordinate law enforcement activities with wilderness managers to ensure that any evidence of illegal activities is removed.

Develop wilderness management direction that establishes limits of acceptable change for all wilderness areas.

Management plans may be developed and implemented for all wilderness areas on the forest.

Coordinate with the Arizona Game and Fish Department on management of native species within wilderness per the current memorandum of understanding (Forest Service, 2006b).

### **Fossil Springs Wilderness**

#### **General Description for Fossil Springs Wilderness**

Sixty miles south of Flagstaff, the Fossil Springs Wilderness encompasses a steep, wide canyon approximately 1,600 feet down at the edge of the Mogollon Rim. Generally, the vegetation types are Piñon-Juniper Evergreen Shrub, Riparian, and Ponderosa Pine; however, there are inclusions of other types due to the topographic and ecological complexity of the area. This wilderness is one of the most diverse areas in the State likely due to the range of plant communities compressed into a small area that ranges from very wet to very dry. The creek is situated in a region dominated by Late Paleozoic sedimentary rocks underlying basalt flows. The springs are located on the southern side of the wilderness, but are not within the wilderness. Calcium carbonate within the stream precipitates chemical mineral deposits called travertine on rocks and sediments in the stream channel. These deposits along with the unique stream chemistry interact with the riparian vegetation and other geological features to produce an unusual environment that is only one of two in Arizona. (See the direction for the [Fossil Springs Botanical Area](#) and [Wild and Scenic Rivers](#) for more discussion of the springs.) Fossil Creek has a wild river segment and a recreational river segment within the wilderness. (See the direction for [Wild and Scenic Rivers](#) and the "Fossil Creek Comprehensive River Management Plan" for more information.)

Fossil Creek is a very important place for the Apache. There are many stories and traditions about the canyon and the role it has played through time as a sanctuary for the Apache people. In the 1870s, most Apache were forcibly relocated to the San Carlos Reservation, although some families managed to hide out and survive in the canyon. With the need for labor to construct the Childs-Irving hydroelectric power plant system, Apache returned to the canyon to help build that historic project and maintain it for over 40 years until they were forced to leave and relocate to the Yavapai-Apache Reservations by Camp Verde, Middle Verde, and Clarkdale.

The desired conditions for this area are in addition to those described for the Verde Valley MA.

### Desired Conditions for Fossil Springs Wilderness Area

#### SA-Wild-Fossil-DC

- 1 The area retains its integrity as an outstandingly clean, pristine site, has primitive hiking trails, and is a good place to find solitude. There are recreation opportunities for big and small game hunters, wildlife and plant viewing, hikers, backpackers, fishermen, swimmers, and kayakers.
- 2 The steep canyon topography has terraces which provide for a greater diversity of plants and habitat conditions. The vegetation types for this wilderness include Piñon-Juniper Evergreen Shrub, Mixed Broadleaf Deciduous Riparian Forest, and Ponderosa Pine (see the desired conditions for these vegetation types for more information). Within these vegetation types there are numerous and diverse inclusions of communities of plants such as mesquite, catclaw acacia, crucifixion thorn, cacti, ash, walnut, alder, cottonwood, sycamore, hackberry, willow, chokecherry, boxelder, piñon pine, several juniper species, and ponderosa pine dominating the higher plateaus with numerous annual and perennial woody and nonwoody plants. A variety of age classes of riparian trees are present, successfully regenerating, and some trees are very large (exceeding 30 inches in diameter). Native shrubby and herbaceous vegetation is also successfully regenerating and provides food and cover for wildlife consistent with the capacity of the area. This vegetative diversity creates many wildlife niches for deer, javelina, and a large number of bird species. Occupied black hawk nesting sites are protected from disturbance during the breeding season.
- 3 Hydrologic and geologic features of the stream are preserved, especially the travertine system. Water quality is outstanding and the river at times appears blue because of the water chemistry. Turbidity is low except during flood events, and *E. coli* levels are low. The exposure above the springs of a scarp of the Mogollon Rim, eroded in Late Paleozoic sedimentary rocks and now buried under extensive Tertiary basalt lava flows, is preserved in pristine geological condition. In the uplands, the landscape is dry and open with a very rocky texture and semiarid vegetation.
- 4 Historical trails and features heighten the wilderness experience of visitors. Mail Trail, once used for horseback mail deliver, and Flume Trail have interpretation appropriate to a wilderness setting that ties to the history of hydropower and industry in the vicinity. Native settlement and culture are another highlight of the wilderness experience in this area. Fossil Creek is notable for its high archaeological site density and diversity in a unique microcosm in the Mogollon Rim. It is also one of the more important locales of historic and modern Apache occupation. The various archaeological site types that occur in the different environments in and around Fossil Creek reflect specialized subsistence and settlement strategies to maximize the specific resources of those environments. In this respect, there is also similarity in the ways the prehistoric Sinagua and historic Apache utilized the Fossil Creek area. Habitations and riparian-oriented agriculture were the main uses of the canyon bottom and virtually every flat location along the creek shows evidence of habitation by both Sinagua and Apache. The hill slopes along the creek were areas extensively utilized for the collecting and gathering of wild plant foods such as yucca, agave, and prickly pear which were cooked in large communal roasting pits. Small pockets of soil that collected in hillsides formed small areas in which corn could be grown, as evidenced by numerous small prehistoric field houses as well as remains of Apache houses in their vicinity.

## **Kachina Peaks Wilderness**

### **General Description for Kachina Peaks Wilderness**

Located just north of Flagstaff, Kachina Peaks Wilderness is part of a large, heavily vegetated composite volcano known as the San Francisco Peaks. The San Francisco Peaks range in elevation from 7,400 to 12,633 feet high and includes Humphreys Peak, the highest point in Arizona. The San Francisco Peaks exhibit a rich diversity of past geologic events such as lava flows, volcanic eruptions, glaciation, and erosion. The San Francisco Peaks are an outstanding example of past volcanic activity and preserve the best example of Ice Age glaciation in Arizona in lateral and medial moraines and former streambeds.

The only Alpine Tundra vegetation in Arizona is found on the San Francisco Peaks. This area is less than 1,000 acres and contains a threatened plant, San Francisco Peaks ragwort, as well as other endemic and threatened species. Wildlife species include mule deer, elk, turkey, black bear, coyote, mountain lion, red squirrel, and Clark's nutcracker. The San Francisco Peaks contain virgin spruce-fir forest and the only area of bristlecone pine on the Coconino NF. The San Francisco Peaks are sacred to a number of southwestern tribes, most notably the Hopi and Navajo, but also the Yavapai, Walapai, Havasupai, Apache, Zuni, and Acoma (see [San Francisco Peaks MA](#)).

This wilderness contains the San Francisco Peaks Research Natural Area, which provides a control or reference for an Alpine Tundra ecosystem at the southern extend of this ecosystems range.

For scenery desired conditions, see the [San Francisco Peaks MA](#).

### **Desired Conditions for Kachina Peaks Wilderness**

#### **SA-Wild-KPeaks-DC**

- 1 There is a diverse composition of wildlife species and native vegetation. In this high elevation wilderness, there are Alpine Tundra, Mixed Conifer with Aspen, and Spruce-Fir forests with Subalpine Grasslands and Ponderosa Pine interspersed (see the desired conditions for these vegetation types for more information). The ecosystem diversity of the wilderness and ecological attributes and processes that allows it to provide watershed values, habitat for native biota, panoramic vistas, and/or solitude are maintained. Recreation use and ecological functions retain the tribal values and the unique attributes of the alpine vegetation.
- 2 The alpine ecosystem provides habitat for San Francisco Peaks ragwort, is able to support and sustain rare or endemic species, and continues to be resilient to natural and human-caused impacts.
- 3 Several roads, jeep trails, and hiking/equestrian trails provide access to the wilderness boundary. Recreational opportunities include day hiking, backpacking, cross-country skiing, snowshoeing, winter camping, snow and ice climbing, small and big game hunting, bird watching, and leaf watching (fall). The top of Kachina Peaks Wilderness provides outstanding views of the Painted Desert, North Rim of Grand Canyon, and Sunset Crater. Trails to the top of peaks within the wilderness are higher traffic than is typical of more remote wilderness. These trails have a stable narrow width and discourage traveling off trail. Particularly in areas of Alpine Tundra vegetation, off-trail travel does not occur. The

mountain maintains attributes that provide historic and cultural values such as shrines. There may be inconsistencies with social encounters associated with the wilderness recreation opportunity spectrum on the Humphreys Trail year round and near the Snowbowl Ski Area in winter.

#### **Standards for Kachina Peaks Wilderness**

##### **SA-Wild-KPeaks-S**

- 1 Off-trail travel is prohibited, except when there is enough snowpack to protect underlying vegetation, particularly in the Alpine Tundra vegetation type.
- 2 No horse or pack stock use above timberline.
- 3 No overnight camping above timberline.

#### **Munds Mountain Wilderness**

##### **General Description for Munds Mountain Wilderness**

Elevations in the Munds Mountain Wilderness range from 3,600 to 6,800 feet. Located east of Sedona, the area is characterized by the moderate to steep slopes of the Mogollon Rim. Rattlesnake, Woods, and Upper Jacks Canyon are the major drainages. Munds Mountain, Lee Mountain, and Horse Mesa are the areas of highest elevation.

Munds and Lee Mountains are unique geologic areas of the Mogollon Rim. There are extensive outcroppings of Coconino and Supai sandstone on the cliff faces of Munds and Lee Mountains underlying the most recent basalt flows.

The desired conditions for this area are in addition to those described for scenery in the Red Rock and Pine Belt MAs.

##### **Desired Conditions for Munds Mountain Wilderness**

##### **SA-Wild-Munds-DC**

- 1 A great diversity of vegetation and wildlife species and outstanding riparian habitat characterize this wilderness. Depending upon slope and aspect, several vegetation types are found including: Ponderosa Pine, Piñon-Juniper Evergreen Shrub, Interior Chaparral, and Mixed Broadleaf Deciduous Riparian Forest. There is a small portion of Semidesert Grasslands. Riparian vegetation and perennial water sources are maintained in the major drainages (see the desired conditions for these vegetation types for more information). Arizona cypress communities are preserved.
- 2 The deep drainages and rugged nature of the terrain offer many opportunities for primitive and unconfined activities including hiking, backpacking, horseback riding, swimming, rock climbing, bird watching, and hunting. The terrain provides many challenging recreation opportunities in areas with few trails. Due to the striking beauty of the red cliffs and riparian habitat, the wilderness also offers outstanding opportunities for photography and painting. In order to identify trail locations, cairns may be found along trails. At Bell Rock, visitors have an awareness of and sensitivity to Munds Mountain Wilderness.
- 3 Prehistoric sites are found in many different locales within the wilderness and reflect hunting activities as early as 9,000 years ago, as well as agricultural settlements by the Sinagua 900

years ago. Although there are no interpreted sites in the wilderness, it contains a great variety of Sinagua sites types, including small field houses, substantial habitation pueblos, so-called “forts,” field systems, and petroglyphs. Later activity by Yavapai and Apache are also present in rock shelters and caves as well as sites in the open. Many reflect long-term harvesting and cooking of agave in communal roasting pits. The historic Chaves Road skirts the south edge of the wilderness and provides a taste of what it was like to travel across this rugged area during pioneer times.

### **Red Rock–Secret Mountain Wilderness**

#### **General Description for Red Rock–Secret Mountain Wilderness**

Located 20 miles south of Flagstaff, Red Rock–Secret Mountain Wilderness includes spectacular red, tan, and buff cliffs that mark the edge of the Colorado Plateau. The country plunges as much as 2,500 feet into canyons that drain into Oak Creek and the Verde River. Secret Mountain and Wilson Mountain are high mesas jutting out into the lower country. Several basalt lava flows cap the high cliffs of the older sedimentary rock formations. The area includes the dramatic backdrops and scenic cliffs that make Sedona a popular tourist spot.

This is an area of great climatic variation. The high rims are cool and moist most of the year, except for May and June. The south end of the wilderness, near Sedona, has a much warmer climate. Mid-winter temperatures average above freezing. The Oak Creek Canyon Research Natural Area (RNA), a diverse vegetation community, is in the wilderness (see the [Oak Creek Canyon RNA](#) direction for more information).

Red Rock–Secret Mountain Wilderness was most heavily occupied in prehistoric times by the Southern Sinagua during the A.D. 1150 to 1300 period. Cliff dwellings are the most notable site types, forming single family homes as well as storage facilities for crops grown on the mesa tops and canyon bottoms. The most impressive sites are on the edge of the wilderness, the cliff dwellings of Honanki and Palatki, both of which have outstanding examples of prehistoric pictographs that span the entire range of human occupation of the Verde Valley. Both sites are developed for public visitation.

The desired conditions for this area are in addition to those described for “Scenery” in the Sedona/Oak Creek and Pine Belt MAs.

#### **Desired Conditions for Red Rock–Secret Mountain Wilderness**

##### **SA-Wild-SecretMtn-DC**

- 1 There are seven major vegetation types: Ponderosa Pine, Mixed Conifer, Interior Chaparral, Piñon-Juniper Evergreen Shrub, Riparian Forests, and Semidesert Grasslands (see the desired conditions for these vegetation types for more information). Arizona cypress communities are preserved. The wide variety of vegetative types provides habitat for equally diverse wildlife populations.
- 2 Native fish populations in the West Fork of Oak Creek persist and are minimally affected by invasive aquatic species. Cliffs that are occupied peregrine falcon habitat are undisturbed during the breeding season. Invasive plants do not occur at levels that disrupt ecological functioning. Plants used for [ethnobotanical](#) purposes thrive here.
- 3 Heritage sites remain unaltered.

- 4 Spectacular red, tan, and buff cliffs that mark the edge of the Colorado Plateau are found throughout this wilderness. Steep forest canyons interspersed with red rock arches and formations provide outstanding opportunities for solitude farther into the area. Visitor encounters are higher at the eastern end of the West Fork of Oak Creek. Opportunities for primitive recreation are many. Primitive hiking is allowed, but overnight camping may be restricted because of the overlying research natural area and resource protection. Wilson Mountain National Recreation Trail provides an outstanding scenic hike within the wilderness. In order to provide for safety, cairns may be found along trails.

### **Strawberry Crater Wilderness**

#### **General Description for Strawberry Crater Wilderness**

Located 30 minutes north and east of Flagstaff, Strawberry Crater Wilderness consists of gently rolling piñon-juniper hills, cinder terrain, and lava fields about 5,500 to 6,000 feet in elevation. Strawberry Crater is part of the San Francisco Peaks volcanic field, which contains some 600 craters and scoria cones. Strawberry Crater itself is about 50,000 to 100,000 years old. In appearance it is quite different from the younger, rounded cinder cones nearby. The crater was formed by slow moving basaltic andesite. The ridges of the central crater show the distinct layering that occurred during eruption. The ridges are broken at right angles to the ground and to one another. The jagged features and deep rust color of Strawberry Crater make it unique among local cinder cones. The area contains the Southwestern Region sensitive plant species Sunset Crater beardtongue (*Penstemon clutei*).

Strawberry Crater Wilderness shows evidence of occupation by the northern Sinagua who probably took advantage of a unique geological setting that exists nowhere else in the territory they occupied in prehistoric times. Strawberry Crater is also an important place to the Hopi and Navajo.

Because of the relatively open terrain and easy access from major roads, motor vehicle intrusion into the wilderness is an issue.

The desired conditions for this area are in addition to those described for “Scenery” in the Volcanic Woodlands MA.

#### **Desired Conditions for Strawberry Crater Wilderness**

##### **SA-Wild-Straw-DC**

- 1 Strawberry Crater Wilderness offers the visitor an opportunity to experience the sense of time and endless horizon presented by the piñon-juniper landscape. The area also contains transitional areas to the Ponderosa Pine and Great Basin Grasslands vegetation types (see the desired conditions for these vegetation types for more information). Strawberry Crater Wilderness shows little evidence of human visitation, and vegetation on its slopes is preserved. From the low cinder cones, there are high quality scenic views of the Painted Desert, the Hopi mesas, and the buttes of the Little Colorado River valley. On the horizon, the San Francisco Peaks and Sunset Crater add another dimension to the view. The area is strewn with cinders and evidence of the prehistoric volcanic activity that formed the area. The lava field to the north is a sea of black in the piñon-juniper landscape.

- 2 The area offers opportunities for day hiking, backpacking, and camping. The area provides ample opportunities for self-reliance and challenging navigation in a flat, densely vegetated area. Petrified bubbles of once boiling lava look as fresh as the sparse vegetation that struggles for a foothold on this rugged moonscape. There are a few game animals and small mammals throughout. Opportunities for solitude and for exploring interesting geological and archaeological features exist. Vehicle intrusions are rare and signing, fencing, and wilderness patrols on the boundary effectively enforce restrictions.
- 3 The construction of barriers and signage along the wilderness boundary prevent motor vehicle intrusion along the south and west boundaries of the wilderness. Educational materials about the sensitive soils and plants are provided to visitors.

### **West Clear Creek Wilderness**

#### **General Description for West Clear Creek Wilderness**

Located 10 miles east of Camp Verde, West Clear Creek is one of the most rugged, remote canyons in northern Arizona. The canyon forms where Willow Valley and Clover Creek join near two access trails: Maxwell Trail and Tramway Trail. The canyon continues westward for approximately 27 miles, measured along the creek, ending near Bull Pen Ranch. The creek continues westward to join the Verde River south of Camp Verde. The canyon is very narrow for most of its length with many side canyons.

West Clear Creek Canyon is the longest of the canyons cutting through the Mogollon Rim, the edge of the Colorado Plateau. The formations visible in the canyon area are, from bottom to top, Late Paleozoic sedimentary rocks (Supai, Coconino, and Kaibab formations), Tertiary sediments, and Tertiary basalt lava flows.

The desired conditions for this area are in addition to those described for “Scenery” in the Verde Valley and Pine Belt MAs.

#### **Desired Conditions for West Clear Creek Wilderness**

##### **SA-Wild-WClrCrk-DC**

- 1 Major vegetation types in this wilderness are Piñon-Juniper Evergreen Shrub and Ponderosa Pine. The Riparian Forests and Semidesert and Montane Grasslands components add to the diversity of the canyon ecosystem (see the desired conditions for these vegetation types for more information). The terrain is rugged and provides for a variety of wildlife habitat. Hanging gardens on the upper slopes are undisturbed (see Riparian Types in the “Vegetation” section for further direction on springs and seeps).
- 2 Heritage sites remain undisturbed.
- 3 The canyon does contain some evidence of human use but the apparent naturalness of the area is unaffected. In spite of the short distance from the northern to the southern boundary, the area offers outstanding opportunities for solitude and primitive recreation by virtue of the very steep canyon walls. Access from Bull Pen Ranch to Bald Hill is fairly easy, even for inexperienced hikers or fishermen. There are short steep access trails that are unmaintained from the rim to the canyon bottom. In the main, narrow part of the canyon, there are no trails. Deep long pools make it necessary to wade or swim in many places when hiking from one end of the canyon to the other so that even the most seasoned hiker will find lots of

challenge. The canyon is wild and primitive. Interpretive materials associated with this wilderness advise that users need to plan trips carefully and be self-reliant.

### **Wet Beaver Wilderness**

#### **General Description for Wet Beaver Wilderness**

Forty miles south of Flagstaff, Wet Beaver Wilderness commences at its eastern border at the confluence of Brady and Jacks Canyons. Moving west, the boundary follows the canyon rim. In the lower reaches of the canyon, the boundary moves back slightly from the rim to include some of the adjacent plateau. The area ends where Wet Beaver Creek Canyon opens toward the Verde Valley. Wet Beaver is a steep walled canyon cutting into the rim of the Colorado Plateau. Supai sandstone and shale form striking red cliffs along the lower canyon.

Like West Clear Creek Wilderness, prehistoric sites occur in almost all types of topographic situations along Wet Beaver Creek and reflect an adaptation to the unique canyon environment. Petroglyphs can be seen along Bell Trail that begins at the mouth of Wet Beaver Creek. Just outside the north edge of the wilderness is the ancient Palatkwabi Trail. It is likely that a side trail from Palatkwabi Trail entered the Verde Valley and was a major trade connection between the southern Sinagua of the Verde Valley and the early Hopi pueblos along the Little Colorado River and the Hopi mesas to the north.

The desired conditions for this area are in addition to those described for “Scenery” in the Verde Valley and Pine Belt MAs.

#### **Desired Conditions for Wet Beaver Wilderness**

##### **SA-Wild-WetB-DC**

- 1 The major vegetation type in this wilderness is Piñon-Juniper Evergreen Shrub, and the additional types of Ponderosa Pine, Semidesert Grasslands, and riparian types add to the diversity of the canyon ecosystem (see the desired conditions for these vegetation types for more information). Wet Beaver Wilderness provides recreation opportunities for waterplay, wildlife viewing, camping, and hiking while protecting the pristine riparian and aquatic resources. The perennial desert stream passes through a canyon of Supai sandstone, shale, and red rock. As visitors move eastward in the canyon, opportunities for solitude increase. Heritage sites remain undisturbed.

### **Sycamore Canyon Wilderness**

#### **General Description for Sycamore Canyon Wilderness**

Sycamore Canyon Wilderness is on the Coconino, Kaibab, and Prescott National Forests. The direction in the Coconino NF plan provides direction for this wilderness area on all three national forests.

The southern portion of the area is a series of broad mesas with gently sloping drainage tributaries to the Verde River. Along the Verde River, there is extensive riparian habitat. The northern section is a series of foothills and canyons that rise to a 300-foot rim of rugged sandstone outcrops along Sycamore Canyon. Elevation ranges from 3,700 to 6,500 feet. These differences in elevation and aspect throughout the canyon result in a variety of contrasting ecological associations set in spectacular “red rock” geologic formations.

## Chapter 3. Management Areas and Special Areas

Sycamore Canyon has long been noted for its cliff dwellings as well as tall tales of lost Spanish gold mines and Mexican treasure hunters ambushed by Apaches. Prehistoric textiles found in one site in the 1930s show that cotton was once grown in areas like Sycamore Canyon, and that the Sinagua produced some of the most sophisticated and complex weaving technologies in the Southwest. Finely woven, highly decorated cotton textiles were undoubtedly one of the more important products the Sinagua traded to the northern pueblos along Palatkwabi Trail.

The desired conditions for this area are in addition to those described for “Scenery” in the Verde Valley, Red Rock, and Pine Belt MAs.

### **Desired Conditions for Sycamore Canyon Wilderness**

#### **SA-Wild-Sycamore-DC**

- 1 The canyon walls represent a diversity of geological history such as red sandstone, white limestone, and brown lava. Vegetation in the canyon varies from Mixed Conifer with Aspen, Ponderosa Pine, and Montane and Semidesert Grasslands in the upper elevations to Interior Chaparral, Piñon-Juniper Evergreen Shrub, Piñon-Juniper Woodlands, Semidesert Grasslands, and Desert Communities in the lower elevations. The stream course is a Mixed Broadleaf Deciduous Riparian Forest (see the desired conditions for these vegetation types for more information). Along Sycamore Creek, the sycamore component is maintained as a higher proportion of the species composition than is seen in other mixed broadleaf deciduous vegetation types.
- 2 Visitors experience solitude and challenge in this diverse canyon and enjoy high-quality views of Red Rock Country.
- 3 Heritage sites remain undisturbed. Springs and historic cabins are protected from recreation impacts.
- 4 Sycamore Canyon Wilderness is a Class I Airshed (see [Air Quality](#) section).
- 5 Noxious weeds, such as tamarisk, are absent from the creek and associated springs.

### **Recommended Wilderness**

See appendix A, map 17.

### **General Description for Recommended Wilderness**

The proposed action includes three recommended wilderness areas—Walker Mountain, Strawberry Crater (addition), and Davey’s ( addition to Fossil Springs Wilderness)—that, if selected in the final plan, would use the interim direction below until they are designated by congressional action. Once an area is designated by Congress, the direction in this section no longer applies and the area is managed according to the Wilderness Act, Agency policy, and direction for designated wilderness in the previous section of the plan.

### **Desired Conditions for Recommended Wilderness**

#### **SA-RWild-DC**

- 1 The primitive and undeveloped characteristics of recommended wilderness are maintained or enhanced. The presence of structures, construction, habitations, and other evidence of

modern human presence or occupation is minimal. Ecological systems are substantially free from the effects of modern civilization and evidence of modern human control or manipulation is reduced. Native species and unique features of the area are preserved. Scenery and wilderness recreation opportunities are emphasized over developments and mechanized forms of recreation. Mechanized recreation within the area does not detract from wilderness values. Motorized vehicle use is reduced. Archaeological sites remain undisturbed.

### **Objectives for Recommended Wilderness**

#### **SA-RWild-O**

- 1 Develop and implement management plans for any newly designated wilderness areas within 5 years after designation occurs.

### **Guidelines for Recommended Wilderness**

#### **SA-RWild-G**

- 1 Existing structures should be maintained but not expanded to maintain the area's wilderness character. Maintenance of existing structures should be carried out in a manner that does not expand the evidence of motor vehicle and mechanized equipment use beyond current conditions within the recommended wilderness area.
- 2 Where the line officer has discretion to do so, construction of new Forest Service and permitted structures should be avoided unless the facility and its future maintenance can be carried out in a manner consistent with the area's wilderness character.
- 3 Motor vehicle use should only occur for limited administrative and permitted activities to maintain the area's wilderness character.
- 4 Maintenance of existing trails should mitigate effects to soil and water resources while maintaining the primitive setting of the trail.
- 5 New trails should only be designed for activities that normally would be allowed in wilderness. Existing trails designed for other uses (e.g., bicycling or motor vehicle use) should be rehabilitated to meet more appropriate trail standards.

### **Management Approaches for Recommended Wilderness**

Use the minimum requirement analysis as a framework to evaluate the potential effects of projects on wilderness character and to develop alternatives for projects within recommended wilderness.

### **Wild and Scenic Rivers**

See appendix A, map 17.

Each congressionally designated wild and scenic river is required to have a comprehensive river management plan (CRMP). The CRMP establishes the river corridor boundary; includes detailed descriptions of the [outstandingly remarkable values \(ORVs\)](#); and addresses goals and desired conditions, development of lands and facilities, user capacities, water quality, instream flow, and monitoring strategy. It may also include standards and guidelines that are the equivalent of plan

direction. The entire CRMP is not incorporated by reference into this forest plan because some portions are meant to identify implementation and site-specific activities. However, explicitly identified management direction in the CRMP is incorporated by reference into the following plan direction.

### **Verde Wild and Scenic River<sup>63</sup>**

#### **General Description for the Verde Wild and Scenic River**

The Verde Wild and Scenic River was designated by the Arizona Wilderness Act of 1984 (P.L. 98-406) on August 28, 1984. Beginning at the most southern point of the forest, the confluence of the Verde River and Fossil Creek, the wild and scenic river stretches northward approximately 22 miles to a parcel of private land south of Camp Verde. The wild and scenic river designation applies to both sides of the river and generally totals one-half mile wide (one-quarter mile on each side of the river). The area overlaps with a portion of Mazatzal Wilderness.

The desired conditions for this area are from chapter 3 of the CRMP and are in addition to those described for “Scenery” in the Verde Valley MA.

#### **Desired Conditions for the Verde Wild and Scenic River**

##### **SA-WSR-Verde-DC**

- 1** The scenic qualities of landform, vegetation, and water within the Verde Wild and Scenic River (VWSR) are distinctive. Landform varies from steep, rocky canyons framing the river to plateaus dropping to wide flood plains, with the river as a central feature. Vegetation varies according to terrain, from broad mesquite bosques and cottonwood gallery forests to narrow bands of riparian willows, in contrast to the surrounding dry grassland and desert vegetation, including barrel cactus. Scenic qualities of the perennial Verde River change dramatically with the seasons and with changes in riverflow. Dramatic fall color contrasts with summer greenery. Waterflow changes from shallow, still pools and slow water, to high flow, seasonal rapids, and waterfalls. Recreationists view the river corridor from the high edges of plateaus and canyons, from within the flood plain, from the riverbank, and from the surface of the river itself. The VWSR area is visually sensitive due to the combination of high viewer expectations, generally long duration of view, and high amount of detail visible to the viewer. The river corridor is characterized in many locations by open, expansive vistas viewed from numerous locations.
- 2** The VWSR offers exceptional river related recreation opportunities that emphasize nonmotorized recreation. Recreation activities occur at appropriate locations and intensities such that ORVs are protected and enhanced. Recreation opportunities and activities are primarily nature based and offer outstanding opportunities for experiencing scenic beauty and the intrinsic cultural and natural resources associated with the river. The high demand for both camping and day use of the VWSR is balanced with the maintenance of outstanding opportunities for primitive recreation and solitude. Facilities and management emphasize recreation opportunities for individuals, families, and small groups. Both day use and camping recreation opportunities are offered within a predominantly undeveloped river setting.

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<sup>63</sup>The section for the Verde Wild and Scenic River comes from the comprehensive river management plan.

- 3 The Beasley Flat and Childs areas are managed for higher levels of visitation and to provide river access while meeting the demands of intensive day use recreation activities in the river's flood plain. Recreation facility operation, maintenance, enforcement, and management presence are consistent with desired resource conditions for outstandingly remarkable values (ORVs). Recreation user conflicts are minimal. Except for the developed areas of Childs and Beasley Flat, the VWSR is managed for a predominantly uncrowded setting. The character of recreation settings is identified and managed through the recreation opportunity spectrum (ROS). Recreation use activities and capacities are established for commercial and noncommercial uses consistent with ORVs and ROS and [WOS \(wilderness opportunity spectrum\)](#) classifications.
- 4 Visitors have opportunities for primitive recreation, solitude, and physical and mental challenge and inspiration consistent with preservation of the wilderness resource. Natural processes operate freely.
- 5 Roads and trails provide access within the VWSR consistent with protection and enhancement of scenic, cultural/historic, wildlife, and fish outstandingly remarkable values, and protection of soil and water quality. The transportation system supports interpretation, recreation, and resource management activities.
- 6 The river exists in a [free-flowing](#) condition with a range of flows that provide optimum conditions for native fish and wildlife and scenic quality. Healthy and diverse stands of riparian vegetation thrive along the banks and flood plain, reflecting the potential of the river's habitats and maintaining the channel at a higher level of stability. Recovery of channel and habitat conditions following scouring floods is not hindered by management activities within the VWSR corridor. Aquatic habitat is maintained in a condition with low substrate embeddedness, abundant aquatic food supply, and stable streambanks (see [Riparian Types](#) in the "Vegetation" section for more desired conditions).
- 7 The river corridor provides important consumptive and nonconsumptive wildlife use opportunities for visitors. The public is aware of these opportunities as well as species protection requirements. The public is aware of the importance of native fish and releases listed species when caught.

#### **Standards for the Verde Wild and Scenic River**

##### **SA-WSR-Verde-S**

- 1 Management standards are identified in the "Verde Wild and Scenic River Comprehensive River Management Plan" under chapter 3 "Management Direction for the Verde River Corridor" (Forest Service, 2004).

#### **Management Approaches for the Verde Wild and Scenic River**

Coordinate with the Arizona Department of Environmental Quality to monitor and achieve acceptable total maximum daily loads (TMDLs) for turbidity in the Verde River.

#### **Fossil Creek Wild and Scenic River**

##### **General Description for Fossil Creek Wild and Scenic River**

Fossil Creek Wild and Scenic River was designated by Congress in spring 2009. This designation included approximately 16.8 miles from the confluence of Sand Rock and Calf Pen Canyons to

the confluence with the Verde River; 9.3 miles of the river are classified as wild and 7.5 miles are recreational. The river is managed jointly by the Tonto and Coconino National Forests.

The Fossil Creek Wild and Scenic River is currently managed under interim direction and the comprehensive river management plan (CRMP) is being completed under a separate decision. Depending on the order of the decisions, the CRMP will either amend the 1987 plan and be carried forward as is into the revised plan or it will amend the revised plan.

#### **Desired Conditions for Fossil Creek Wild and Scenic River**

##### **SA-WSR-FossilCrk-DC**

- 1 The designated river and its adjacent areas retain their free-flowing character and outstandingly remarkable values and classifications.

#### **Management Approach for Fossil Creek Wild and Scenic River**

Manage the river consistent with the Coconino and Tonto National Forests' interim direction until such time as the CRMP is completed.

#### **National Trails and Scenic Byways**

See appendix A, map 2.

#### **Arizona National Scenic Trail**

##### **General Description for Arizona National Scenic Trail**

The Arizona National Scenic Trail (ANST) is a nonmotorized, largely primitive trail that stretches 800+ miles across Arizona to connect deserts, mountains, forests, wilderness, canyons, historic sites, communities, and people. It passes through some of the most renowned landscapes in the State and is the only national scenic trail in Arizona. The ANST showcases Arizona's diverse life zones and scenery and is enjoyed by a wide variety of nonmotorized recreationists, including hikers, equestrians, mountain bicyclists, and cross-country skiers. Starting in the Coronado National Memorial, on the border between the U.S. and Mexico, the trail climbs and descends from one Coronado National Forest "sky island" to another. North of the Coronado, the trail continues across rolling Sonoran Desert hills and mountains, crosses the Gila River, then winds through the Superstition Mountains and on to the Mogollon Rim and the forests of northern Arizona.

On the Coconino NF, the ANST ascends the Mogollon Rim and crosses the canyons and ridges of the Upper Clear Creek watershed. In this area, visitors come across the historic Battle of the Big Dry Wash and C.C. Cragin Reservoir. North of State Highway 87, the ANST crosses Anderson Mesa, where visitors encounter the grasslands and lakes of the plateau. The ANST crosses through the community of Flagstaff and then ascends the San Francisco Peaks. From there, visitors continue north across the volcanic field to the Kaibab National Forest and Grand Canyon. The ANST crosses the Grand Canyon on the South and North Kaibab Trails then continues across the Kaibab Plateau to end at the Utah border next to the Vermillion Cliffs National Monument. About 70 percent of the ANST lies on National Forest System land, but the ANST also crosses Bureau of Land Management, National Park Service, Arizona State Parks, Arizona State Trust, county, private, and municipal lands.

### **Desired Conditions for Arizona National Scenic Trail**

#### **SA-Tri&Bwy-AzT-DC**

- 1 The ANST provides both short and long distance nonmotorized recreation opportunities in mainly remote and primitive settings representative of the dramatic natural landscapes and varied vegetation of Arizona. Along most of the trail, infrastructure and facilities are few and are constructed in such a way as to be compatible with the scenic, natural, historic, and cultural qualities for which the ANST was established. In remote areas, the sights and sounds of roads, motorized trails, utility corridors, and other facilities are rarely encountered. Near towns and developed recreation facilities, the ANST may become a more accessible and highly developed route with access to amenities via connector trails. Recreation and other activities on or adjacent to the ANST do not negatively impact cultural and natural resources, scenic integrity, or the nonmotorized recreation experience. User conflicts are infrequent. Signage, while unobtrusive, is present to help long-distance travelers find nearby developed sites, trailheads, recreation facilities, and drinking water sources. Trailheads are conveniently located and, where equestrian use is common, parking space for trucks pulling trailers exists.

### **Guidelines for Arizona National Scenic Trail**

#### **SA-Tri&Bwy-AzT-G**

- 1 Fire on, or in, the foreground of the ANST should be managed using minimum impact suppression tactics, or other tactics appropriate for the protection of values and resources for which the trail was designated<sup>64</sup>.
- 2 To retain the character for which the trail was designated, management actions should not result in recreation setting changes from less to more developed, particularly within the foreground (a half of a mile) of the ANST.
- 3 Permitted recreation special use authorizations should be managed to protect the desired recreation setting for a nonmotorized trail.
- 4 New road or motorized trail construction across or adjacent to the ANST should be avoided to protect the nonmotorized setting.
- 5 Placement of new utility corridors and communication facilities across the trail should be avoided by choosing alternate locations or collocating them with existing utility corridors and facilities to minimize the number of disruptions on the trail experience.
- 6 Forest health projects should be managed to minimize long term visual impacts within and adjacent to the ANST corridor.

### **Management Approaches for Arizona National Scenic Trail**

Work with adjacent landowners and the Arizona Trail Association to maintain the trail corridor and the condition and character of the surrounding landscape.

Manage the ANST and corridor consistent with the “Arizona Trail Management Guide” (Arizona State Parks, 1995) until such time as the comprehensive management plan<sup>65</sup> is completed.

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<sup>64</sup> The source for this guideline is “Minimum Impact Suppression Tactics Guidelines for the Northern Region of U.S. Department of Agriculture Forest Service” (Jolly, 1993).

Manage the ANST and corridor consistent with the comprehensive management plan when completed.

### **General Crook National Recreation Trail**

#### **General Description for General Crook National Recreation Trail**

When American settlers first began homesteading in Arizona, the Army established outposts at Fort McDowell, Fort Verde, Camp Reno, Fort Apache, and Camp San Carlos. General George Crook, who was the head of the military department, established a supply route along the Mogollon Rim. This route became one of the first major roads in Arizona and for decades was used as a supply and communications route, as well as a patrol route for monitoring the western Apache. Today, the original blazes can still be seen on the ponderosa pines lining the trail, as well as occasional traces of homesteads. The trail is multiuse and popular with equestrians and mountain bikers as well as hikers. The trail is 114 miles long, from Fort Verde to west of Cottonwood Wash<sup>65</sup>.

The General Crook Trail has been designated as a national recreation trail and is being studied for nomination as a [national historic trail](#). The trail, also known as Crook Road, was developed along the Mogollon Rim as a way of quickly moving troops between Fort Whipple, Fort Verde, and Fort Apache during the Apache Wars period of the 1870s and 1880s. The road was engineered by General Crook, likely following earlier American Indian trails. A “V” and a number indicating the miles from Fort Verde was cut into rocks or trees each mile along the road. Most of these are now gone, but the “V-13” still can be seen at 13 Mile Rock. White and yellow chevrons now mark the route of the national recreation trail, which generally follows the historic route. The trail is eligible as a national historic trail pending completion of an approved trail study.

#### **Desired Conditions for General Crook National Recreation Trail**

##### **SA-Trl&Bwy-Crook-DC**

- 1 The historic route and associated values are preserved. Foot and horse travel are the emphasized recreation activities on the trail. Signage is provided to advise the public of motorized restrictions on the trail. The needs of people with disabilities and those with limited mobility are considered in developing access facilities for the trail. Recreational facilities for the trail are related to significant interpretive and recreation points of interest on or adjacent to the trail. Interpretation of the trail is consistent across landownership and Forest Service administrative boundaries.

#### **Standards for General Crook National Recreation Trail**

##### **SA-Trl&Bwy-Crook-S**

- 1 Protect General Crook National Recreation Trail chevrons and route markers and historic milepost markers.

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<sup>65</sup> This management plan is in development as of the time of forest plan revision.

<sup>66</sup> Source: [Public Lands Information Center, www.publiclands.org](http://www.publiclands.org)

### **Management Approaches General Crook National Recreation Trail**

Manage the 138-mile General Crook Trail corridor on National Forest System land from Fort Whipple to Fort Apache and associated historic sites and side trails in cooperation with adjacent national forests, tribes, and private landowners for potential congressional designation as a national historic trail.

Cooperate with partners to develop one representative visual logo for the entire trail with adjacent national forests and local entities.

### **Wilson Mountain National Recreation Trail**

#### **General Description for Wilson Mountain National Recreation Trail**

This trail is a strenuous 5.6 miles to the top of Wilson Mountain and provides some of the most panoramic views in the Oak Creek Canyon/Sedona area. There is no unique direction for this trail.

#### **Desired Conditions for Wilson Mountain National Recreation Trail**

##### **SA-Tri&Bwy-WilMtn-DC**

- 1 Wilson Mountain Trail retains its scenic integrity and provides broad views of Red Rock Country. Recreation opportunities on the trail are consistent with the transition wilderness opportunity spectrum (WOS).

### **All Scenic Byways**

#### **Desired Conditions for All Scenic Byways**

##### **SA-Tri&Bwy-Bywy-All-DC**

- 1 Along scenic byways, visitors find occasional developed recreation sites that provide desired amenities (e.g., restrooms, picnic tables). These facilities are mostly in character with the National Forest System setting, except where it is appropriate to match the character of the built environment. Occasionally, visitors see small historic sites—these areas are positive scenic elements, providing a glimpse of times past.

#### **Management Approach for All Scenic Byways**

Work closely with the Arizona Department of Transportation and local communities to promote and improve services and interpretive opportunities on byways.

### **Historic Route 66 All-American Road**

#### **General Description for Historic Route 66 All-American Road**

Historic Route 66 All-American Road (or Route 66) is known as “The Mother Road” as it heralded the development of the U.S. highway system. With its history starting with American Indian trails across the country, it developed over the years into the first national highway linking Chicago and Los Angeles. Its route was pioneered along the 35<sup>th</sup> Parallel with the engineering explorations of Lieutenant Edward Fitzgerald Beale in 1857 to 1859. He later directed the construction of Beale Road, which opened up the western frontier for settlers, ranchers, and the military. When transcontinental railroad construction began in the 1880s, its route followed the

Beale Road and encouraged the growth of towns and commercial development of the West. The main period of significance for Route 66 began with its construction in 1920 until 1944, when the Federal-Aid Highway Act (P.L.78-521) was passed. “The Main Street of America,” as it came to be known, was replaced in 1956 with the construction of Interstate 40.

Route 66 occupies a special place in American popular culture and history as it represents freedom, mobility, and adventure. Nowhere is that more prevalent than the open lands of northern Arizona along Route 66. The Mother Road, Main Street USA, and Get Your Kicks on Route 66 are all synonymous with the wonderful resource. Unfortunately, the actual condition of the remaining route and its former attractions is less than desirable and is the driving force behind efforts of communities along the byway to save what remains (Arizona Department of Transportation, 2005). There are short segments of the official byway crossing the Coconino NF and many parallel routes that were formerly part of the Mother Road.

#### **Desired Conditions for Historic Route 66 All-American Road**

##### **SA-Trl&Bwy-Rt66-DC**

- 1 Arizona Historic Route 66 All-American Road is preserved and promoted in a manner that protects its intrinsic qualities and enhances visitors’ appreciation of the scenic, natural, recreational, cultural, historical, and archaeological resources of the corridor. The highway serves as a vital link between the communities along the route and provides a direct connection to the diverse historic and cultural visitor opportunities within northern Arizona.
- 2 Historic alignments of Route 66 are interpreted and their locations are made available to the public. Interpretation of these alignments emphasizes the history of highway development and the changing uses across the forest that are associated with the time period that the alignment was part of Route 66.

#### **Guidelines for Historic Route 66 All-American Road**

##### **SA-Trl&Bwy-Rt66-G**

- 1 To retain its historic character, signage and facilities on Route 66 should incorporate elements of historic roadside architecture including, but not limited to, elements of the cultural landscape from nearby communities or historic Forest Service design.
- 2 Activities along the byway should be consistent with direction in the “Arizona Historic Route 66 Corridor Management Plan” to ensure consistency with other jurisdictions.

#### **Management Approaches for Historic Route 66 All-American Road**

Partner with the Route 66 Scenic Byway Association to coordinate activities and design of byway facilities.

#### **Red Rock All-American Road**

##### **General Description for Red Rock All-American Road**

The 7.5-mile Red Rock All-American Road, from milepost (MP) 302.5 to MP 310.0 on State Highway 179, is the gateway to the Red Rock Management Area and Sedona/Oak Creek MA. The major buttes and scenic attractions that characterize the area are visible along the road. The

Forest Service manages the majority of the viewshed, with the exception of the village of Oak Creek and Sedona.

#### **Desired Conditions for Red Rock All-American Road**

##### **SA-Tri&Bwy-RedRck-DC**

- 1 The Red Rock All-American Road is preserved and promoted in a manner that protects its intrinsic qualities and enhances visitors' appreciation of the scenic, natural, recreational, cultural, historical, and archaeological resources of the corridor. Views of prominent red rock formations such as Bell Rock, Courthouse Rock, and Cathedral Rock are unobstructed from the byway. Scenic pullouts are provided along the byway with safe vistas for photography and scenery viewing, facilities such as restrooms, and interpretive signs. Travel routes along the byway accommodate bicycles and pedestrians safely and connect them to the urban trail system. Wildlife crossings reduce the risk of wildlife mortality. Alternative transportation is provided to increase the sustainability of tourism on the byway.

#### **Guidelines for Red Rock All-American Road**

##### **SA-Tri&Bwy-RedRck-G**

- 1 Activities along the byway should be consistent with direction in the "Red Rock Scenic Road Corridor Management Plan" (Federal Highway Administration and Arizona Department of Transportation, 2005) to ensure consistency with other jurisdictions.

#### **Research Natural Areas and Botanical and Geological Areas**

See appendix A, map 2.

#### **General Description for Research Natural Areas and Botanical and Geological Areas**

Research natural areas (RNAs), botanical, and geological areas are designated to ensure protection of specific biological and geological communities. Research natural areas are areas that the Forest Service has designated to be permanently protected and maintained in natural condition, so they may serve as experimental research controls and monitoring sites for the particular ecosystem they represent and used for education.

There are four existing RNAs on the Coconino NF: Casner Canyon, G.A. Pearson, Oak Creek Canyon, and San Francisco Peaks. G.A. Pearson is within the Fort Valley Experimental Forest and, therefore, is not managed by this plan. Oak Creek Canyon and the San Francisco Peaks RNAs are within designated wilderness. The revised plan is proposing three new RNAs: West Clear Creek, Rocky Gulch, and an expansion of the existing San Francisco Peaks RNA. A version of all three of these areas was proposed by the 1987 plan but never established. In the 1987 plan, the RNA in West Clear Creek was proposed in a different location than the current recommendation, and the expansion of the existing San Francisco Peaks RNA was larger than the current recommendation. West Clear Creek and the expansion of the San Francisco Peaks are within existing wilderness and will, therefore, be managed in accordance with Agency policy on retaining wilderness character. Direction for RNAs (listed below) should be applied to both proposed and established RNAs.

Botanical and geological areas are designated for a special feature such as a rare plant or exemplary geological formation. There are four existing botanical areas—Verde Valley, Mogollon Rim, Fossil Springs, and Fern Mountain; one existing geological area—Red Mountain; and one proposed geological area—Cottonwood Basin Fumaroles.

### **Desired Conditions for Research Natural Areas and Botanical and Geological Areas**

#### **SA-RNABotGeo-DC**

##### **Research Natural Areas**

- 1 Research natural areas have excellent examples of the ecological features for which they were designated, with little evidence of human activity or disturbance. Visitor access and use occurs at environmentally acceptable levels to maintain the research values of the RNA. Special use permits within these areas are inappropriate unless they are related to research for which the area is designated. Fire management mimics natural fire processes and is compatible with ongoing research.
- 2 Casner Canyon RNA protects the ecological integrity of a pure stand of Arizona cypress along with Supai sandstone.
- 3 San Francisco Peaks RNA and its recommended expansion retain the characteristics of the transition zone between Mixed Conifer and Alpine Tundra with populations of bristlecone pine.
- 4 The Oak Creek Canyon RNA protects a diversity of vegetation within Oak Creek Canyon. The Oak Creek Canyon RNA is an example of a biologically diverse creekside area and is a paleobotanical area containing plant species surviving from the last ice age.
- 5 Rocky Gulch proposed RNA retains the ecological integrity of old-growth ponderosa pine, and it is a control for research in the Beaver Creek watershed.
- 6 West Clear Creek proposed RNA retains the riparian communities in a steep canyon setting as well as hanging gardens and springs.

##### **Botanical Areas**

- 7 Botanical areas protect the plants and plant communities for which they are designated. Plants and plant communities within these areas are resilient and are not negatively impacted from human activities. Nonmotorized recreation is allowed on a limited basis on designated trails to protect soil conditions and hydrologic flow. New trails are discouraged.
- 8 Verde Valley Botanical Area preserves a unique, limestone dependent desert community containing Arizona cliffrose, which has been greatly reduced by human conversion of its habitat.
- 9 The Mogollon Rim Botanical Area preserves a white fir/bigtooth maple community and represents a unique vegetation type in Arizona, found only at a few locations along the Mogollon Rim.
- 10 Fern Mountain Botanical Area preserves a high elevation riparian scrub community dominated by Bebb's willow.
- 11 Fossil Springs Botanical Area preserves a riparian deciduous forest associated with a large perennial spring and travertine geology.

- 12 Soil productivity and functions (including the ability of the soil to resist erosion, infiltrate water, and recycle nutrients) are sustained so botanical areas are more resilient and can better adapt to climate change.

**Geological Areas**

- 13 The Red Mountain Geological Area preserves a unique cinder cone whose internal structure is exposed within the San Francisco Peaks volcanic field. The large natural amphitheater cut into the cone's northeast flank is free of alterations by human activity. Erosional pillars called "hoodoos" are retained in the amphitheater, and dark mineral crystals that erode out of its walls are preserved (U.S. Geological Survey, 2007). These asymmetrical cinder cones, amphitheater, erosional pillars or hoodoos, and minerals for which the area was designated, are predominantly undisturbed by administrative or research and recreation activities. Nonmotorized recreation within the area allows for access to view the unique geological formations. Cinder slopes are protected from human-caused erosion.
- 14 The Cottonwood Basin Fumaroles Geological Area preserves a unique and interesting geologic landscape that developed from volcanic fumaroles (hot springs) that formed within the Towel Creek Tuff that was deposited in the lakebed of Cottonwood Basin by the Hackberry Volcano some 8 million years ago. The formations resembling tepees or cones with holes or caverns in the rock are retained, and the physical and chemical weathering processes that exposed them are not accelerated by human activities. The cones, pipes, relict fumaroles, and erosional caps are protected from human activities. The vegetation unique to the fumaroles is undisturbed. There is no evidence of vandalism, trash dumping, or human alteration of the volcanic formations. The area is predominantly accessible by foot travel. The educational and scientific value of the geological landscape is highlighted and interpreted. Interpretive materials are available that describe the geological history of the area and highlight preservation and conservation of unique rock and plant features.

**Objectives for Research Natural Areas and Botanical and Geological Areas**

**SA-RNABotGeo-O**

- 1 Within 2 years of plan approval, prepare establishment reports for Rocky Gulch, West Clear Creek, and the eastern expansion of the San Francisco Peaks RNAs.

**Standards for Research Natural Areas and Botanical and Geological Areas**

**SA-RNABotGeo-S**

- 1 Overnight camping and recreation campfires are prohibited in established RNAs.
- 2 Prohibit permitted commercial tours except in support of approved research in established RNAs.

### **Guidelines for Research Natural Areas and Botanical and Geological Areas**

#### **SA-RNABotGeo-G**

- 1 Recreation uses should be excluded from RNAs and botanical and geological areas where they have a negative impact on the resource for which the area is designated.
- 2 Fire should be managed using minimal impact suppression tactics or other appropriate suppression tactics to protect the resources for which RNAs and botanical and geological areas were designated.
- 3 Noncommercial group size should be limited to 25 persons or fewer in Casner RNA and 12 persons or fewer without a permit in the Oak Creek Canyon RNA.
- 4 Allotment management plans should have provisions to protect the uniqueness and/or ecological condition of the special areas.
- 5 Removal of rocks from the geological areas should be limited to collection for approved scientific purposes and carried out under the appropriate authorization (i.e., special use permit, agreement).

### **Management Approaches for Research Natural Areas and Botanical and Geological Areas**

Encourage partnerships with site stewards to provide onsite interpretation and monitoring for the Cottonwood Basin Fumaroles Geological Area.

### **Environmental Study Areas**

See appendix A, map 2.

#### **General Description for Environmental Study Areas**

Environmental study areas (ESAs) are locations on the forest that are set aside from development for the purpose of environmental education. Each area has an approved school curriculum associated with it and is associated with a specific school.

Mount Elden ESA is located at the base of Mount Elden, adjacent to the subdivisions of Shadow Mountain, Paradise Hills, Skyline Estates, and Swiss Manor and adjacent to Buffalo Park. Originally a bird sanctuary, Mount Elden ESA is a popular daytime destination for hiking, dog walking, mountain biking, and horse riding. The El Paso Natural Gas pipeline crosses the area. Old Caves Crater ESA is located north of Silver Saddle Road, east of U.S. Highway 89, and adjacent to the Doney Park communities. Griffith's Spring ESA is located south of Flagstaff on State Highway 89A, adjacent to the Forest Highlands community and just south of Pine Dell.

#### **Desired Conditions for Environmental Study Areas**

##### **SA-ESA-DC**

###### **Elden ESA**

- 1 Trails provide for popular hikes that are convenient and easy to use and environmental education opportunities for the general public as well as school groups. The area is available

for study, and recreation and is an integral part of the Flagstaff Public School curriculum. There are many formal access points developed along the edge of subdivisions providing public access. This ESA strengthens the opportunities for partnerships between the school, Forest Service, and Arizona Game and Fish Department. A wintering deer herd provides an opportunity for wildlife viewing by the students.

#### **Old Caves Crater ESA**

- 2 This large volcanic cinder cone has diverse vegetation, provides scenic backdrops to surrounding residents, and contains archaeological sites and cultural values. Teachers at local schools have curriculums for the area, and students can safely learn about the forest resources while visiting the site. There are trails in the area and high levels of nonmotorized daytime dispersed recreation use.

#### **Griffith's Spring ESA**

- 3 Among a variety of uses, local teachers use the spring and its stream channel as an outdoor classroom. The area is accessible to visitors traveling State Highway 89A who stop here for picnics and daytime walks and to nearby residents. There is a stream channel with riparian vegetation and aquatic species. A nearby wet meadow adds additional diversity.

### **Guidelines for Environmental Study Areas**

#### **SA-ESA-G**

- 1 New transmission corridors should avoid the Elden ESA to protect the educational resources and setting.
- 2 New special use authorizations or amendments to existing special use authorizations that would or could adversely affect or change the character of the ESA should not allowed.
- 3 ESAs that are not currently open to livestock grazing should remain closed in order to preserve their educational and ecological opportunities and to minimize human–livestock interactions.
- 4 The Elden ESA should be open to the public for foot traffic and day use only, and horses should be allowed on the pipeline trail in order to provide for the desired visitor experiences and minimize use conflicts.

### **Management Approaches for Environmental Study Areas**

Plan and support uses and trails in conjunction with curriculum needs of the associated public schools. Develop environmental education programs cooperatively with public schools.

### **Experimental Forests**

See appendix A, map 2.

The Forest Service's experimental forests are dedicated to long-term research on ecosystem processes, silviculture and forest management options, wildlife habitat characteristics, and forest growth and development. The nearby Fort Valley and Long Valley Experimental Forests are managed by the Rocky Mountain Research Station and not by the Coconino NF. Therefore, direction in this plan does not apply to these areas.



# Chapter 4. Suitable Uses

## Introduction

The identification of an area as suitable for various uses is guidance for project and activity decisionmaking and is not a commitment or a final decision approving projects and activities. Uses that are not specifically identified as suitable are generally not allowed and would be evaluated at the project level relative to desired conditions and could be reclassified as suitable. Uses that are neutral to or help move the forest toward the desired conditions may be allowed. Uses that are suitable must also be consistent with other plan components and other laws and regulations.

## Timber Suitability

See appendix A, map 18.

The National Forest Management Act (NFMA) requires that National Forest System (NFS) lands be classified as to their suitability for timber production. NFS lands were reserved with the intent of providing goods and services to satisfy public needs over the long term. Among these goods is the production of a sustainable supply of forest products. Timber production is the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees for industrial or consumer use. Timber production activities can contribute to social, economic, and ecological sustainability. For example, timber production may offset some or all of the costs of silvicultural treatments and other forest development or maintenance activities that restore ecosystems to desired conditions, lower uncharacteristic fire and insect risk, increase understory plant diversity and abundance, and create employment opportunities.

Areas unsuitable for timber production are those where it is either not desirable or feasible to manage for periodic harvests of forest products. For example, restoration of grasslands often requires cutting trees. These trees can be made available for sale, but the intent for the future is to maintain them as grasslands. In this case, timber production is not desirable. Where long-term resource productivity would be impaired or law, regulation, or policy prohibits it, timber production is not feasible.

In accordance with the provisions of the 1982 planning rule provisions and using guidance from the Southwestern Regional Office (Forest Service, 2011b), an analysis was conducted on all NFS lands managed by the Coconino NF to determine the acres of land that are categorized as suitable or not suitable for timber production. Table 14 provides acreages used in the timber suitability calculation. See the “Vegetation and Fire” section in appendix C, “Methodology and Analysis Process,” of the “Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan” (Forest Service, 2013) for additional information about the methodology used to calculate timber suitability.

**Table 14. Timber suitability acreage calculation**

Land Category	Acres
Coconino NF (total acres)	1,851,626
Non-forested lands	-992,224
Lands withdrawn from timber production	-113,857
Lands where irreversible resource damage is likely	-48,633
Lands where adequate restocking is not assured	-80,074
<i>Subtotal of acres not suitable for timber production</i>	<i>1,234,788</i>
<b>Land Tentatively Suitable for Timber Production</b>	<b>616,838</b>
Lands where management prescriptions preclude timber production <sup>67</sup>	-80,281
Lands where management objectives limit timber harvest	0
Lands that are not economically cost efficient in meeting timber objectives <sup>68</sup>	-8,876
<i>Subtotal of acres not appropriate for timber production</i>	<i>89,157</i>
<b>Land Suitable for Timber Production</b>	<b>527,681</b>

## Grazing Suitability

Procedures in the 1982 Planning Rule require that the suitability and capability of National Forest System lands for producing forage for grazing animals be determined in forest planning. Suitability is the appropriateness of applying certain resource management practices to a particular area of land in consideration of the relevant social, economic, and ecological factors. Capability is the potential of an area of land to produce resources and supply goods and services. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology.

Suitability is determined based on compatibility with desired conditions and objectives in the plan area. Lands within the plan area are not identified as suitable for a certain use if that use is prohibited by law, regulation, or policy; would result in substantial and permanent impairment of the productivity of the land or renewable resources; or if the use is incompatible with the desired conditions for the relevant portion of the plan area. Designation of an area as suitable for a particular use does not mean that the use will occur over the entire area. Likewise, a determination that a particular use is not suitable in a management area does not mean that the use will not occur in specific areas. The identification of an area as suitable for various uses is *guidance* for project and activity decisionmaking; it is *not a resource commitment or final decision* approving projects and activities. Final decisions on resource commitments are made at

<sup>67</sup> Lands shall be tentatively identified as not appropriate for timber production to meet objectives of the alternative being considered if: based upon a consideration of multiple-use objectives for the alternative, the land is proposed for resource uses that preclude timber production (National Forest System Land and Resource Management Planning - 1982 Planning Rule, (219.14(c)(1)).

<sup>68</sup> Describes land where the cost for harvest and removal of material exceeds the value of the product.

the project level. The final decision to authorize livestock grazing would be made at a project (allotment) level.

The following areas of the forest are not suitable for livestock grazing<sup>69</sup>, as determined by previous NEPA decisions or prior planning decisions (1987 plan as amended). Any area not listed is identified to be suitable for livestock grazing. See appendix C, Methodology and Analysis Process, of the accompanying “Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan” for the description of the range capability and suitability evaluation process.

- Allotments closed prior to 1987 (Camp Verde, Middle Verde, Montezuma, Rimrock, Cave Hill, and Dry Creek);
- Portions of allotments closed prior to 1987 (Cottonwood, Cinder, Turkey Tanks, Deadman, Dove Tanks, Frisco Mountain, Hart Prairie, Tom’s Creek, Indian Gardens, and Oak Creek);
- Strawberry Crater Wilderness;
- Tundra and upper mixed conifer/spruce-fir slopes within the Kachina Peaks Wilderness (areas above 9,500 feet elevation);
- Stoneman Lake basin;
- Cinder Hills Off-highway Vehicle Area;
- Oak Creek Canyon (formerly Management Area 14);
- Developed recreation sites and Snow Bowl special use authorization area;
- Inner Basin (formerly Management Area 16);
- Oak Creek Canyon Research Natural Area;
- Casner Research Natural Area;
- Elden Environmental Study Area;
- Old Cave Crater Environmental Study Area
- Griffith’s Spring Environmental Study Area:
- Right-of-way in the Highway 180 Travel Corridor;
- Riparian habitat in the Verde Wild and Scenic River corridor, unless site-specific NEPA analysis approved by the forest supervisor authorizes future grazing use;
- Horse Mesa, Boynton Canyon, and Sedona allotments;
- Portions of the Buck Springs Allotment (as described in the decision notice signed on August 18, 2003);
- South Newman, Walnut, and West Walnut Pastures in the Walnut Canyon Allotment.

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<sup>69</sup> The Beaverhead-Grief Hill sheep driveway overlaps some of the areas listed as not suitable for livestock grazing, including but not limited to, the former Montezuma and Horse Mesa grazing allotments. This multi-forest sheep driveway provides temporary use to seasonally move sheep from lower elevations on the Prescott National Forest to higher elevation summer range on the Coconino and Kaibab National Forests. This driveway remains suitable for livestock grazing associated with the temporary, seasonal use by domestic sheep herds.

## Recreation and Transportation Suitability

Table 15 displays areas that are suitable or not suitable for motorized uses, including new motorized areas, roads, motorized trails, temporary or permanent road construction, and mechanized travel and nonmotorized travel. These areas were determined based on the activities appropriate for the Recreation Opportunity Spectrum allocation and for special areas, given law, regulation, policy, and desired conditions.

**Nonmotorized travel** (not including mechanized travel) is defined as movement not relying on machines that use a motor, engine, or other nonliving power source (e.g., walking, canoeing, and horseback riding).

**Mechanized travel** is defined as movement using any contrivance over land, water, or air, having moving parts that provides a mechanical advantage to the user and that is powered by a living or nonliving power source. This includes, but is not limited to: sailboats, hang gliders, parachutes, bicycles, game carriers, carts, and wagons. Mechanized travel does not include wheelchairs or mobility devices when used as necessary by a mobility-impaired person for locomotion ([Forest Service Manual](#) 2353.05). It also does not include skis, snowshoes, rafts, canoes, sleds, travois, or similar primitive devices without moving parts.

**Motorized travel**<sup>70</sup> is defined as movement using machines that use a motor, engine, or other nonliving power sources other than a vehicle operated on rails or a wheelchair or mobility device (including one that is battery powered) that is designed solely for use by a mobility-impaired person for locomotion and that is suitable for use in an indoor pedestrian area.

A **motorized area** is one that has been designated for motor vehicle use.

**NFS roads and trails** are roads and trails that the Forest Service determines are necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

**NFS motorized trails** are divided into two categories—greater than 50 inches and less than 50 inches—to accommodate a variety of vehicles, including single track vehicles.

**Temporary roads** are roads necessary for emergency operations or are authorized by contract, permit, lease, or other written authorization, and they are not a NFS road or trail and not included in a forest transportation atlas. Temporary roads are obliterated or rehabilitated following the completion of the activity for which they were built.

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<sup>70</sup> The [Travel Management Rule](#) decision is in effect on the Coconino NF (September 2011). Under this decision, the forest has designated specific roads, trails, and areas suitable for motorized vehicle use. These designations have been identified on a motor vehicle use map (MVUM) and, in general, cross-country motorized travel is prohibited. This forest plan provides the framework in which the MVUM is developed and any other subsequent travel guidance on the forest.

**Table 15. Recreation and transportation suitability**

ROS <sup>1</sup> & Special Area Designations	New Motorized Areas	NFS Roads & Motorized Trails > 50"	NFS Motorized Trails < 50"	Temporary Roads	Permanent Roads	Mechanized Travel	Nonmotorized Travel
Urban and Rural ROS	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Roaded Natural ROS	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
SPM ROS	Not Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
SPNM ROS	Not Suitable	Not Suitable	Not Suitable	Suitable	Not Suitable	Suitable	Suitable
Primitive ROS	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable	Suitable
Recommended RNA	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable
RNA	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable
Botanical and Geological Areas	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable
Environmental Study Areas	Not Suitable	Not Suitable	Not Suitable	Suitable	Not Suitable	Suitable	Suitable
Recommended Wilderness	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable	Suitable
Wilderness	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable
Eligible or Designated WSR – Recreation and Scenic	Not Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Eligible or Designated WSR – Wild	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable	Suitable

<sup>1</sup> ROS = Recreation Opportunity Spectrum; SPM = Semiprimitive Motorized; SPNM = Semiprimitive Nonmotorized; RNA = Research Natural Area; WSR = Wild and Scenic River.



# Chapter 5. Monitoring Strategy

## Introduction

The purpose of monitoring and evaluation is to evaluate, document, and report how the forest plan is applied, how well it works, and if its purpose and direction remain appropriate. Monitoring determines actual conditions and compares them with desired conditions. Evaluation of monitoring results may identify that desired conditions are not met and propose alternative management strategies that respond to changing conditions or new information, including research and scientific papers. Monitoring and evaluating the effects of plan implementation is critical to [adaptive management](#).

Given the uncertainty of future budgets and resources, the focus and intent of this monitoring strategy is to evaluate the progress of not only required monitoring elements but also particular areas where the current condition at the time of the development of this plan was drastically different from desired conditions. In this way, the forest can direct resources toward and evaluate progress of, critical changes that need to occur on the forest.

The monitoring plan consists of monitoring questions that focus on key plan decisions where carrying out projects and activities are likely to cause a change over time and include both implementation as well as effectiveness monitoring.

The forest supervisor annually evaluates the monitoring information displayed in the evaluation reports through a management review and determines if any changes are needed in management actions or the plan itself. In general, annual evaluations of the monitoring information consider the following questions:

- What are the effects of resource management activities on the productivity of the land?
- To what degree are resource management activities maintaining or making progress toward the desired conditions and objectives identified in the plan?
- What modifications are needed to account for unanticipated changes in conditions?

In addition to annual monitoring, the forest supervisor reviews the conditions on the land covered by the plan at least every 5 years to determine whether conditions or demands of the public have changed significantly. The plan is ordinarily revised on a 10-year cycle and the forest supervisor may amend the plan at any time. All of the monitoring and evaluation timeframes identified in this chapter begin from the date of the record of decision.

## Monitoring Plan

The monitoring questions and potential monitoring methods that could be used to evaluate movement toward key plan desired conditions are displayed below (table 16).

For each monitoring question/performance measure listed in table 17, additional monitoring descriptors are included to provide context for the type of information to gather and how often to gather it. These descriptors are defined here:

- **Monitoring Question:** The question(s) that will be answered.
- **Scale:** The geographic scale at which the monitoring question will be evaluated.
- **Possible Monitoring Methods and Data Sources:** The possible methods and data sources available to evaluate the monitoring questions at the time of plan approval and

are not the required method of measurement. As new tools become available, other methods may be used to answer the monitoring questions.

- **Frequency of Monitoring:** How often information is gathered or measured such as annually, every 5 years, or every 10 years.
- **Frequency of Evaluation:** How often the information is analyzed and reported. Depending upon the question being answered, analysis of the information may occur at longer time intervals than the frequency of monitoring. Some resources need to be monitored annually to produce trend data. Annually gathered data may be analyzed periodically (e.g., 3-, 5-, or 10-year cycles), depending upon the timeframe specified by each objective.
- **Data Precision and Reliability:** An indication of how rigorous the information used to evaluate the monitoring question is with respect to repeatability, reliability, accuracy, and precision. Two categories of precision and reliability are appropriate at the plan scale, and because of varying methods and data sources used to evaluate the monitoring question, both classes may be indicated. Classes of precision and reliability, however, are not meant to identify which methods and data sources may be most appropriate to answer the monitoring question.
  - **Class A:** Methods that are generally well accepted for modeling or quantitative measurement. Results have a high degree of repeatability, reliability, accuracy, and precision.
  - **Class B:** Methods or measurements that are based on project records, personal communications, ocular estimates, pace transects, informal visitor surveys, and similar types of assessments. The degree of repeatability, reliability, accuracy, and precision are not as high as Class A methods, but they still provide valuable information.

Monitoring and evaluation are identified, approved, and scheduled through the annual budget process. Actual budget levels, funding emphasis, and emergence of new issues may affect accomplishment of both management activities that make progress toward desired conditions as well as monitoring. Partnerships may be developed to accomplish monitoring and evaluation.

**Table 16. Coconino NF's plan monitoring questions, monitoring methods, units of measure, and frequency of measurements**

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
<b>Maintenance and Improvement of Ecosystem Health</b>						
1	What are the status and trends for the State of Arizona's air quality standards in airsheds that overlap the Coconino NF?	Forest	Particulate matter data from local ADEQ air quality monitoring stations (Camp Verde, Cottonwood, Flagstaff)	Daily	Annually	A
2	What are the status and trends for the visibility of the Sycamore Wilderness Class I Area?	Greater than forestwide	Data from IMPROVE <sup>1</sup> program (ADEQ air quality monitoring station at Ike's Backbone)	Weekly	Annually	B
3 <sup>2</sup>	How much have management activities contributed to maintaining or making progress toward DCs related to overstory and understory vegetation structure and composition for terrestrial vegetation types? Particular focus in answering this question should be given to the following PNVTs: Semidesert Grasslands, Piñon-Juniper Evergreen Shrub, Ponderosa Pine, Mixed Conifer with Frequent Fire, and Piñon-Juniper with Grasslands <sup>3</sup> .	PNVT	FACTS and INFRA databases; stand exam data; FIA plots; change in species composition and cover frequency (range monitoring data); and acres of restored grassland.	Every 1-5 years	Every 5 years	A, B
4 <sup>2</sup>	How much have management activities contributed to maintaining or making progress toward fire regime condition class for terrestrial vegetation types? Particular focus in answering this question should be given to the following PNVTs: Semidesert Grasslands, Ponderosa Pine, Mixed Conifer with Frequent Fire, and Piñon-Juniper with Grass.	PNVT	FACTS database	Every 5 years	Every 5 years	A, B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
5 <sup>2</sup>	How much have management activities made progress toward achieving desired conditions for wetland/cienega, stream riparian areas, and springs, including reducing the incidence or abundance of aquatic invasive species? Focus should include functional-at-risk or nonfunctional riparian and wetland areas.	PNVT	Monitor ground-disturbing activities' effect on riparian function for a subset of projects; proper functioning condition (PFC) data methodology; surveys and reports, including partner agencies and organizations (e.g., Fossil Creek native fish annual monitoring report); data on miles of streams/acres of lakes/pond of nonnative species removal, number of sites or acres of new nonnative populations, etc. Information from State and Federal agencies on new populations of aquatic invasive species.	1-5 years where management activities have been implemented at a scale that may result in a change in PFC	5 years	B
6 <sup>2</sup>	How much have management activities contributed to maintaining wetland/cienega and stream riparian areas and springs that were identified in proper functioning condition (PFC)?	PNVT	Monitor ground-disturbing activities' effect on riparian functional condition for a subset of projects; PFC data methodology.	10 years	10-15 years	B
7 <sup>2</sup>	How has the scale and severity of disturbance (e.g., wildfire, insects and disease) contributed to the maintenance of or progress toward DCs? (1982 Planning Rule (sec. 219.12(k)(4)(iv)))	PNVT or 6 <sup>th</sup> code watershed	Forest health surveys and reports, stand exams, project inspections and reviews, remote sensing, incident mapping for wildfire, large fire occurrence map, surveys and reports	1-5 years	Every 5 years.	A, B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
8 <sup>2</sup>	Are management activities improving long-term soil health and productivity (Semidesert Grasslands, Great Basin Grasslands, Piñon-Juniper Evergreen Shrub, Piñon-Juniper with Grass, Ponderosa Pine, and Mixed Conifer with Frequent Fire)?	PNVT	Soil condition assessments, soil disturbance protocols, vegetation groundcover transects	Every 3–5 yrs.	Every 5 yrs.	A
9	As indicators of water quality, what are the status and trends for aquatic species in cold water streams (i.e., aquatic macroinvertebrates—an ecological indicator)?	Streams	ADEQ water quality monitoring data for aquatic macroinvertebrates	Every 3 yrs.	Every 3 yrs.	A
10	How much are management activities contributing to DCs or maintaining watersheds in a healthy state? Particular focus in answering this question should be given to priority 6 <sup>th</sup> code watersheds identified in the watershed condition assessment.	6 <sup>th</sup> code watershed	6 <sup>th</sup> code Watershed Condition Assessment Tracking Tool (WCATT)	Annually	Every 5 years	B
11 <sup>2</sup>	Are terrestrial and aquatic habitats for threatened and endangered species being maintained or enhanced to meet recovery objectives?	Forest	Review of implementation and effectiveness of project mitigation measures affecting habitat; NRIS database; pre-project surveys; survey results from wildlife agencies; research studies; NRIS database; results from other monitoring questions related to habitat for these species; stand exams; FIA data.	1–5 years	Every 5 years	A, B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
12 <sup>2</sup>	How have management activities influenced population trends, habitat quality and quantity, and trends of management indicator species (i.e., pronghorn, Mexican spotted owls (MSO) <sup>4</sup> , pygmy nuthatch)? Pronghorn habitat includes Great Basin Grasslands and Montane Grasslands. Semidesert Grasslands, and Ponderosa Pine. MSO habitat includes Ponderosa Pine (Gambel oak subtype), Mixed Conifer with Frequent Fire, and Mixed Conifer with Aspen. Habitat for the pygmy nuthatch includes Ponderosa Pine (old growth and snags).	Forest	Review AZGFD breeding bird and pronghorn surveys; MSO monitoring per recovery plan; ongoing bird monitoring (e.g., Rocky Mountain Bird Observatory)	Every 5 years	Every 5 years	A, B
13 <sup>2</sup>	How have management activities improved the quality and quantity of aspen (an ecological indicator)?	Forest	Southwestern Region forest health monitoring, Flagstaff District volunteer program.	Every 3 years	Every 3 years	A, B
14	Have lands not suited for timber been re-examined to determine if suitability has changed (and suitable lands returned to timber production)? (sec. 219.12(k)(4)(ii))	Forest	Reapply timber suitability criteria and process. FACTS database.	Every 10 years	Every 10 years	A, B
15	Are forest and woodland stands adequately restocked within 5 years of final harvest treatment? (sec. 219.12(k)(4)(i)); should maximum size limits for harvest areas be continued? (sec. 219.12(k)(4)(iii))	Forest	Review annual reforestation needs report, stocking certifications, silvicultural prescriptions, and timber/silviculture tracking database. FACTS database.	1–5 years	Every 5 years	A, B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
<b>Recreation</b>						
16	Are objectives for recreation settings and opportunities being achieved?	Forest	Miles and type of trails provided (INFRA database), NVUM (satisfaction questionnaire results)	Every 5 years	Every 5 years	A, B
17	How are projects and programs making progress toward scenic integrity DCs in areas not meeting scenic integrity objectives?	Forest	Project implementation monitoring and tracking in areas not meeting scenic integrity objectives (identified in the environmental impact statement for the plan).	Upon completion of project implementation.	Every 5–10 years	B
<b>Other</b>						
18	Have there been changes that have resulted in unforeseen issues requiring plan amendments? (sec. 219.12(k))	Forest	Review the number of plan amendments and conduct a content analysis on those amendments.	Every 5 years	Every 5 years	B
19	Are the plan desired conditions, standards, and guidelines (including best management practices) being incorporated in NEPA documents and implemented on the ground? (sec. 219.12(k))	Forest	Review a subset of NEPA decision documents. Conduct management reviews on selected newly implemented and ongoing activities relative to compliance with the associated NEPA decision.	Every 1–2 years	Every 1–2 years	B
20	How do actual accomplishments compare with plan objectives? (comparison of projected and actual outputs and services. (sec. 219.12(k)(1))	Forest	Annual accomplishment reports	Annually	Every 5 years	B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
21	How have the plan components, objectives, and management approaches affected land, resources, and communities adjacent to or near the Coconino NF? (sec. 219.7(f))	“All-lands” stakeholders, to include Federal agencies, State and local governments, and tribes.	Coordinate with stakeholders to review effects of Coconino NF management. Review stakeholders’ new or revised plans or policies for alignment or conflicts with plan direction.	Every 1–2 years	Every 5 years	B
22	How have the management of activities on nearby lands managed by other Federal or government agencies or under the jurisdiction of local governments affected Coconino NF management? (sec. 219.7(f))	“All-lands” stakeholders, to include Federal agencies, State and local governments, and tribes.	Review conflicts identified with management activities on nearby lands managed by other Federal or government agencies or under the jurisdiction of local governments.	Every 1–2 years	Every 5 years	B

<sup>1</sup> The Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring program was established in 1985 to aid the creation of Federal and State implementation plans for the protection of visibility in Class I areas (156 national parks and wilderness areas) as stipulated in the 1977 amendments to the Clean Air Act.

<sup>2</sup> See table 17 for supplementary information that clarifies which PNVTs and monitoring information may be applicable to particular monitoring questions.

<sup>3</sup> These PNVTs were identified as being of concern with respect to departure from reference conditions and trend for vegetation structure in the “Ecological Sustainability Report” (Forest Service, 2009) and are expected to be influenced by Coconino NF management.

<sup>4</sup> Information gathered in conjunction with meeting the “Mexican Spotted Owl Recovery Plan” should be used to monitor Mexican spotted owl (MSO) population and habitat trends. If that information is not available, this monitoring item may be accomplished by evaluating accumulated project level owl occupancy and habitat information.

### Supplemental Monitoring Information

The supplemental information found below (table 17) is intended to further clarify what types of information may be used to answer monitoring questions that are related to potential natural vegetation types (PNVTs), management indicator species (MIS), and threatened and endangered species (T&E). PNVTs to be monitored were identified for each column based on whether there were plan objectives tied to those areas (noted with OBJ) or whether they provide habitat associated with species to be monitored (noted with MIS or T&E). These PNVTs may be changed if species are delisted or added. Objectives that were not specifically tied to PNVTs were not included but may be used to address monitoring questions as appropriate.

**Table 17. Supplemental information to clarify PNVTs and additional information applicable to monitoring questions**

Question Number	Monitoring Questions	PFC Monitoring an a Subset of Ground-Disturbing Activities <sup>1</sup>	Long-term Soil Health and Productivity <sup>2</sup>	Overstory and Understory Structure and Composition <sup>3</sup>
3	How much have management activities contributed to maintaining or making progress toward desired conditions related to overstory and understory vegetation structure and composition for terrestrial vegetation types? Focus on objectives, T&E.			X
4	How much have management activities contributed to maintaining or making progress toward fire regime condition class for terrestrial vegetation types?			X Particular focus in answering this question should be given to the following PNVTs: Semidesert Grasslands, Ponderosa Pine, Mixed Conifer with Frequent Fire, and Piñon-Juniper with Grass
5	How well have management activities contributed to maintaining or making progress toward wetland/cienega, stream riparian areas, and springs DCs, including reducing the incidence or abundance of aquatic invasive species? Focus should include functional at risk or nonfunctional riparian and wetland areas?	X		
6	How much have management activities contributed to maintaining wetland/cienega and stream riparian areas, streams that were identified in proper functioning condition?	X		

Chapter 5. Monitoring Strategy

Question Number	Monitoring Questions	PFC Monitoring an a Subset of Ground-Disturbing Activities <sup>1</sup>	Long-term Soil Health and Productivity <sup>2</sup>	Overstory and Understory Structure and Composition <sup>3</sup>
7	How has the scale and severity of disturbance (e.g., wildfire, insects and disease) contributed to the maintenance of or progress toward DCs? (sec. 219.12(k)(4)(iv))			X
8	Are management activities improving long-term soil health and productivity?		X	
11	Are terrestrial and aquatic habitats for threatened and endangered species being maintained or enhanced to meet recovery objectives?	X		X (May include FRCC as another source of information.)
12	How have management activities influenced population trends and habitat quality, quantity, and trends of management indicator species? (Also includes other agency information.)		X (Montane and Great Basin Grasslands for pronghorn)	X (Montane and Great Basin Grasslands for pronghorn; Ponderosa pine for pygmy nuthatches; and Ponderosa Pine-Gamble Oak subtype, Mixed Conifer with Frequent Fire, and Mixed Conifer with Aspen for Mexican spotted owl)
13	How have management activities improved the quality and quantity of aspen, an ecological indicator.			X

<sup>1</sup> PFC=Proper Functioning Condition. This question may apply to Wetland/Cienega (OBJ), Cottonwood Willow Riparian Forest (T&E), Mixed Broadleaf Riparian Forest (T&E), Montane Willow Riparian Forest (T&E), Springs (OBJ), stream aquatic habitats (any PNVT) (OBJ), and stream riparian habitats (any PNVT) (OBJ).

<sup>2</sup> Unless otherwise specified, this question may apply to Semidesert Grasslands (OBJ), Great Basin Grasslands (MIS, OBJ), Piñon-Juniper Evergreen Shrub (OBJ), Piñon-Juniper with Grass (OBJ), Ponderosa Pine (OBJ), Mixed Conifer with Frequent Fire (OBJ), and Montane Grasslands (MIS).

<sup>3</sup> This includes changes in fire regime condition class and changes resulting from wildfires and insect and disease outbreaks outside of historic range of variability. Unless otherwise specified, this question may apply to Desert Communities (T&E), Alpine Tundra (T&E), Great Basin Grassland (OBJ), Semidesert Grassland (OBJ), Aspen and Maple (OBJ), Piñon-Juniper Evergreen Shrub (OBJ), Piñon-Juniper with Grass (OBJ), Ponderosa Pine (OBJ, MIS), Ponderosa Pine (Gambel Oak subtype) (T&E, MIS), Mixed Conifer with Frequent Fire (T&E, OBJ), and Mixed Conifer with Aspen (T&E).

# List of Preparers

Following is a list of the names, titles, and education and professional experience of individuals who contributed substantially to development of the “Draft Land and Resource Management Plan for the Coconino National Forest.”

Name	Title	Education and Experience
Judy Adams	Lands Team Leader	B.S. Forestry, Michigan Technological University; 27 years experience with the Forest Service.
Noah Bard	Data Services Specialist	M.S. Applied Geospatial Sciences, Northern Arizona University; B.S. Parks and Recreation: Wildland Management, Northern Arizona University; 3 years experience with the Forest Service.
Chris Barrett	GIS Specialist	M.A. Applied Archaeology, Northern Arizona University; GIS Certification, Northern Arizona University; B.S. Cultural Resources Management, Sinte Gleska University; 12 years experience with the Forest Service.
James Beard	Landscape Architect	B.A. Landscape Architecture in Environmental Design, University of Georgia and Graduate Certificate in GIS, Northern Arizona University; 36 years experience with the Forest Service.
Carl Beyerhelm	Resource Information Specialist	M.S. Forestry, University of Minnesota; B.S. Fisheries and Wildlife Biology, Iowa State University; 22 years experience with the Forest Service.
Sarah Belcher	Landscape Architect	M.L.A. (Masters of Landscape Architecture), Virginia Polytechnic Institute; B.A. Human Studies, Warren Wilson College; 10 years experience with the Forest Service.
Carol Boyd	Forestry, Range, and Admin. Staff Officer	M.S. and B.S. Range Science; B.S. Wildland Recreation Management, University of Idaho; 27 years experience with the Forest Service.
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# Glossary

**Accessibility** – According to section 504 of the Rehabilitation Act of 1973 (P.L. 93-112), all Federal programs and facilities are required to be “to the highest degree feasible, readily accessible to and usable by all persons who have a disability, including mobility, visual, hearing, or mental impairments.”

**Adaptive management** – The process of implementing policy decisions incrementally, so that changes can be made if the desired results are not being achieved. Adaptive management is a process similar to a scientific experiment in that predictions and assumptions in management plans are tested, and experience and new scientific findings are used as the basis to improve resource management practices and future planning.

**Administrative site** – A site used by the Forest Service for the administrative activities such as offices, storage, and interpretive centers.

**Age class** – Refers to trees that originated within a relatively distinct range of years. Typically the range of years is considered to fall within 20 percent of the average natural maturity (e.g., if 100 years is required to reach maturity, then there would be five 20-year age classes).

**Allotment** – A designated area available for livestock grazing upon which a specified number, kind of livestock, and season of use may be grazed under a term grazing permit. The basic land unit used to facilitate management of the range resource on National Forest System and associated lands administered by the Forest Service.

**Basal area** – The cross-sectional area at breast height (4.5 feet above the ground) of trees measured in square feet. Basal area is a way to measure how much of a site is occupied by trees. The cross-sectional area is determined by calculating the tree’s radius from its diameter (diameter/2 = radius) and using the formula for the area of a circle ( $\pi \times \text{radius}^2 = \text{cross-sectional area}$ ). Basal area per acre is the summation of the cross-sectional area of all trees in an acre or in a smaller plot used to estimate basal area per acre. Diameter at root collar (defined below) is used to calculate the cross-sectional area of multitemmed trees such as juniper and oak.

**Base for exchange lands** – National forest lands available for exchange to other landowners (see definition for land adjustments).

**Bedload** – Sand, silt, gravel, soil, or detritus, carried by a stream on or immediately above the bottom.

**Best management practices (BMPs)** – With respect to water resources, the method, measure, or practice selected by an agency to meet its nonpoint-source pollution control needs. BMPs include, but are not limited to, structural controls, operations, and maintenance procedures. BMPs can be applied before, during, or after pollution-producing activities to reduce or eliminate the introduction of pollutants into the water.

**Biological soil crusts** – Crusts of soil particles formed by living organisms (e.g., algae, mosses, lichens) in arid areas. They hold soil in place, help retain moisture, and improve soil nutrients by fixing atmospheric nitrogen.

**Class I Area** – Under the Clean Air Act of 1963, a Class I area is one in which visibility is protected more stringently than under the national ambient air quality standards; it includes

## Glossary

national parks, wilderness areas, monuments, and other areas of special national and cultural significance.

**Climax** (seral stages) – The stage where an ecosystem has reached a steady state. Through the process of ecological succession, an equilibrium is reached in which the biological community is best adapted to the average conditions in that area.

**Clump** – Refers to a tight cluster of two to five trees of similar age and size originating from a common rooting zone that typically lean away from each other when mature. A clump is relatively isolated from other clumps or trees within a group of trees, but a stand-alone clump of trees can function as a tree group.

**Coarse woody debris** – Woody material on the ground greater than 3 inches in diameter, including logs.

**Concern Level roads** – Concern Level 1 roads are travel routes where forest visitors have a high interest in scenic qualities. Concern Level 2 roads are travelways where forest visitors have a moderate interest in scenic qualities.

**Condition class** – The Forest Service Manual (FSM 2521.1) uses three classes to describe watershed condition:

- **Class 1** watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning properly.
- **Class 2** watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning at risk.
- **Class 3** watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are impaired function.

**Constructed feature** – Anything constructed by the Forest Service or by a permittee for use in administering National Forest System lands. When used in the context of scenery, the term refers to anything that is built in the landscape.

**Cultural resources overview** – A study of published and unpublished documents, records, files, registers, and other sources, resulting in analysis and synthesis of all reasonably available data. A cultural resources overview encompasses prehistoric, historic, and ethnological/sociological elements and, in large part, chronicles past land uses. It may have major relevance to current land use decisions.

**Declining** – Refers to the senescent (i.e., aging) period in the lifespan of plants that includes the presence of dead and/or dying limbs, snag tops, and other characteristics that indicate their later life stages.

**Designated road, trail, or area** – Routes and areas designated on the motor vehicle use map and established by a decision that is compliant with the 2005 Travel Management Rule.

**Designated special uses** – Legally mandated designation by states and tribes of water uses to be achieved and protected. Appropriate uses are identified by taking into consideration the use and value of the water body for public water supply; protection of fish, shellfish, and wildlife; and

recreational, agricultural, industrial, and navigational purposes. In designating uses for a water body, states and tribes examine the suitability of a water body for the uses based on the physical, chemical, and biological characteristics of the water body, its geographical setting and scenic qualities, and economic considerations.

**Desired landscape character** – Described in the Scenery Management System Handbook as, “The most complete, attractive and sustainable expression of the desired landscape character which is compatible with that landscape’s fully integrated set of desired conditions” (Handbook page 5-5 expanded). Desired landscape character represents the most “ideal” and attractive scenic identity that is possible, given the limitations of the ecosystem and achievement of other resource objectives as defined in the desired conditions.

**Developed recreation** – Recreation that occurs at human-made developments such as campgrounds, picnic areas, resorts, ski areas, and trailheads. Facilities might include: roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings. Campgrounds and picnic areas are examples of developed recreation sites.

**Developed recreation site** – A distinctly defined area where facilities are provided for concentrated public use (e.g., campgrounds, picnic areas, or swimming areas).

**Diameter at breast height (d.b.h.)** – The diameter of a tree typically measured at 4.5 feet above ground level.

**Dispersed camping** – Camping outside of a developed camping facility.

**Dispersed recreation** – The type of outdoor recreation that tends to be spread out over the land and in conjunction with roads, trails, and undeveloped waterways. Activities are often day-use oriented and include hunting, fishing, boating, hiking, off-road vehicle use, cross-country skiing, mountain biking, and rock climbing

**Easement** – The right of use over the property of another. The land having the right of use is known as the dominant estate and the land that is subject to the easement is known as the servient estate.

**Ecosystems** – Spatially explicit, relatively homogeneous units of the Earth that include all interacting organisms and elements of the abiotic environment within its boundaries. An ecosystem is commonly described in terms of its:

- **Composition** – the biological elements within the different levels of biological organizations, from genes and species to communities and ecosystems.
- **Structure** – the organization and physical arrangement of biological elements such as snags and down woody debris, vertical and horizontal distribution of vegetation, stream habitat complexity, landscape pattern, and connectivity.
- **Function** – ecological processes, such as energy flow; nutrient cycling and retention; soil development and retention; predation and herbivory; and natural disturbances such as wind, fire, and floods that sustain composition and structure.

**Ecotone** – A transition zone between two distinct ecological communities.

## Glossary

**Effective vegetative groundcover** – The amount of live plant growth (vegetative basal area) plus dead, unattached organic matter (litter) over an area of ground that provides adequate protection from erosion, drought, and other ecological disturbances.

**Effective vegetation** – A level of natural herbaceous composition that is required to successfully meet a desired management result and/or ecosystem character. The desired level of herbaceous composition may include both qualitative and quantifiable measures.

**Emergent vegetation** – Aquatic plants with some or most of the leaf area extending out of the water.

**Endemic** – A plant or animal species whose natural occurrence is confined to a certain region and whose distribution is relatively limited.

**Erosion** – The processes whereby earthy or rocky material is worn away, loosened, dissolved, and removed from any part of the Earth's surface.

**Erosion hazard** – The risk of erosion and sedimentation that is based on slope, soil type, and the amount and type of material on the ground that is able to trap eroded material.

**Ethnobotany** – The study of the uses of plants by different cultures such as food, medicinal, tool, and ceremonial purposes.

**Even-aged stands** – Tree stands that are comprised of one distinct age class of trees.

**Facility** – Structures needed to support the management, protection, and use of the national forests including roads, trails, buildings, utility systems, dams, and other construction features. There are three types of facilities: recreation, administrative, and permittee.

**Federally listed species** – A species listed under the provisions of the Endangered Species Act.

**Fire intensity** – Fire intensity represents the energy released during the phases of combustion. This matrix includes measures of the amount of heat produced by the flaming front, the residence time or the amount of time that the heat is present at a given location, and the rate at which the flaming front is progressing. These three measures directly influence the vegetative effects that the fire will produce. A low intensity fire refers to a flaming front that is progressing at a rate in which the amount of heat produced and residence time do not result in highly damaging vegetative effects (Keely, 2009).

**Fire regime** – Refers to the patterns of fire that occur over a long period of time across an appropriately scaled area and its immediate effects on the ecosystem in which it occurs. An ecosystem's natural fire regime is the one that existed prior to human-facilitated interruption of fire frequency, extent, or severity. There are five fire regimes which are classified based on frequency (i.e., average number of years between fires) and severity (i.e., amount of replacement on the dominant overstory vegetation) of the fire. These five regimes are:

- **Fire Regime I** – 0 to 35 year frequency and low (surface fires most common, isolated torching can occur) to mixed severity (< 75 percent of dominant overstory vegetation replaced);
- **Fire Regime II** – 0 to 35 year frequency and high severity (> 75 percent of dominant overstory vegetation replaced);

- **Fire Regime III** – 35 to 100+ year frequency and mixed severity;
- **Fire Regime IV** – 35 to 100+ year frequency and high severity; and
- **Fire Regime V** – 200+ year frequency and high severity.

**Fire severity** – A measure of the direct effects of the fire on vegetation. Low severity generally replaces less than 25 percent of the dominant overstory vegetation. Mixed-severity fires may replace up to 75 percent of the dominant overstory vegetation, and high-severity fires are considered those that replace more than 75 percent of the dominant overstory vegetation. (FRCC Guidebook, 2010)

**Flood plain** – That portion of a stream valley, adjacent to the channel, which is covered with water when the stream overflows its banks at flood stages.

**Forage** – All browse and nonwoody plants that are available to livestock or game animals for grazing or harvesting for feeding. The weight may be expressed as green, air dry, or oven dry. The term may also be modified as to time of production such as annual, current year's, or seasonal forage production.

**Forb** – Any herbaceous broad-leaved plant species.

**Foreground** – A term used in the Scenery Management System to denote the area within 300 feet to half a mile of a site or boundary.

**Forest (wood) products** – Any resource derived from trees except lumber. This includes seeds, nuts, firewood, biomass, and other related products.

**Forest Service Handbook (FSH)** – Forest Service Handbooks are the principal source of specialized guidance and instruction for carrying out the direction issued in the FSM. Specialists and technicians are the primary audience of handbook direction. Handbooks may also incorporate external directives with related USDA and Forest Service directive supplements.

**Forest Service Manual (FSM)** – The Forest Service Manual contains legal authorities, objectives, policies, responsibilities, instructions, and guidance needed on a continuing basis by Forest Service line officers and primary staff in more than one unit to plan and execute assigned programs and activities.

**Fragmentation** – A process that occurs wherever a large, contiguous habitat is transformed into smaller patches that are isolated from each other by a landscape unlike the original. This landscape can differ from the original habitat in either composition or structure, and it functions as either a partial or total barrier to the distribution of the species associated with the original habitat. A major threat to the viability of wildlife species is when fragmentation leads to the isolation of pairs and populations.

**Free flowing** – Defined by the National Wild and Scenic River Act of 1968 (P.L.90-542) as “existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. The existence, however, of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion in the national wild and scenic rivers system shall not automatically bar its consideration for such inclusion....”

## Glossary

**Free thinning** – The silvicultural management technique that thins trees within an area of the forest through the release of selected crop trees based on desired crown position, bole quality, and spacing.

**Friable** – Rock types which are fragile, crumbly, or easily reduced to grainy particles.

**Fugitive dust** – Particles lifted into the ambient air caused by human-made and natural activities such as the movement of soil, vehicles, equipment, blasting, and wind. This excludes particulate matter emitted directly from the exhaust of motor vehicles and other internal combustion engines; from portable brazing, soldering, or welding equipment; and from piledrivers.

**Functioning ecosystem** – An ecosystem that contains all components and processes necessary to maintain resilience over time.

**Gap** – Refers to the space occurring in a forested area as a result of individual or group tree mortality from small disturbance events or from local site factors such as soil properties that influence vegetation growth patterns.

**Geomorphology** – The classification, description, nature, origin, and development of present landforms and their relationships to underlying structures and of the history of geologic changes as recorded by these surface features.

**Grazing permittee** – An individual who has been granted written permission to graze livestock for a specific period on a range allotment.

**Ground-disturbing activities** – An activity which moves soil to the extent where an archaeological site may be impacted.

**Groundwater recharge** – Recharge is the process by which groundwater is replenished. A recharge area is where water from precipitation is transmitted downward to an aquifer. Recharge is promoted by natural vegetation cover, flat topography, permeable soils, a deep water table, and the absence of confining beds.

**Groups** – A cluster of two or more trees with interlocking or nearly interlocking crowns at maturity surrounded by an opening. Size of tree groups is typically variable depending on forest type and site conditions and can range from fractions of an acre (a two-tree group) (i.e., ponderosa pine, dry mixed conifer) to many acres (i.e., wet mixed conifer, spruce-fir). Trees within groups are typically nonuniformly spaced, some of which may be tightly clumped.

**Group selection** – An uneven-aged management method in which trees are removed and new age classes are established in groups, adjacent to other groups of different age classes. Group cut size is determined by the reproduction requirements of the species desired and the number or total acreage of different age classes desired across the stand.

**Group site** – A recreation site designed to accommodate group events such as family gatherings.

**Heritage asset** – Property, plant, and/or equipment that are unique for one or more of the following reasons: historical or natural significance; cultural, educational, or artistic importance; or significant architectural characteristics.

**Hydrologic unit code (HUC)** – Hydrologic unit codes are a way of identifying all of the watersheds in the U.S. in a nested arrangement from largest to smallest. Each hydrologic unit is identified by a code. The Coconino NF extends across seven 4<sup>th</sup> code watersheds which drain into the Little Colorado River basin to the east or the Verde River basin to the west. Each 4<sup>th</sup> code watershed is comprised of smaller 5<sup>th</sup> code watersheds which, in turn, are comprised of even smaller 6<sup>th</sup> code watersheds.

**Hydrology** – The study of the behavior of water in the atmosphere, on the Earth’s surface, and underground.

**Immediate foreground** – A term used in the Scenery Management System to denote the area within 0 to 300 feet of a site or boundary.

**Improvement** – Human-made developments such as roads, trails, fences, stock tanks, pipelines, power and telephone lines, survey monuments, and ditches.

**Inclusion** – A variance in vegetation within a vegetation type due to landform, moisture regime, soil type, erosion, or past disturbance.

**Infiltration** – The process of water entering the soil. The rate of infiltration is the maximum velocity at which water enters the soil surface.

**Integrated pest management approach** – A broad-based ecological approach to structural and agricultural pest control that integrates pesticides/herbicides into a management system, incorporating a range of practices for economic control of a pest.

**Intermittent/ephemeral stream** – An intermittent or ephemeral stream or stretch of a stream is one that flows only in direct response to precipitation. It receives no water from springs and no long-continued supply from melting snow or other source. Its stream channel is at all times above the water table. The term may be arbitrarily restricted to streams or stretches of streams that do not flow continuously during periods of as much as 1 month.

**Interpretation** – Information services designed to present inspirational, educational, and recreational values to forest visitors to provide the utmost in understanding, appreciation, and enjoyment from their forest experience.

**Invasive species** – Any species that is nonnative (or alien) to the forest and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.

**Inventoried roadless area (IRA)** – Areas, typically of 5,000 acres or greater, which were identified in the Roadless Area Review and Evaluation in 1979.

**Land exchange** – The conveyance of non-Federal land or interest in the land to the U.S. in exchange for National Forest System land or interest in the land.

**Land purchase** – The conveyance of non-Federal land or interest in the land to the U.S. by fee-simple purchase.

**Leasable minerals** – Leasable minerals are not locatable and are subject to leasing under the Mineral Leasing Act and include oil, gas, gypsum, and geothermal. By the lease terms, the lessee has the legal right to drill or mine subject only to the terms and conditions of the lease.

**Litter** – The uppermost layer of organic debris on the ground, composed mainly of fresh or slightly decomposed leaves, bark, twigs, flowers, fruits, and other vegetative matter.

**Livestock utilization** – Grazing pastures with cattle, sheep, or other domestic animals.

**Locatable minerals** – Locatable minerals are minerals that are regulated under the provisions of the 1872 Mining Law and include gold, silver, uranium, and many others. Locatable mineral uses can occur unless the lands are withdrawn from mineral entry.

**Management indicator species (MIS)** – Plant or animal species or habitat components selected in the planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.

**Memorandum of understanding (MOU)** – A legal agreement between the Forest Service and other agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A MOU is not a fund obligating document.

**Mineral materials** – A collective term used to describe petrified wood and common varieties of sand, gravel, stone, pumice, pumicite, cinders, clay, and other similar materials. Common varieties do not include deposits of those materials which are valuable because of some property giving them distinct and special value (36 CFR228.42). The determination of which minerals are considered common variety is made by the Bureau of Land Management.

**Mineral withdrawal** – Mineral withdrawal reserves public lands from entry by leasable or locatable mineral entry. To request a mineral withdrawal, the Forest Service must submit a request and documentation to the Bureau of Land Management.

**Mosaic** – The pattern of patches, corridors, and matrices (forest or non-forest) that form a landscape in its entirety.

**Motor vehicle use map (MVUM)** – A map displaying designated roads, trails, and areas for motor vehicle use on an administrative unit or a ranger district of the National Forest System.

**National Environmental Policy Act (NEPA)** – An act declaring a National policy to encourage productive and enjoyable harmony between people and their environment, to promote efforts which will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of people, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality (P.L. 91-190).

**National forest land and resource management plan** – A plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974 (P.L. 93-378) , as amended, that guides all resource management activities and establishes management standards and guidelines for National Forest System lands of a given national forest.

**National Forest System (NFS) lands** – Federal lands that have been designated by Executive Order or statute as national forest, national grasslands, or purchase units, or other lands under the administration of the Forest Service.

**National historic trail** – National historic trails were authorized under the National Trails System Act of 1968 (P.L. 90-543) along with national scenic trails and national recreation trails. National scenic trails and national historic trails may only be designated by an act of Congress.

**National Register of Historic Places** – A list of heritage resources that have local, state, or national significance maintained by the Secretary of the Interior.

**Native species** – All indigenous, terrestrial, and aquatic species that evolved naturally in an ecosystem.

**Natural fire regime** – The fire regime that existed prior to human-facilitated interruption of frequency, extent, or severity.

**Niche** – The locality where an organism may generally be found and where all essentials for its development and existence are present. Habitat niches are described by their geographical boundaries, or with terms such as “shady woodlands,” “banks of streams,” and “dry hillsides.”

**Northern goshawk foraging areas** – The areas that surround the PFAs (see below) that northern goshawks use to hunt for prey. They are approximately 5,400 acres in size.

**Northern goshawk nest areas** – The areas immediately around a nest that are used by northern goshawks in relation to courtship and breeding activities. They are approximately 30 acres in size and contain multiple groups of large, old trees with interlocking crowns.

**Northern goshawk post-fledgling areas (PFAs)** – The areas that surround the nest areas. They represent an area of concentrated use by the northern goshawk family until the time the young are no longer dependent on adults for food. PFAs are approximately 420 acres in size (not including the nest area acres).

**No surface occupancy** – A fluid mineral leasing stipulation that prohibits occupancy or disturbance on all or part of the land surface to protect special values or uses. The NSO stipulation includes stipulations that may have been worded as “No Surface Use/Occupancy,” “No Surface Disturbance,” “Conditional NSO,” and “Surface Disturbance or Surface Occupancy Restriction by location.” Lessee may exploit the oil and gas or geothermal resources under leases restricted by this stipulation through use of directional drilling from sites outside the NSO area.

**Noxious weed** – A legal term applied to plants regulated by Federal and state laws, such as plants designated as noxious weeds by the Secretary of Agriculture or by the responsible state official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insect or disease, and being not native or new or not common to the U.S. or parts thereof.

**Nurse trees** – Larger, faster growing trees that shelter smaller, slower growing trees or plants.

**Off-highway vehicle** – Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain.

**Old growth** – Old growth in southwestern forested ecosystems is different than the traditional definition based on northwestern infrequent fire forests. Due to large differences among forest types and natural disturbances in the Southwest, old growth forests vary extensively in tree size, age classes, presence and abundance of structural elements, stability, and presence of understory.

## Glossary

Old growth refers to specific habitat components that occur in forests and woodlands—old trees, dead trees (snags), downed wood (coarse woody debris), and structure diversity. These important habitat features may occur in small areas, with only a few components, or over larger areas as stands or forests where old growth is concentrated. In the Southwest, old growth is considered “transitional,” given that the location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Some species, notably certain plants, require “old forest” communities that may or may not have old growth components but have escaped significant disturbance for lengths of time necessary to provide the suitable stability and environment.

**Openings** – Spatial breaks between groups or patches of trees, as large as or larger than groups, that contain grass, forb, shrub, and/or tree seedlings but are largely devoid of big trees, with a total tree cover of less than 10 percent in openings.

**Open pit** – A shallow human-made open pond or pit used on a drill site or production pad to hold produced water or fluids from drilling. “Closed” pits refer to the use of tanks to store these types of fluids.

**Outstandingly remarkable values (ORVs)** – Scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values which make a river eligible for designation as a wild or scenic river.

**Overland flow** – A condition in which the precipitation rate is faster than the infiltration rate, and excess water runs over the surface of land.

**Overlay** – A management area or special area that provides more specific direction for a small geographic location within a larger management area. The direction of the larger management area continues to apply. For example, if proposing a project next to the wild and scenic portion of the Verde River, a specialist would have to look at direction for wild and scenic rivers and the Verde Valley Management Area in addition to the forestwide direction.

**Overstory** – That portion of a plant community consisting of the taller plants on the site; the forest or woodland canopy.

**Patches** – Areas larger than tree groups in which the vegetation composition and structure are relatively homogeneous. Patches comprise the mid-scale, thus they range in size from 100 to 1,000 acres.

**Perennial stream** – Permanently inundated surface stream course. Surface water flows throughout the year except in years of infrequent drought.

**Planned ignition** – A fire ignited by management actions under certain predetermined conditions to meet plan desired conditions. Prescribed fire is a synonymous term.

**Potential natural vegetation type (PNVT)** – The plant community that would become established if all successional sequences were completed without human interference under present environmental and floristic conditions, including those created by humans.

**Prescribed fire** – Fire burning under conditions specified in an approved plan to dispose of fuels, control unwanted vegetation; stimulate growth of desired vegetation; change successional stages; and to meet range, wildlife, recreation, wilderness, watershed, or timber management objectives.

Prescribed burns occur under specified environmental conditions that allow the fire to be confined to a predetermined area and produce the fireline intensity and rate of spread required to meet management objectives.

**Priority heritage assets (PHAs)** – **Heritage assets** of distinct public value that are, or should be, actively maintained. The significance and management of a PHA must meet one or more of the following criteria: (1) recognized through an official designation such as a listing on the National Register of Historic Places, State Register, and so forth; (2) recognized through prior investment in preservation, interpretation, and use; (3) recognized in an agency approved management plan; or (4) exhibits critical deferred maintenance, which is defined as a potential health or safety risk, or imminent threat of loss of significant resource values. Any improvement to a PHA that meets real property designation criteria is now considered real property.

**Probable Fossil Yield Classification** – A system used to classify geologic units based on the relative abundance of vertebrate fossils or scientifically significant invertebrate (or plant) fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. The Probable Fossil Yield Classification system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources.

- **Class 1** – Igneous and metamorphic (ashes are excluded from this category) geologic units that are not likely to contain recognizable fossil remains.
- **Class 2** – Sedimentary geologic units that are not likely to contain vertebrate fossils nor scientifically significant nonvertebrate fossils.
- **Class 3** – Fossiliferous (fossil containing), sedimentary geologic units whose fossil content varies in significance, abundance, and predictable occurrence. Also sedimentary units of unknown fossil potential.
- **Class 4** – Class 4 geologic units are Class 5 units (see below) that have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation.
- **Class 5** – Highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils and/or scientifically significant nonvertebrate fossils and that are at risk of natural degradation and/or human-caused adverse impacts.

**Proper functioning condition** – Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to: dissipate stream energy associated with high flows (thereby reducing erosion and improving water quality); filter sediment; capture bedload and aid in flood plain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks; develop diverse ponding and channel characteristics to provide habitat for fish, waterfowl and other uses; and support greater biodiversity.

- **Functional at risk** – Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.
- **Nonfunctional** – Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and, consequently, are not reducing erosion and improving water quality.

**Property classes** – A term used in heritage resources management for site types or combinations of site types.

## Glossary

**Pushes** – A vegetative treatment used in piñon-juniper types in which heavy machinery (e.g., bulldozers) is used to push over trees or chains connected to machinery are used to uproot trees.

**Quiet areas** – Special areas of the forest open only to foot, horse, or bicycle traffic for the purpose of providing a unique, nonmotorized recreational experience. These areas benefit wildlife by providing relatively untrammled ecosystems and through stress reduction associated with the absence of noisy sound-scapes.

**Receptors** – Areas sensitive to air quality impacts where exceeding the Federal or local standard may not be the only limitation or where visibility restrictions are important.

**Recreation Opportunity Spectrum (ROS)** – A framework for stratifying and defining classes of outdoor recreation environments, activities, and experience opportunities. The settings, activities, and opportunities for obtaining experiences are arranged across a continuum or spectrum of six classes: primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and urban.

- **Primitive** – Characterized by an essentially unmodified natural environment of a fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within these areas is prohibited. There is an extremely high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of outdoor skills in an environment that offers a high degree of challenge and risk.
- **Semiprimitive Nonmotorized** – Nonmotorized back-country area with a predominantly natural-appearing environment, without evidence of resource modification and utilization practices. Provides opportunities for self-reliance and challenge, with a low concentration of users and high degree of interaction with the natural environment. Recreation developments are rustic and rudimentary and primarily provided for the protection of the resources rather than the convenience of users.
- **Semiprimitive Motorized** – Similar setting to semiprimitive nonmotorized except this area provides a motorized back-country experience where trails and primitive roads are designed for high-clearance, four-wheel-drive vehicles. Moderate probability of experiencing solitude. High degree of self-reliance and challenge in using motorized equipment. These areas are predominantly natural, lacking some human modification, except when necessary for site protection.
- **Roaded Natural** – Characterized by a predominantly natural appearing environment with moderate evidence of human activity. Resource modification and utilization practices are evident but harmonize with the natural environment. May have a mosaic of highly modified areas to pockets of unmodified lands. Developed sites provide for some user comfort as well as site protection, but harmonize with the natural environment.
- **Rural** – A substantially modified natural environment. There is evidence of resource modification and utilization practices, and facilities are often designed for larger numbers of people. Campgrounds often include paved roads, electricity, and other conveniences.

- **Urban** – Landscape character that has resulted from extensive human activities, no longer appearing natural, such as conversion of native landscapes into an extensively altered landscape (e.g., a town, city, or metropolitan area).

**Reference conditions** – Environmental conditions that infer ecological sustainability. When available, reference conditions are represented by the characteristic range of variation (not the total range of variation), prior to European settlement and under the current climatic period. For many ecosystems, the range of variation also reflects human-caused disturbance and effects prior to settlement. It may also be necessary to refine reference conditions according to contemporary factors (e.g., invasive species) or projected conditions (e.g., climate change). Reference conditions are most useful as an inference of sustainability when they have been quantified by amount, condition, spatial distribution, and temporal variation.

**Resiliency** – The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change.

**Restoration** – The process of assisting in the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecological restoration focuses on establishing the composition, structure, pattern, and ecological processes necessary to facilitate terrestrial and aquatic ecosystem sustainability, resilience, and health under current and future conditions.

**Riparian** – An area of vegetation adjacent to an aquatic ecosystem distinguished by a high water table, certain soil characteristics, and some vegetation that requires free water or conditions that are more moist than normal.

**Research natural area (RNA)** – An area set aside by the Forest Service to preserve a representative sample of an ecological community, primarily for scientific and educational purposes. Commercial exploitation is not allowed and general public use is discouraged.

**Road** – A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36 CFR 212.1, FSM 7705).

**Roadway** – Portion of the road that includes everything from the top of the cut slope to the bottom of the fill slope.

**Salable minerals** – These minerals are relatively low value per volume; for example: sand, gravel, cinders, common building stone, and flagstone. Many of the materials are used for road surfacing, boulders, and engineering construction or may be specialty resources such as soil amendments or decorative stone, including flagstone. These minerals are typically sold unless used internally, by another government agency, or for ceremonial uses. In these cases they may be provided free of charge.

**Scales** – The aerial extent of certain plan decisions are described at various scales:

- **Fine scale** is an area of about 10 acres or less at which the distribution of species is described.
- **Mid-scale** is an area of 100 to 1,000 acres composed of assemblages of grouped and individual species which have similar biophysical conditions. An area at this scale is composed of 10 or more fine-scale units.

## Glossary

- **Landscape scale** is a unit of forest land approximately 10,000 acres or greater, typically composed of variable elevations, slopes, aspects, soils, plant associations, and natural ecological processes. An area at this scale is composed of 10 or more mid-scale units.

**Scenery** – General appearance of a place, landscape, and/or its visible features (USDA Handbook Number 701, “Landscape Aesthetics: A Handbook for Scenery Management,” slightly revised for clarity).

**Scenic integrity** – A measure of the degree to which a landscape is visually perceived to be “complete” and is determined by three factors: dominance, degree of deviation, and intactness of the desired landscape character; it is established based on the existing condition. Scenic integrity disturbances most typically result from human activities but can also result from natural events which exceed the landscape’s historic range of variability (HRV) in terms of magnitude, duration, or intensity. An exception to this is direct human alterations that have become accepted over time as positive landscape character attributes (e.g., historic cabins, farms, and ranches).

- **Very High Integrity** – The valued scenery appears natural and unaltered. These areas generally provide for ecological change only. When used as a standard or guideline, this level should be achieved as soon after project completion as possible or within 3 years maximum.
- **High Integrity** – The valued scenery “appears natural or unaltered,” yet visual disturbances are present; however, they remain unnoticed because they repeat the form, line, color, texture, pattern, and scale of the valued scenery. When used as a standard or guideline, this level should be achieved as soon after project completion as possible or within 3 years maximum.
- **Moderate Integrity** – The valued scenery “appears slightly altered.” Noticeable disturbances are minor and visually subordinate to the valued scenery because they repeat its form, line, color, texture, pattern, and scale. When used as a standard or guideline, this level should be achieved as soon after project completion as possible or within 3 years maximum.
- **Low Integrity** – The valued scenery “appears moderately altered.” Visual disturbances are codominant with the valued scenery and may create a focal point of moderate contrast.
- **Very Low Integrity** – The scenery shows obvious human activities of vegetative and landform alterations which dominate the natural landscape but should appear as natural occurrences when viewed at background distances.

**Scenic integrity objectives (SIO)** – The state of naturalness, or conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from the existing landscape character in a national forest. (USDA Handbook Number 701, “Landscape Aesthetics: A Handbook for Scenery Management”)

**Scenic quality** – Degree to which the appearance of a place, landscape, or feature can elicit psychological and physiological benefits to individuals and, therefore, to society in general (definition per Scenery Management System Handbook Glossary, revised). Scenic quality is described and measured through the landscape character inventory information and the

cumulative conditions of the two primary Scenery Management System indicators described in this appendix: scenic integrity and scenic stability.

**Scoria cone** – A cinder cone that, in geological terms, is relatively “young” in age. Scoria cones have bowl-shaped craters and are often found on the landscape in clusters.

**Seral stage** – One stage in a series of steps in the process of ecological succession.

**Significant cave** – A cave located on National Forest System lands that has been evaluated and shown to possess features, characteristics, values, or opportunities in one or more of the following resource areas: biota; cultural; geologic-mineralogic-paleontologic; hydrologic; recreational; or educational-scientific for scientific, educational, or recreational purposes; and which has been designated “significant” by the forest supervisor (National Cave Resources Management and Protection Act, P.L. 100-691).

**Smoke sensitive areas** – Areas in which smoke from outside sources is intolerable for reasons such as heavy population, existing air pollution, or intensive recreation or tourist use.

**Snag** – A standing dead or partially dead tree (snag topped), often missing many or all limbs. Snags provide essential wildlife habitat for many species and are important for forest ecosystem function.

**Soil compaction** – Soil compaction occurs when soil particles are pressed together, reducing the pore space between them. This increases the weight of solids per unit volume of soil (bulk density). Soil compaction occurs in response to pressure (weight per unit area) exerted by field machinery or animals. The risk for compaction is greatest when soils are wet.

**Soil condition classes** – There are four types of soil condition classes: satisfactory, impaired, unsatisfactory, and inherently unstable.

- **Satisfactory** – Indicators signify that soil function is being sustained and soil is functioning properly and normally. The ability of the soil to maintain resource values and sustain outputs is high.
- **Impaired** – Indicators signify a reduction in soil function. The ability of the soil to function properly and normally has been reduced and/or there exists an increased vulnerability to degradation. An impaired category indicates there is a need to investigate the ecosystem to determine the cause and degree of decline in soil functions. Changes in land management practices or other preventative measures may be appropriate.
- **Unsatisfactory** – Indicators signify that a loss of soil function has occurred. Degradation of vital soil functions result in the inability of the soil to maintain resource values, sustain outputs, or recover from impacts. Unsatisfactory soils are candidates for improved management practices or restoration designed to recover soil functions.
- **Inherently Unstable** – These soils have natural erosion exceeding tolerable limits. Based on the universal soil loss equation (USLE), these soils are eroding faster than they are renewing but are functioning properly and normally.

**Soil productivity** – The capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit, area/year, percent plant cover, or other measures of biomass accumulation.

**Special status species** – A plant or animal species with either Federal listing as endangered, threatened, candidate, or proposed (under the Endangered Species Act) or listing by the Southwestern Region as sensitive.

**Special uses** – All use and occupancy on more than a transient basis except those covered by mining laws or associated with harvesting timber or grazing livestock. These uses include roads, all types of utilities, ski areas, cemeteries, electronic sites, and recreation residences. Uses are ordinarily covered by one of two types of permits: either an annual or term permit. Annual permits are for a relatively short-term use and are revocable by the Forest Service. They are renewable each year by the payment of a fee. Term permits are used to cover uses of a longer time period (up to 30 years) and having a large economic investment. Examples of when this permit would be used are large electric transmission lines and large recreation resorts and ski areas.

**Stand** – A group of trees sufficiently uniform in species composition, size, age, structure, spatial arrangement, and condition to be distinguished from surrounding stands and managed as a single unit.

**Streamside management zone** – An area of vegetation or forest litter located adjacent to stream courses and/or riparian areas for the purpose of filtering sediment, providing bank stability, and providing shade for fisheries habitat in tree/shrub ecosystems.

**Structure** (vegetation) – The presence, size, and physical arrangement of vegetation in a stand. Vertical structure refers to the variety of plant heights, from the canopy to the forest floor. Horizontal structure refers to the types, sizes, and distribution of trees and other plants across the land surface. Forest lands with substantial structural diversity provide a variety of niches for different wildlife species.

**Successional stage** – A stage of development of a plant community as it moves from bare ground to climax. The grass-forb stage of succession precedes the woody shrub stage.

**Surface runoff** – Refers to the loss of water from an area by flow over the land surface.

**Sustainability** – A goal for economic development and natural resource management. Ecosystem sustainability is the capacity of an ecosystem for long-term maintenance of ecological processes and functions, biological diversity, and productivity. It is also called ecological sustainability, which generally refers to land management practices that provide goods and services from an ecosystem without degradation of the site quality and without a decline in the yield of goods and services over time.

**Terrestrial ecosystem survey (TES)** – (Also called terrestrial ecological unit inventory or TEUI.) A classification of ecological types and mapped terrestrial ecological units at a consistent standard throughout National Forest System (NFS) lands. Ecological units are designed to identify land and water areas at different levels of resolution based upon similar capabilities and potentials for response to management and natural disturbances. Capabilities and potentials derive from multiple elements: climate, geomorphology, geology, soils, water, and potential vegetation.

**Travertine** – A calcium-rich rock composed primarily of calcium carbonate minerals which forms by chemical precipitation from certain types of shallow or surface waters such as springs and rivers; a type of limestone.

**Timber production** – The process of managing stands of trees within the national forest to maximize woody output. This is not a linear process because other factors must be considered, including, but not limited to: marketable and nonmarketable goods, financial benefits, management practices, and the environmental implications of these management practices.

**Total maximum daily load (TMDL)** – A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, of which portions of that load are allocated among the various sources of that pollutant.

**Trail** – A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail (36 CFR 212.1).

**Trafficability** – The measure of ease and effort it takes for a vehicle or person to travel across the terrain.

**Travel Management Rule (TMR)** – Located in 36 CFR 212, Subpart B, Designation of Roads, Trails, and Areas for Motor Vehicle Use. The rule requires each national forest or ranger district to designate those roads, trails, and areas open to motor vehicles. Designation will include class of vehicle and, if appropriate, time of year for motor vehicle use. A given route, for example, could be designated for use by motorcycles, off-highway vehicles, or street-legal vehicles. Once designation is complete, the rule will prohibit motor vehicle use off the designated system or inconsistent with the designations. Designations will be shown on a motor vehicle use map. Use inconsistent with the designations will be prohibited.

**Understory** – Trees occupying the lower level of a stand that has at least two size and age classes.

**Uneven-aged forests** – Forests that are comprised of three or more distinct age classes of trees, either intimately mixed or in small groups.

**Utility corridors** – The linear space needed to bury a produced water line, gas pipeline, oil pipeline, electric line, or other line(s). It is often, but not always, located along a road.

**Viability** – The capacity of living, or being distributed, over wide geographical limits; as in the viability of a species.

**Vigorous** – Growing at or near full capacity; resilient, not suppressed.

**Water rights and claims** – Certified water rights are legally recognized water rights that document how much water can be used, for what beneficial use, and by whom. Claimed water rights are water right claims for use recognized by the Arizona Department of Water Resources pending adjudication by the court that will decree how much water can be used, for what beneficial use, and by whom

**Water quality categories** –

- **Category 5 (Impaired)** – Those waters on the State of Arizona impaired waters list (the 303d List) which are characterized by the most severe water quality problems. These waters are then scheduled for total maximum daily load (TMDL) assessments. There are strict discharge permit requirements to assure that any new discharges or modifications will not further degrade water quality.

## Glossary

- **Category 4 (Not Attaining)** – Those waters where designated use is not attaining State water quality standards, there have been past water quality impairments, and there are current TMDL plans aimed at improving water quality.
- **Category 3 (Inconclusive)** – Those waters where all designated uses are inconclusive. Also, any surface water not assessed due to lack of credible data may be included.
- **Category 2 (Attaining Some Uses)** – Those waters where at least one designated use has been assessed as attaining and all other uses have been assessed as inconclusive.
- **Category 1 (Attaining All Uses)** – All designated uses assessed as attaining.

**Well distributed** – Commonplace, common, or not uncommon. Noticeable, visible, evident or conspicuous.

**Wildfire** - Any unplanned ignition of vegetative fuels which can be human caused, naturally caused (e.g., lightning), or caused by prescribed fires that are declared wildfires. Every wildfire contains protection objectives that address firefighter and public safety and the protection of values (e.g., natural, cultural, infrastructure). When the land management plan allows, naturally ignited wildfires may include additional resource objectives that help move ecosystems toward desired conditions.

**Wilderness area** – An area of undeveloped Federal land that Congress designated as wilderness and that retains its primeval character and influence, without permanent improvements or human habitation, and is protected and managed to present its natural conditions. An area that (1) generally appears to have been affected primarily by the forces of nature, with the imprint of people's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) comprises at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value (Wilderness Act of 1964, P.L. 88-577).

**Wild and scenic river (WSR)** – A river that is free flowing and has at least one outstandingly remarkable value. Eligible and suitable rivers are given a tentative classification of wild, scenic, or recreational. These rivers may be included in the National Wild and Scenic Rivers System.

- **Wild** – Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
- **Scenic** – Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
- **Recreational** – Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

**Wilderness Opportunity Spectrum (WOS)** – Based on the same concept and management framework of the recreation opportunity spectrum (ROS). The settings, activities, and opportunities provided for within the WOS describe the variations in degree of isolation from the sounds and influences of people and the amount of recreation visitor use. There are four WOS classes: pristine, primitive, semiprimitive, and transition.

- **Pristine** – The area is characterized as an extensive, unmodified, natural environment. Natural processes and conditions have not been measurably affected by the actions of users. The area will be managed as free as possible from the influences of human activity. Terrain and vegetation allow for extensive and challenging cross-country travel.
- **Primitive** – The area is characterized by an essentially unmodified, natural environment. Concentrations of visitors are low and evidence of human use is minimal. The area has high opportunity for isolation, solitude, exploration, risk, and challenge.
- **Semiprimitive** – The area is characterized by a predominantly unmodified environment of at least moderate size. System trails and campsites are present and there is evidence of other uses. A minimum of onsite controls and restrictions are implemented to protect physical, biological, and social resources. Some facilities may be present to reduce visitor impact.
- **Transition** – The area is characterized by a predominantly unmodified environment; however, the concentrations of visitors may be moderate to high at various times. The area is characterized as having a large number of day users who are often mixed with overnight and long-distance travelers on trails near trailheads and wilderness boundaries.

**Wildland-urban interface (WUI)** – Includes those areas of resident populations at imminent risk from wildfire and human developments having special significance. These areas may include critical communications sites, municipal watersheds, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that if destroyed by fire, would result in hardship to communities. These areas encompass not only the sites themselves but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.

**Wildlife corridors** – Strips of trees, shrubs, and understory vegetation that provide cover and habitat for wildlife and serve as travel lanes for movement across open areas and between isolated patches of habitat. They provide wildlife with access to the different types of habitat they require and can foster recolonization of forest fragments.



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- Wilderness Act of 1964, P.L. 88-577, 78 Stat. 890, as amended.



# Appendix A. Maps

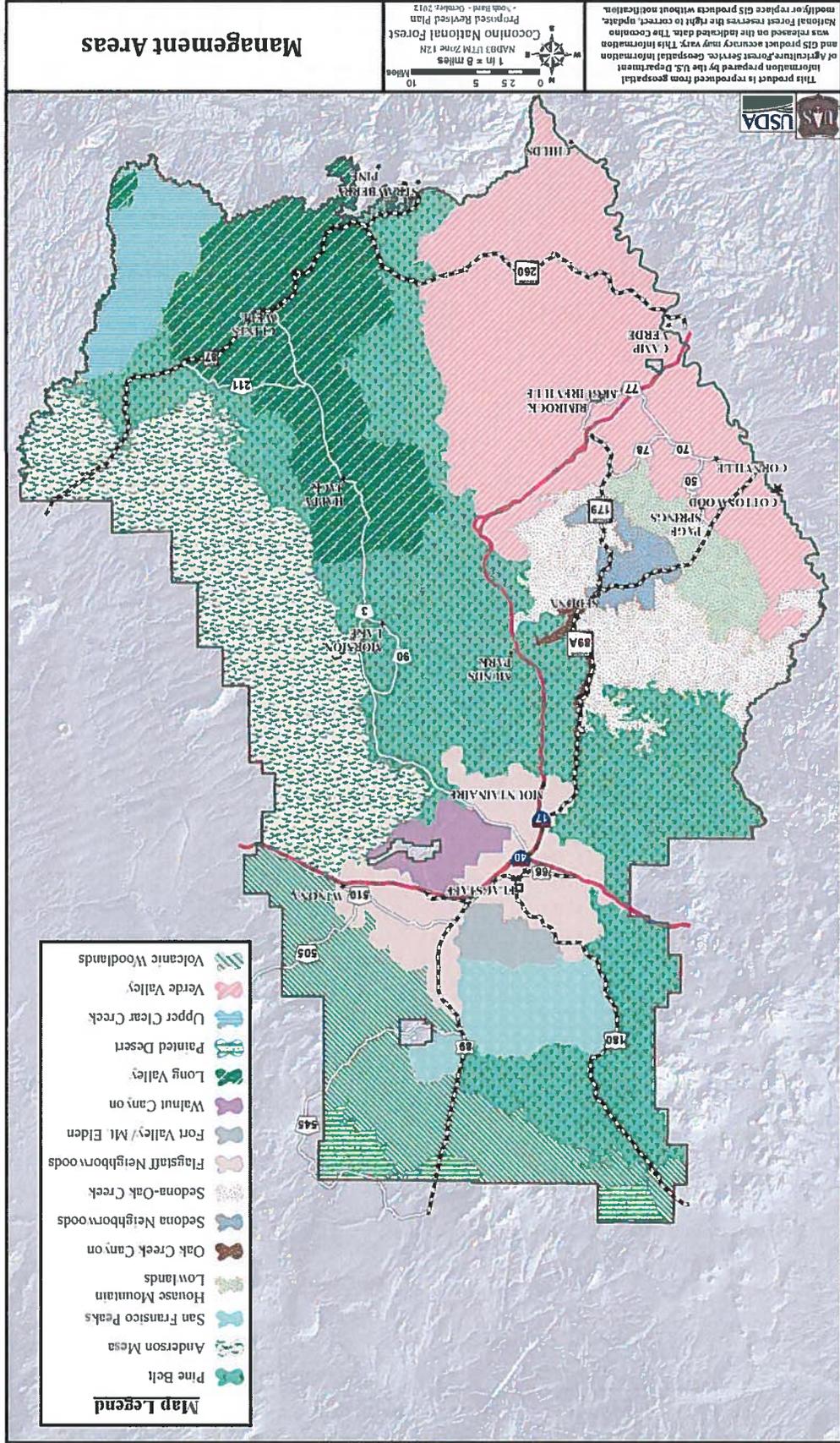
Maps identifying potential natural vegetation types (PNVT) are provided at a coarse scale. Given the variability of the landscape, in instances where the mapped PNVT does not correspond to the vegetation type of a given area, management activities are to be governed by the plan components from the PNVT description that most accurately depicts the on-the-ground vegetation type.

Maps displaying the Recreation Opportunity Spectrum (ROS) and Scenic Integrity Objectives (SIO) are provided at the landscape scale. These boundaries are to be used as a framework for management activities and may require flexibility at the ground level to address site-specific conditions and anomalies that are not exact matches with the specific ROS or SIO designation. These types of situations may require field expertise and judgment to identify an area's ROS or SIO designation and may need to be adjusted to meet site-specific conditions.

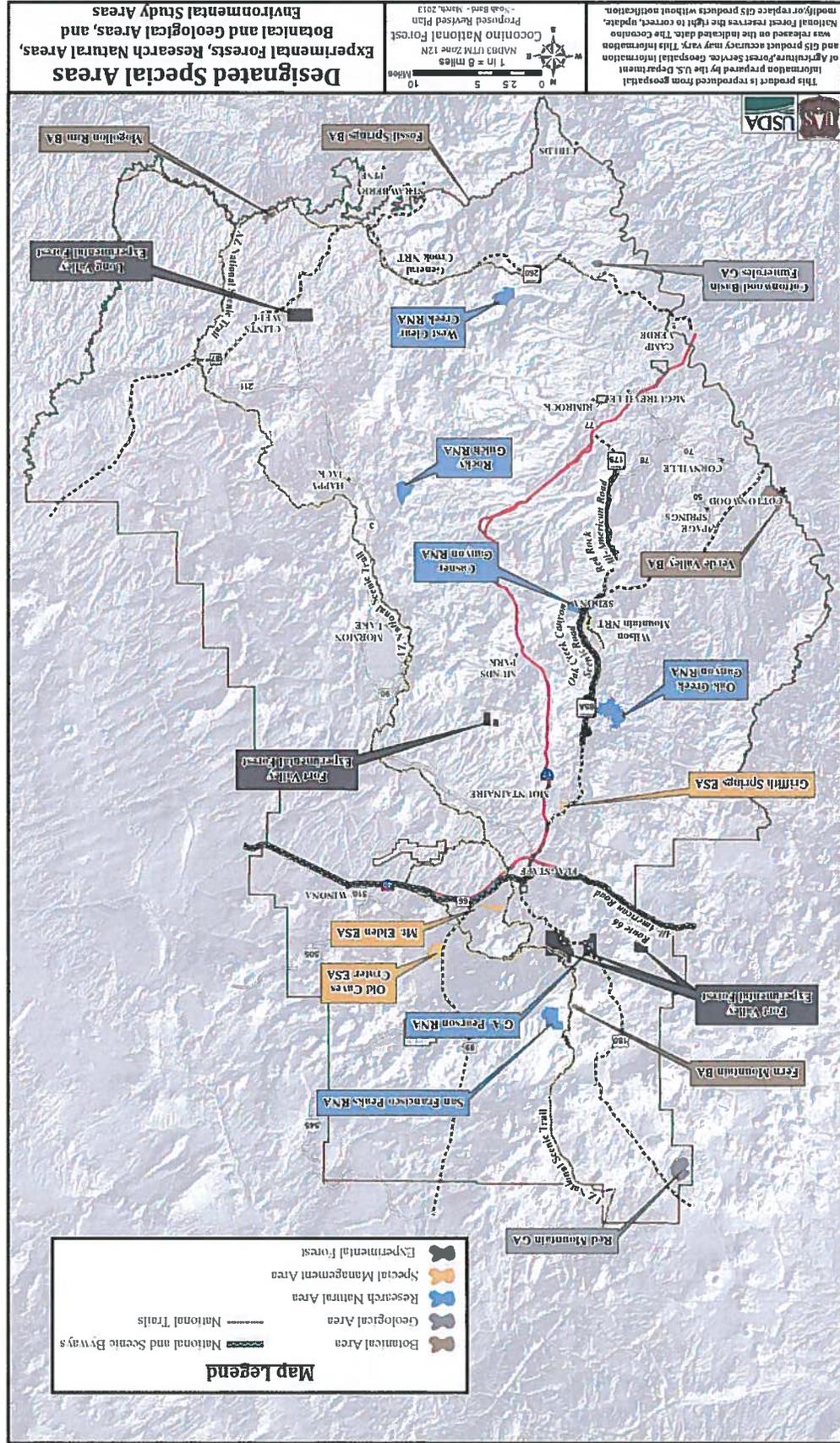
**For printing:** Maps 1 to 4 are formatted to be printed on paper sized at 11 x 17 inches. For printers limited to sheets sized at 8½ x 11 inches, the appropriate settings (e.g., "Fit to Page") will need to be adjusted to ensure that these maps are plotted successfully to your printer.

Map 1. Management areas .....	217
Map 2. Designated special areas .....	218
Map 3. Forest orders and area designations .....	219
Map 4. Potential Natural Vegetation Types.....	220
Map 5. Potential Natural Vegetation Type – Riparian Vegetation and Water Bodies .....	221
Map 6. Potential Natural Vegetation– Desert Communities and Semidesert Grasslands .....	222
Map 7. Potential Natural Vegetation – Interior Chaparral .....	223
Map 8. Potential Natural Vegetation – Piñon and Juniper .....	224
Map 9. Potential Natural Vegetation – Ponderosa Pine .....	225
Map 10. Potential Natural Vegetation – Mixed Conifer .....	226
Map 11. Potential Natural Vegetation – Montane/Subalpine and Great Basin Grasslands...	227
Map 12. Potential Natural Vegetation – Spruce-Fir Forest and Alpine Tundra .....	228
Map 13. Land adjustments – real estate for acquisition and exchange.....	229
Map 14. Desired recreation opportunity spectrum (ROS) .....	230
Map 15. Scenery management – scenic integrity objectives (SIOs).....	231
Map 16. Scenery management – scenic integrity objectives rehabilitation .....	232
Map 17. Existing and recommended wilderness areas .....	233
Map 18. Timber suitability.....	234





Map 1. Management areas



Map 2. Designated special areas

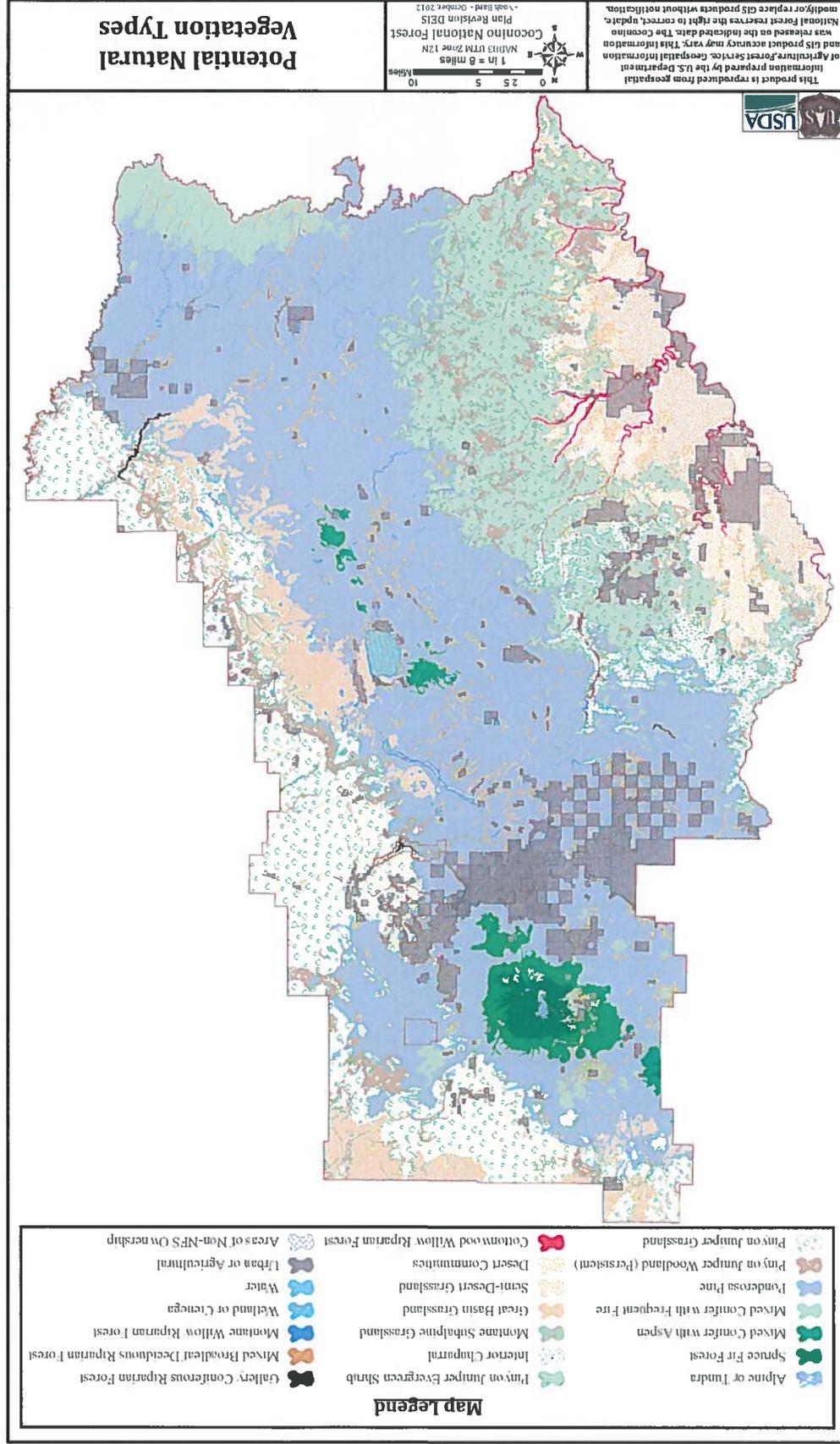
**Designated Special Areas, Botanical and Geological Study Areas, Experimental Forests, Research Natural Areas, and Environmental Forests**

Coconino National Forest  
 Proposed Revised Plan  
 -Web Board - March, 2013  
 NAD83 UTM Zone 12N  
 1 in ≈ 6 miles  
 0 2.5 5 10 Miles

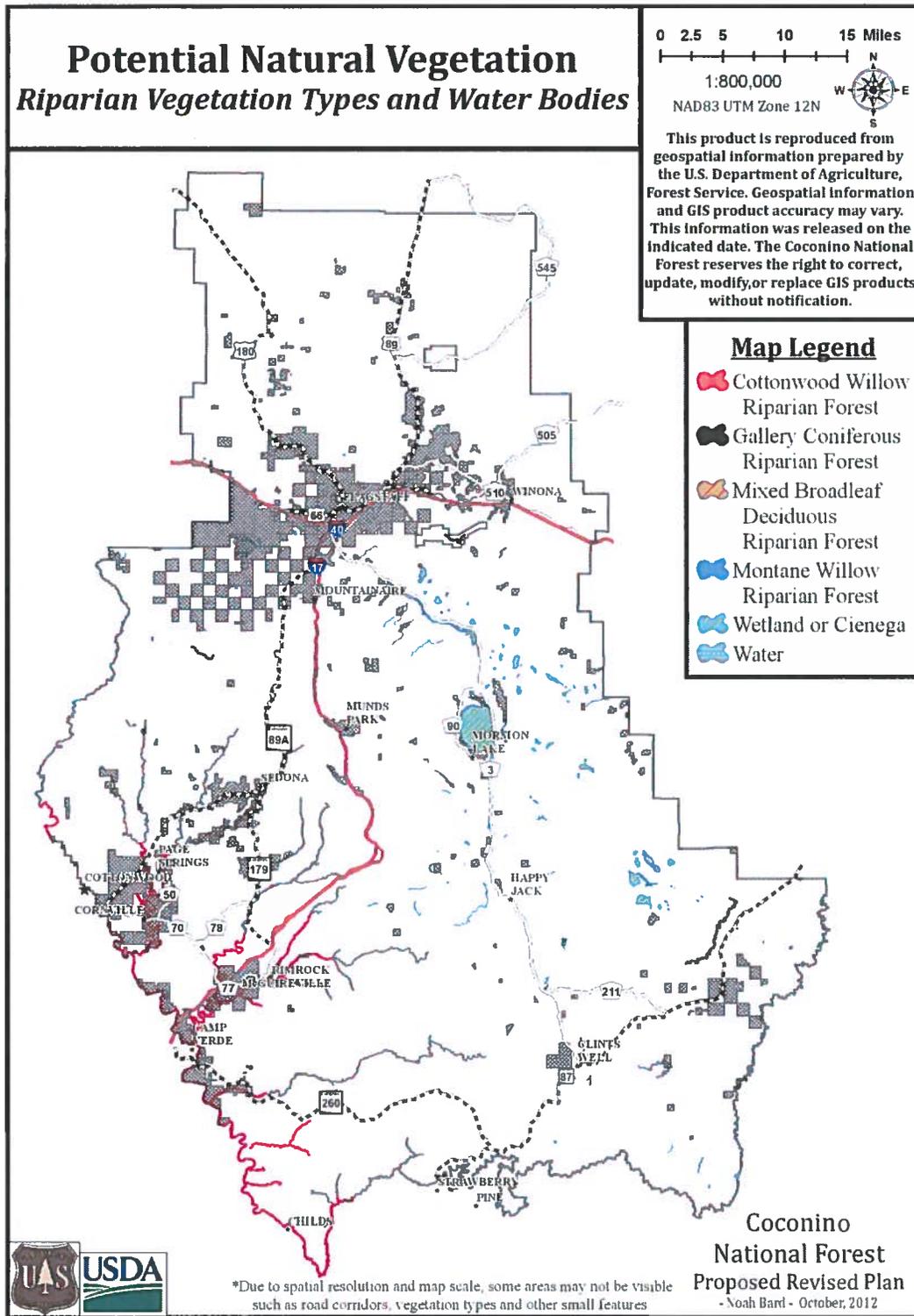
This product is reproduced from Geospatial Information prepared by the U.S. Department of Agriculture, Forest Service. Geospatial information and GIS product accuracy may vary. This information was rechecked on the indicated date. The Coconino National Forest reserves the right to correct, update, modify, or replace GIS products without notification.



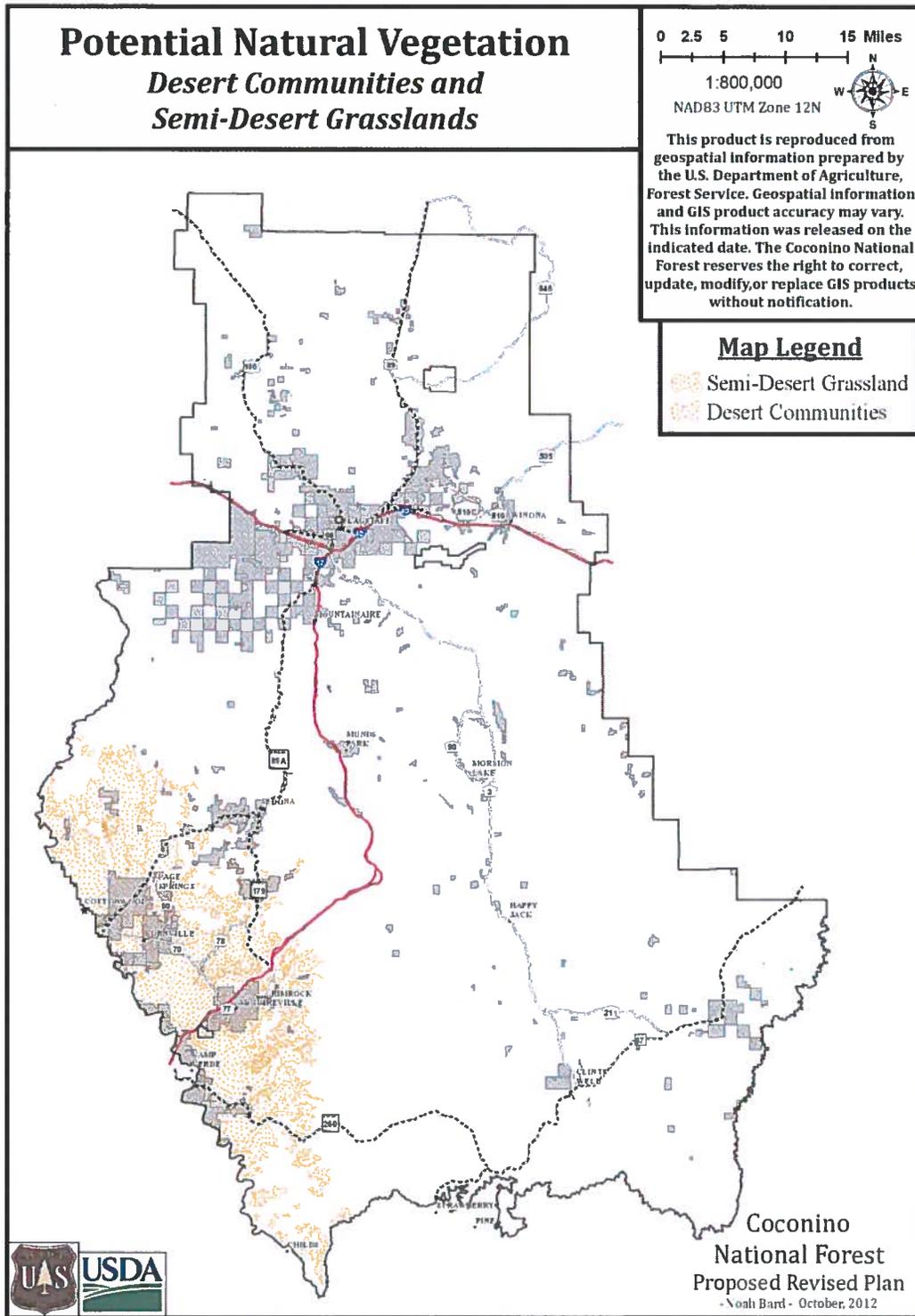




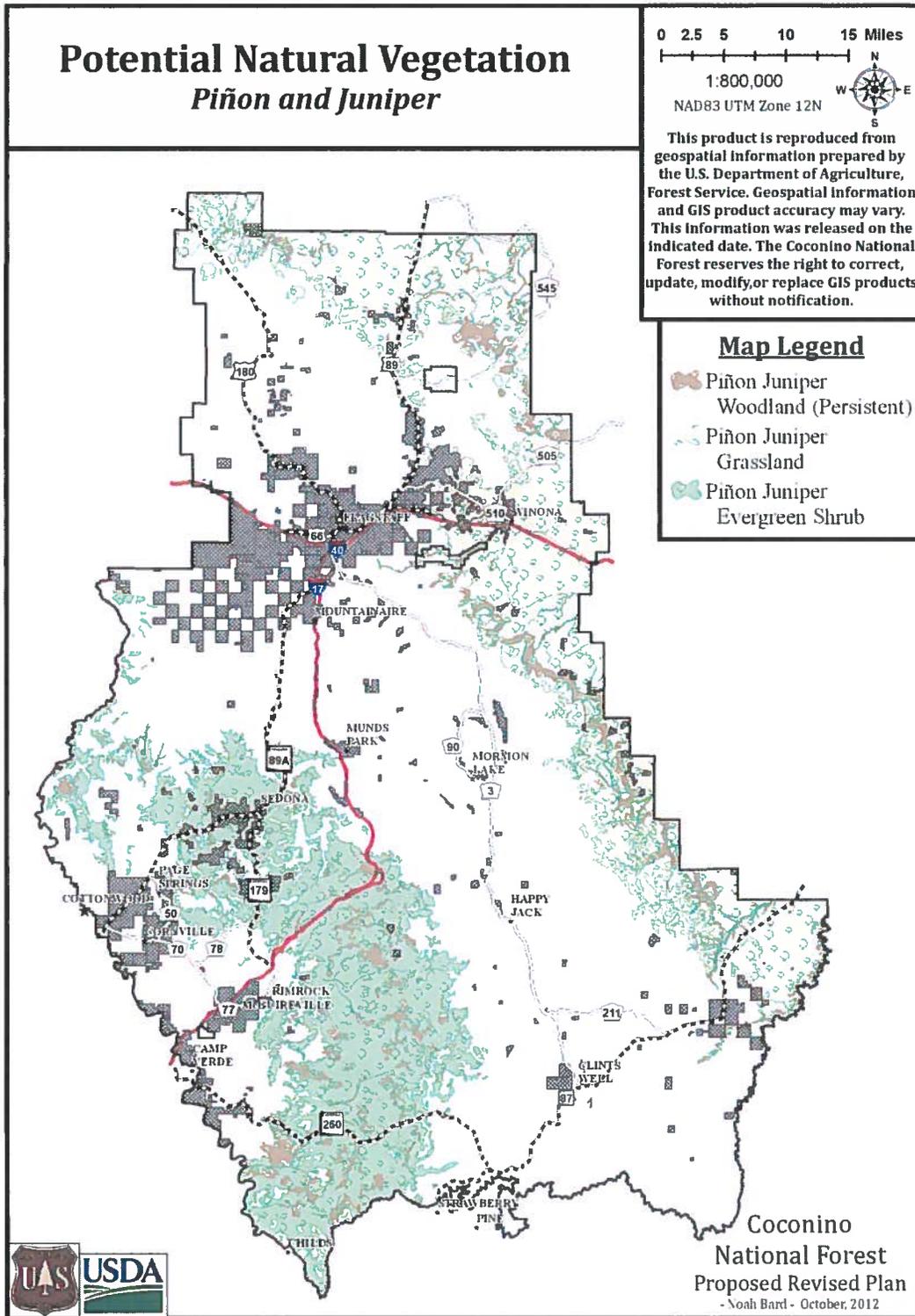
Map 4. Potential Natural Vegetation Types



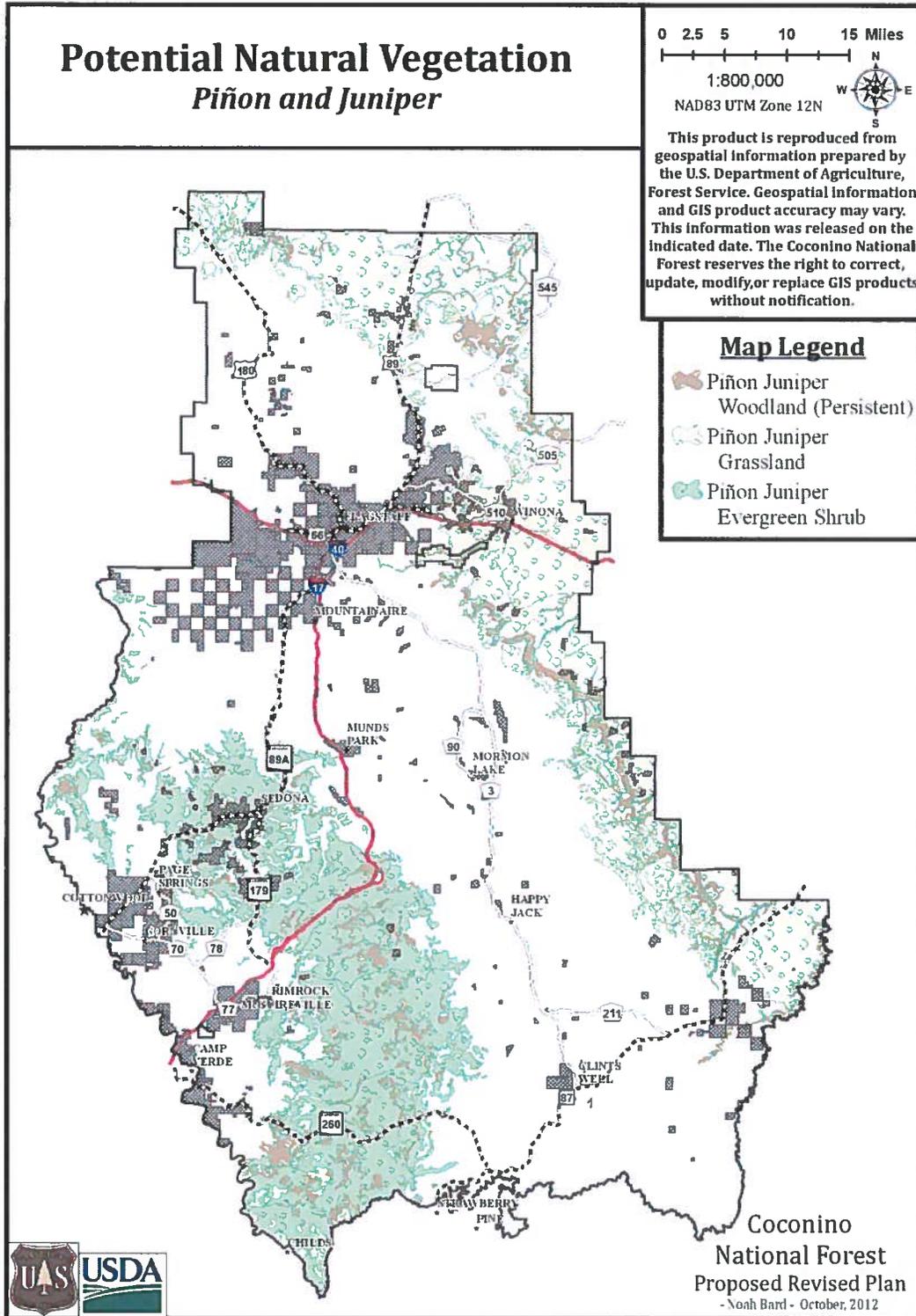
**Map 5. Potential Natural Vegetation Type – Riparian Vegetation and Water Bodies**



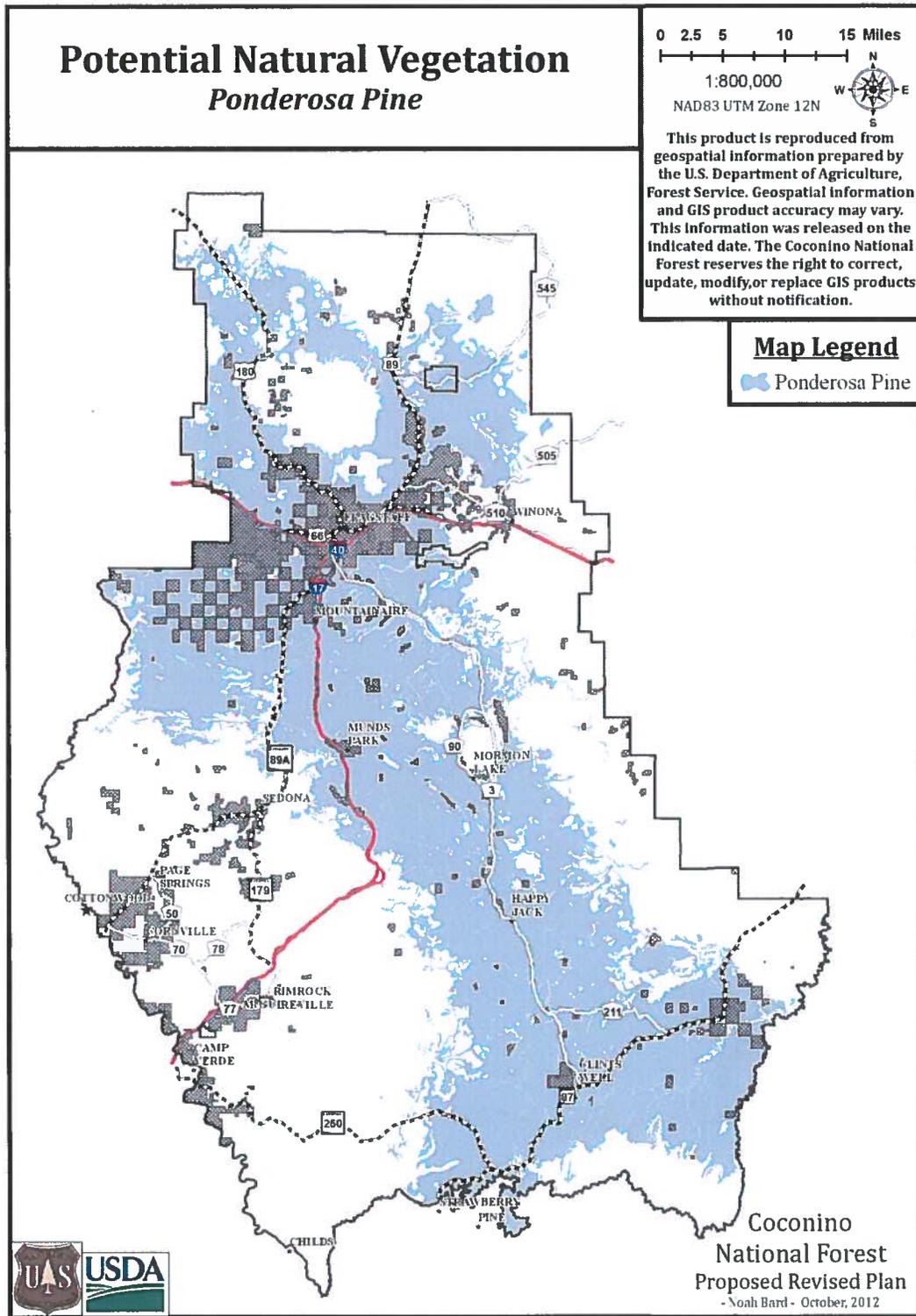
Map 6. Potential Natural Vegetation— Desert Communities and Semidesert Grasslands



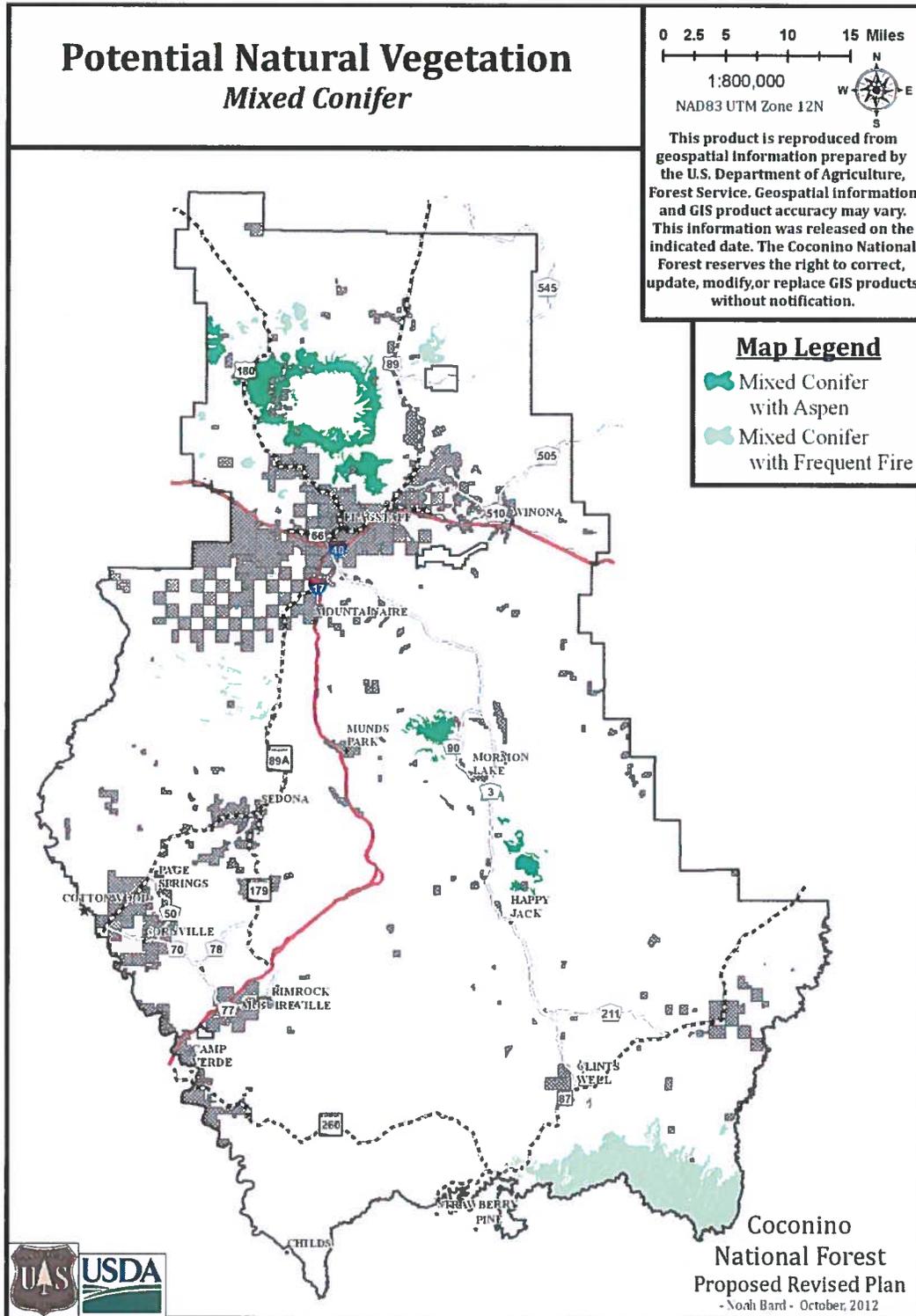
**Map 7. Potential Natural Vegetation – Interior Chaparral**



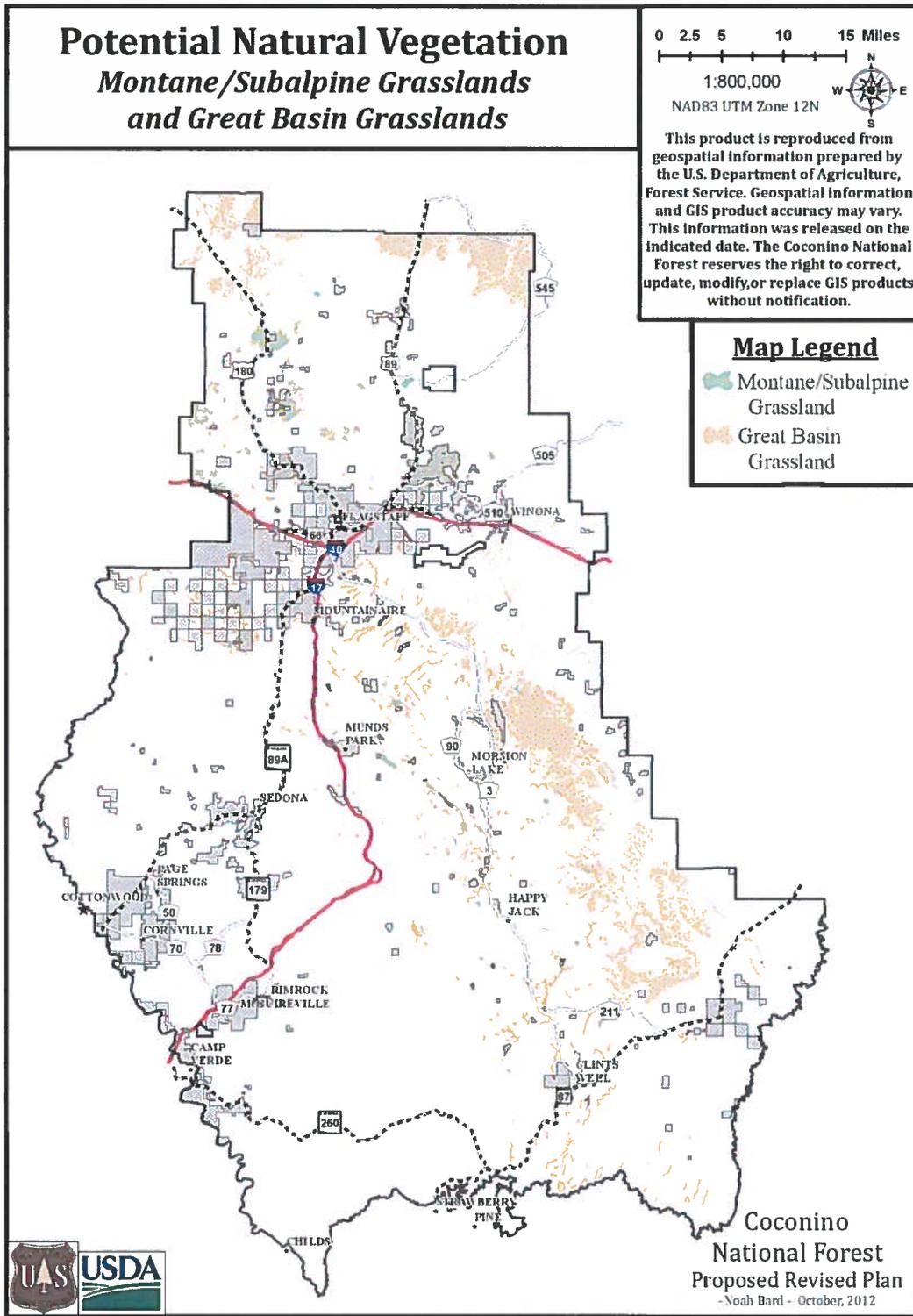
Map 8. Potential Natural Vegetation – Piñon and Juniper



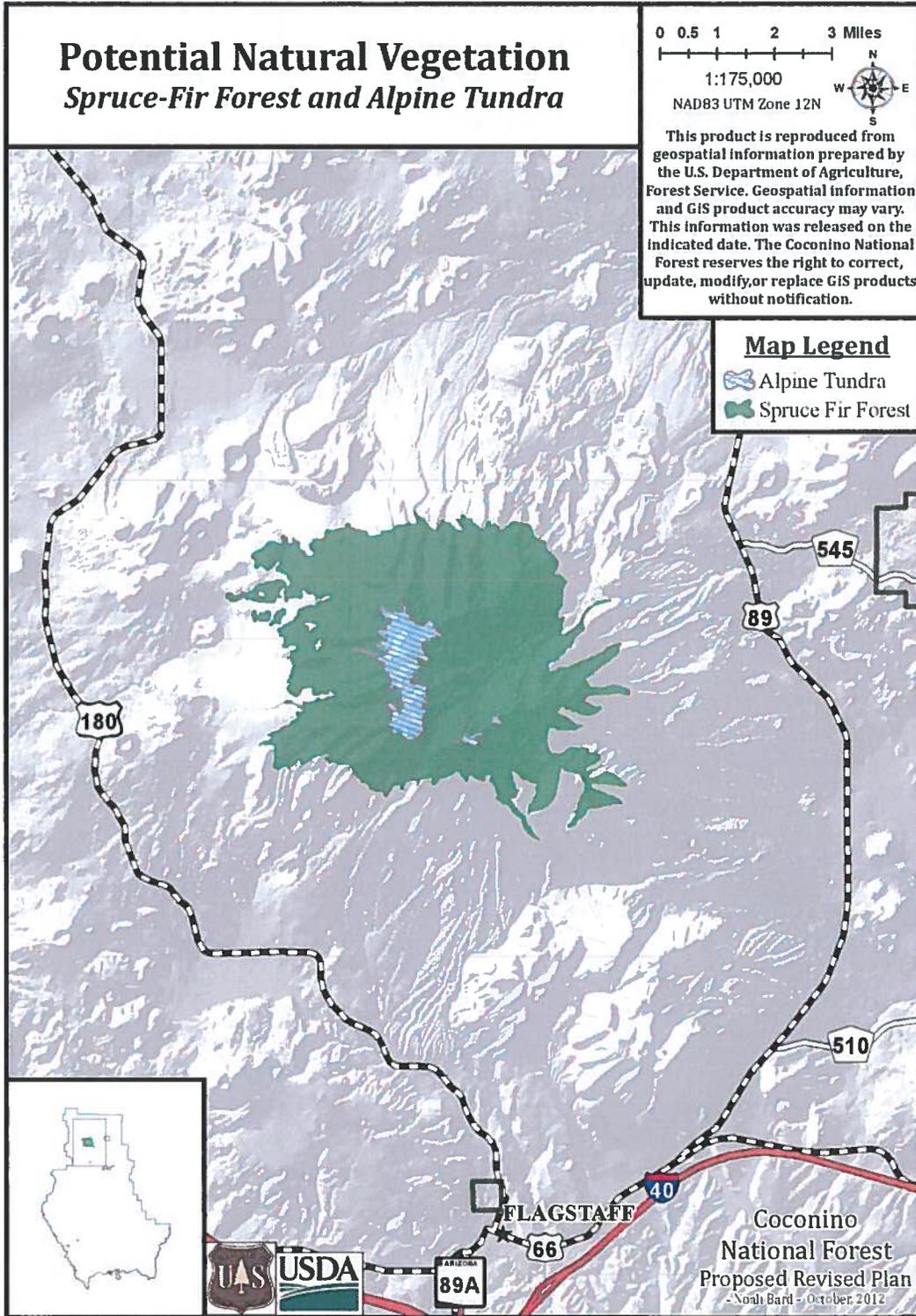
Map 9. Potential Natural Vegetation – Ponderosa Pine



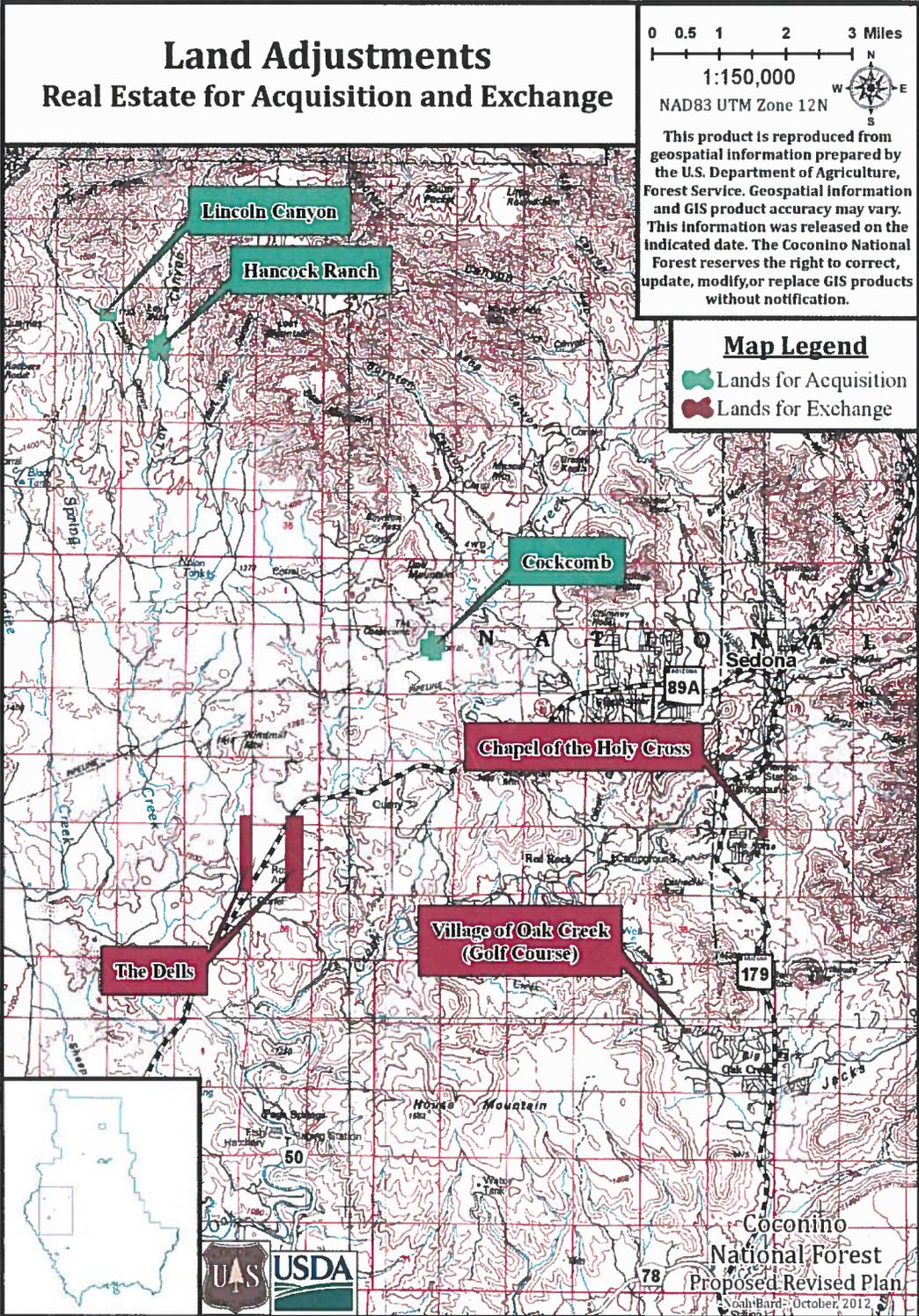
Map 10. Potential Natural Vegetation – Mixed Conifer



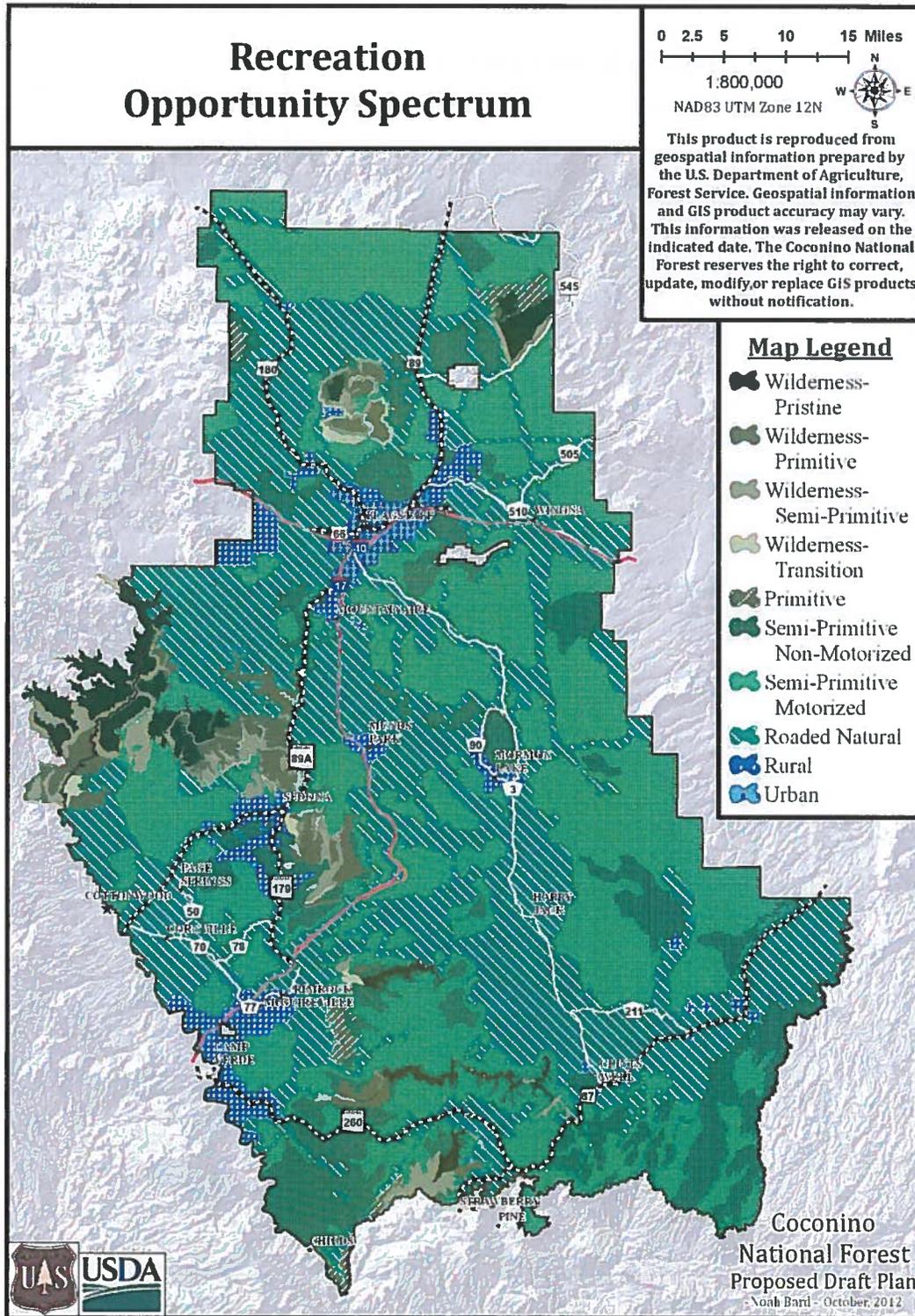
Map 11. Potential Natural Vegetation – Montane/Subalpine and Great Basin Grasslands



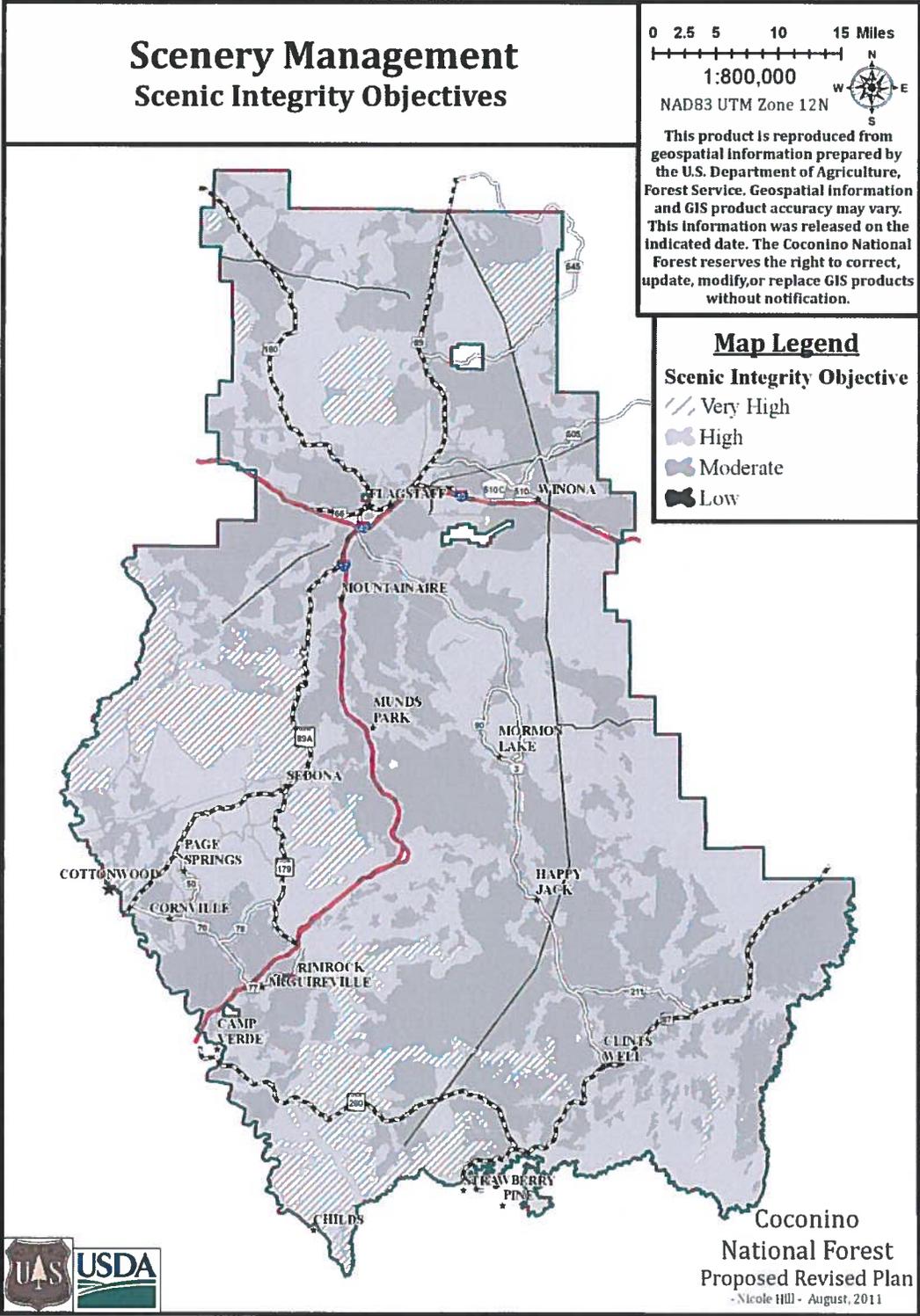
Map 12. Potential Natural Vegetation – Spruce-Fir Forest and Alpine Tundra



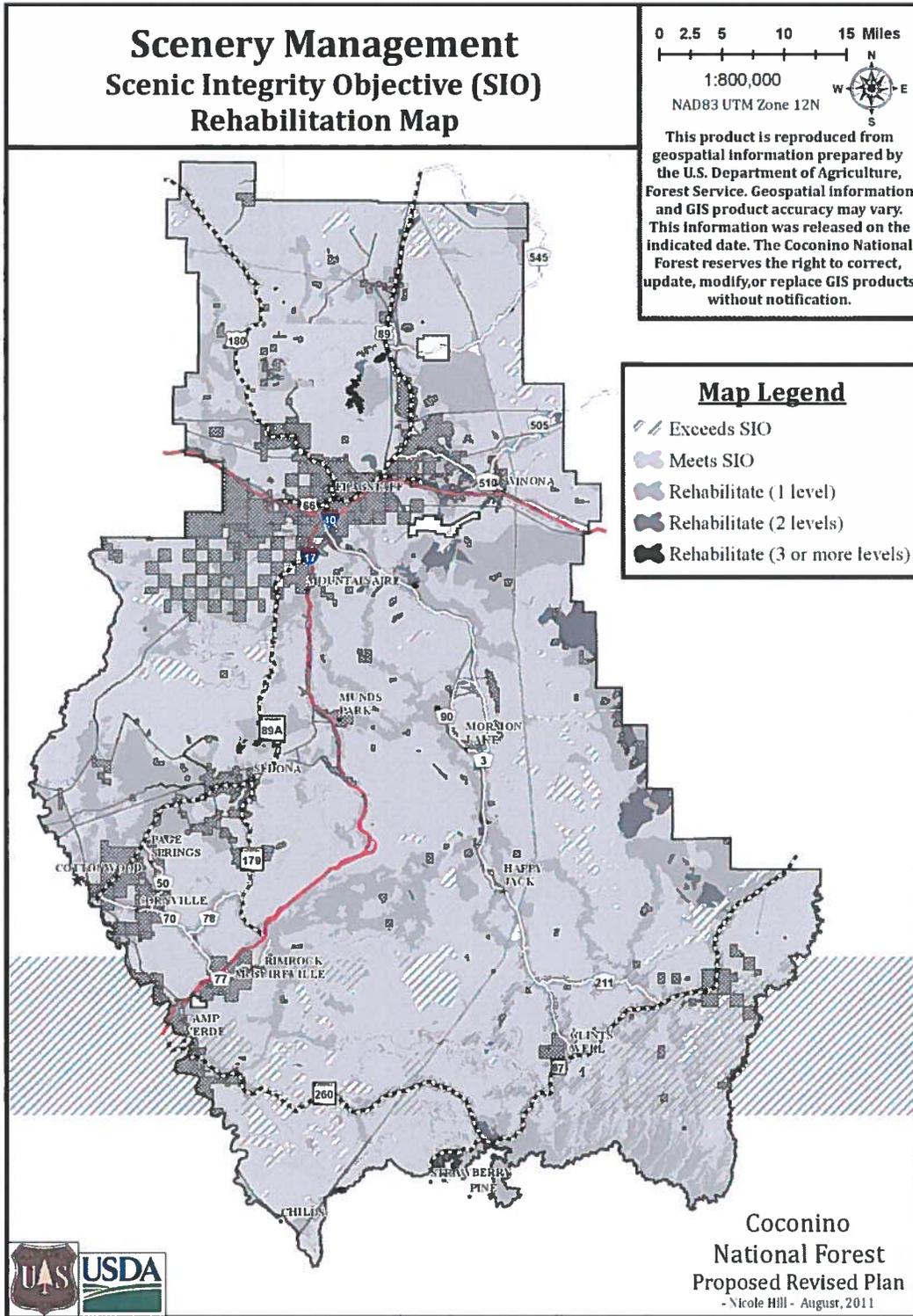
Map 13. Land adjustments – real estate for acquisition and exchange



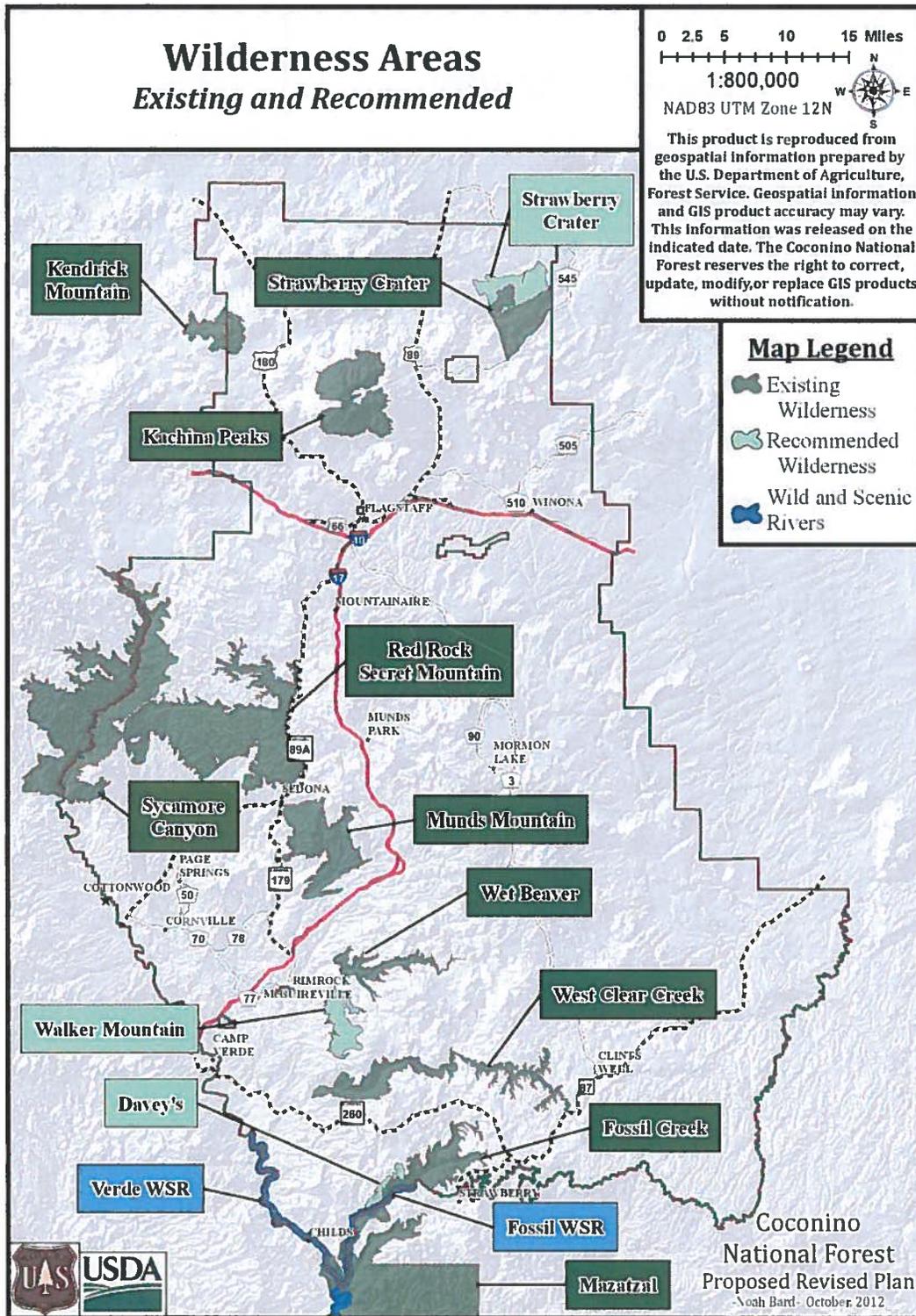
Map 14. Desired recreation opportunity spectrum (ROS)



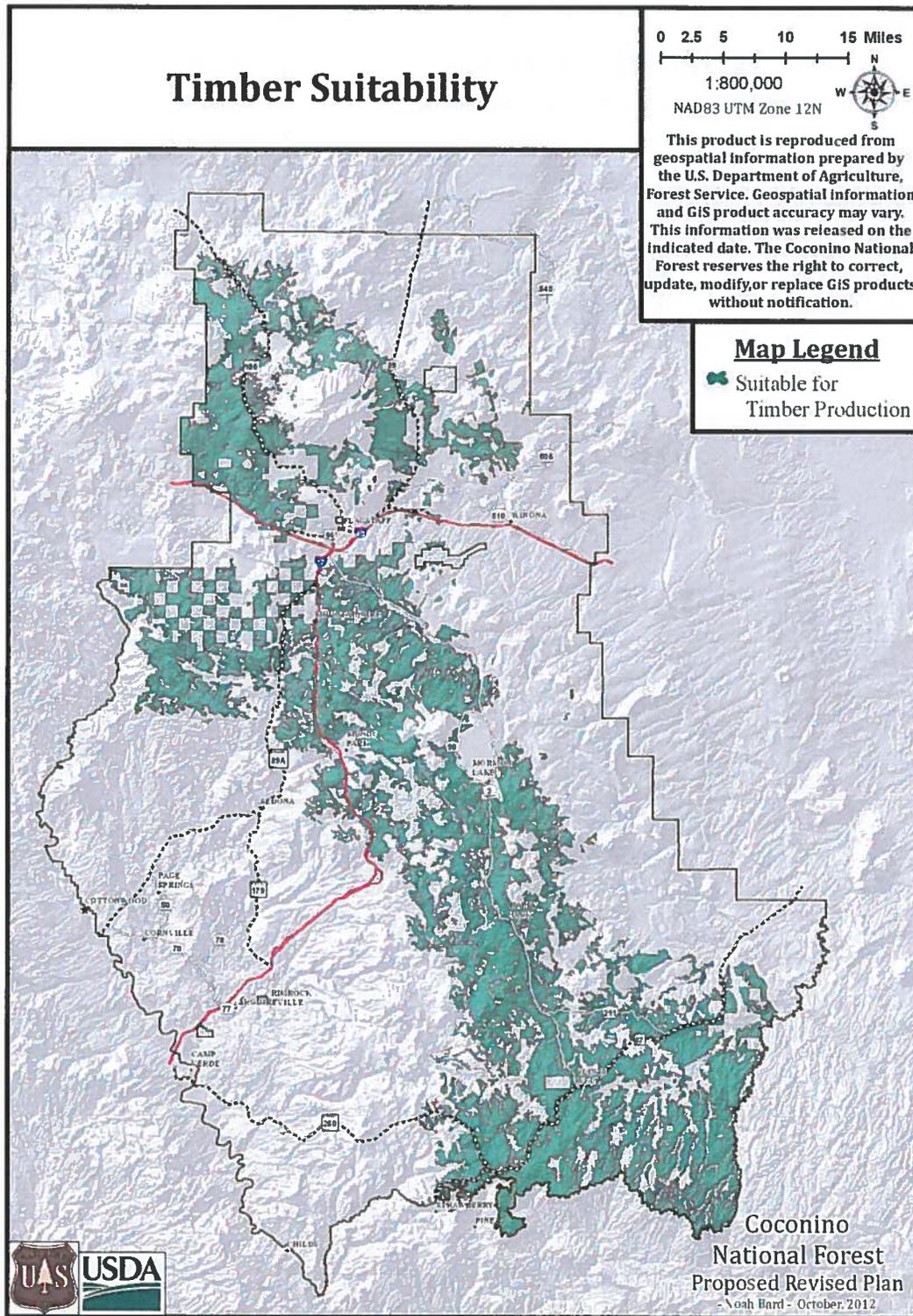
Map 15. Scenery management – scenic integrity objectives (SIOs)



Map 16. Scenery management – scenic integrity objectives rehabilitation



Map 17. Existing and recommended wilderness areas



Map 18. Timber suitability

# Appendix B. Proposed and Probable Management Practices

## Introduction

This appendix describes proposed and probable practices and timber sale schedule that may subsequently take place on the Coconino NF at the project or activity level to help maintain existing conditions or achieve the desired conditions described in the plan. Included are items such as program strategies; inventories, assessments, resource analyses and other planning needs; and ongoing work with partners and cooperating agencies anticipated during the next 10 to 15 years.

The listed proposed and probable management practices are not intended to be all-inclusive, nor are they intended to be decisions. They are simply projections of what actions may take place in the future. A plan amendment is not required to change or modify any of the proposed and possible actions. The list of these actions can be updated at any time through an administrative correction of the plan. More information may be found under plan objectives and management approaches.

## Ecosystems

### Air

- Coordinate with the Arizona Department of Environmental Quality (ADEQ) on smoke impacts from wildfires and prescribed fires.

### Watersheds, Water Quality and Quantity

- Plan and implement improvement activities in watersheds which are functionally at risk or impaired.
- Secure water rights and participation in water right settlement and adjudication.
- Coordinate and educate with other government agencies to protect water quality and protect aquatic ecosystems from invasive plants and animals.

### Wetlands and Reservoirs/Lakes

- Restore wetlands that are not in proper functioning condition.
- Coordinate with the Arizona Game and Fish Department (AZGFD) and U.S. Fish and Wildlife Service (USFWS) on the management of sport and native fishes.

### Springs

- Reconstruct or restore riparian function to at least 25 springs identified as not in proper functioning condition

### Biophysical Features

- Coordinate with State and Federal agencies to manage and monitor bat roosts in order to determine population dynamics at least once every 3 years.

## Appendix B. Proposed and Probable Management Practices

- Monitor significant caves or other biophysical features to determine visitor impacts and the conditions of key resources in order to protect the long-term ecology of the feature or resource.
- Participate in public education activities about disease prevention “best practices” for caves.
- Complete periodic updates to the list of significant caves on the forest.

### **Paleontological Resources**

- Coordinate and collaborate, where possible, with the scientific community, non-Federal partners, and the general public.
- Promote educational programs, interpretive presentations, or publications to increase public awareness of forest paleontological resources and their significance.
- Complete paleontological surveys in areas where there is high potential to encounter these resources.

### **Soil**

- Maintain satisfactory soil conditions and improvement of impaired and unsatisfactory soil conditions. Treatments which move forest priority 6<sup>th</sup> code watersheds toward satisfactory conditions should take precedence.
- Implement resource improvement projects that are beneficial for maintaining and improving (1) soil condition and productivity and (2) water quality and quantity.
- Complete onsite soil investigations and refinement of maps for soil disturbing projects that require site-specific, precise, and highly detailed soil information which is beyond the scale of the terrestrial ecosystem survey.
- Analyze or collect site-specific TES information, as needed, to accurately determine the limitations, suitabilities, and productivity potentials of the different terrestrial ecosystems that occur on the forest.

### **Wildlife, Fish, and Botany**

- Implement actions to benefit federally listed and sensitive species by contributing to its recovery or supporting trends that avoid listing.
- Restore terrestrial and aquatic wildlife habitat.
- Coordinate with the AZGFD, USFWS, and interested parties on education, research, and activities that promote and enhance habitat conditions and species recovery.
- Maintain the native-fish-only status of Fossil Creek through remedial actions to remove invasives, increase public education, and provide signage and law enforcement.

### **All Vegetation Types**

- Restore maple and aspen stands.
- Coordinate with local research institutions.

### **Riparian Types**

- Restore nonfunctioning or functioning-at-risk riparian areas so they are in or moving toward proper functioning condition.

### **Desert Communities**

- Construct trails and establishment of restrictions to prevent recreation impacts to Desert Communities.

### **Semidesert Grasslands**

- Collaborate with partners and stakeholders on grassland restoration, grassland connectivity, and education.

### **Great Basin and Montane/Subalpine Grasslands**

- Distribute information to the media and general public that is focused on the unique properties of meadows and appropriate activities within meadows.
- Collaborate with partners and stakeholders on grassland restoration, connectivity, and education.
- Coordinate with the AZGFD on objectives for wildlife conservation, education, and habitat restoration and improvements, particularly regarding pronghorn and prairie dogs.

### **Interior Chaparral**

- Coordinate with local partners and stakeholders to reduce the risk of uncharacteristic fire in the wildland-urban interface (WUI) on the Coconino NF and adjacent non-National Forest System lands.

### **Piñon and Juniper**

- Complete treatments in piñon-juniper vegetation types to move toward desired conditions.
- Use naturally ignited fires to treat Piñon-Juniper Evergreen Shrub and Piñon-Juniper with Grass with low to mixed severity fire.

### **Ponderosa Pine**

- Thin and use prescribed fires and naturally-ignited fires to treat ponderosa pine.

### **Mixed Conifer Types**

- Use prescribed fires and naturally-ignited fires to treat mixed conifer types.

### **Spruce-Fir and Alpine Tundra**

See “Wilderness.”

## **Invasive Species Management**

- Complete treatments in areas containing invasive species to restore native vegetation.
- Complete treatments in aquatic systems containing invasive species to restore native fish populations.
- Prioritize wilderness areas, research natural areas, botanical areas, wild and scenic areas, and riparian areas for control of invasive exotic species to maintain the integrity of native species populations in these unique and rare habitats.
- Maintain a current inventory of invasive exotic species on forest lands.
- Coordinate invasives species management activities with internal and external partners and stakeholders to reduce, minimize, or eliminate the potential for the introduction, establishment, spread, and impact of invasive species.

## **People and the Landscape**

### **Fire Management**

- Complete treatments in WUI areas to reduce fire hazards to communities and the forest.
- Coordinate with other jurisdictions such as communities; service providers (infrastructure); and county, Federal, State, tribal, and local entities regarding prevention, preparedness, planned activities, and responses to wildland fires. Provide notification of upcoming and ongoing fire season activities and any prescribed fire activities to these jurisdictions.
- Implement initial attack activities and other activities to manage naturally-ignited wildfires for resource objectives.
- Participate in the development and implementation of community wildfire protection plans (CWPP) to promote public safety and to reduce the risk of wildfire on non-National Forest System lands.

### **Livestock Grazing**

- Review active allotment management plans on a regular basis.
- Maintain and replace fencing, waters, and other range improvements.

### **Forest Products**

- Ensure the sustainability of special forest products through observation of commercial sales and personal use permit harvest levels.

### **Energy and Minerals**

- Coordinate with the Bureau of Land Management (BLM) to properly process applications for mineral entry on the forest.
- Request withdrawal of some areas on the forest from mineral entry.
- Rehabilitate mineral operations sites that are no longer in use.

### **Heritage Resources**

- Complete project clearances required under existing law, regulation, and policy.
- Complete class of property analysis to better understand site classes and provide more cost-effective clearances.
- Complete nonproject related archaeological surveys in area of moderate or very high site density.
- Stabilize historic structures.
- Participate in partnerships with the Arizona Site Stewards Program, the Arizona Archaeological Society, National Park Service, and the Museum of Northern Arizona to study, protect, and monitor sites.
- Protect cultural and biological resources in the vicinity of Hartwell Canyon.
- Curate records and artifacts through agreements with Forest Service approved repositories.
- Support offsite educational/enrichment products such as classroom programs, heritage celebrations, publications, and field trips.
- Update the cultural resources overview as archaeological study units are defined and existing class of property classes are analyzed.

### **Tribal Relations and Uses**

- Continue tribal consultation on projects and needs as they arise.
- Observe memoranda of agreement between the forest and consulting American Indian tribes to guide consultation processes and reflect the tribes' particular perspectives and interests.
- Participate in regular meetings with tribes to understand their needs.
- Develop a consistent forest products collection policy and tribal firewood program for use on both the Coconino and Kaibab National Forests by working with the Kaibab National Forest and local tribes.
- Create volunteer opportunities for tribal members.

### **Roads and Facilities**

- Naturalize or decommission unauthorized roads and system roads to create a more cost-effective road system and to restore natural resources impacted by roads.
- Construct and close new temporary and permanent roads to support ecosystem restoration activities.
- Coordinate with local, State, and Federal agencies to mitigate impacts from community, highway, and interstate road reconstruction and management needs.
- Implement effective wildlife passage improvement projects.
- Issue road use permits to private landowners who use forest roads and take maintenance responsibility for roads that primarily serve private uses.
- Evaluate outdated facilities and sites for current and future needs, potential reuse, and the capacity to update or retrofit them in order to meet the agency's mission in an economical manner.

### **Land Adjustments**

- Consult with local governments about land adjustment proposals the Coconino NF plans to carry forward and conduct NEPA (National Environmental Policy Act) analysis.
- Encourage open space designations on private land (located between private development and national forest lands) as a buffer to minimize conflicts between residents and other forest users.
- Coordinate with landowners and local and regional governments to encourage private land uses that are compatible with the forest's desired conditions.
- Coordinate with local and regional governments and road agencies to develop transportation solutions that reduce traffic and vehicle impacts on National Forest System lands.
- Ensure reasonable road ingress and egress to private property in the Neighborwoods Management Area that allows fire engines mobility and access.
- Acquire right-of-way agreements for the public and Forest Service uses.

### **Special Uses**

- Issue and supervise permits for new special use activities on the forest including: powerlines, special events, large group gatherings, outfitter-guide activities, and research.
- Rehabilitate existing special use sites that do not meet the scenery guidelines as they are brought up for reauthorization or are no longer required.
- Issue and supervise forest product or vegetation management permits to lessen abrupt vegetation transition in powerline rights-of-way, where it is necessary to clear the right-of-way boundary to meet national standards.
- Complete updates to communication site plans for existing and new communication sites.
- Coordinate with the research community to identify and manage long-term research locations, with the intent of balancing research and management needs.
- Identify preapproved sites for recreation events and large group gatherings on the Red Rock and Flagstaff Ranger Districts.
- Coordinate with the AZGFD for wildlife viewing permits.

### **Dispersed Recreation**

- Develop trail systems for bikes, equestrians, and motorized recreation users.
- Complete updates and changes to the motor vehicle use map to achieve forest plan desired conditions.
- Maintain trails according to development level and managed use.
- Develop a management plan for the Cinder Hills OHV areas.
- Coordinate with the Great Western Trail Association and associated groups to maintain its long-distance trail opportunity.
- Complete updates to the memorandum of understanding (MOU) between the National Park Service and the Coconino NF.
- Develop interpretive plans.

- Participate in outdoor classrooms for school groups and other partnership opportunities with local schools.
- Develop education and outreach programs and/or signs to help reduce user conflicts, such as conflicts between motorized and nonmotorized users.
- Implement management actions to discourage illegal activity and/or creation of unauthorized routes.
- Implement management strategies to reduce user conflicts and address resource concerns.
- Develop interpretive sites as opportunities become available and in conjunction with partners.
- Maintain interpretive signs and exhibits.
- Distribute visitor information at Forest Service offices, visitor centers, and other locations.

### **Developed Recreation**

- Implement vegetation management activities in developed recreation sites, including periodic reviews of vegetation health and opportunities for vegetation to provide screening or manage recreation site concerns—following the protocol for removing hazard trees, where needed. Continue an active tree planting or a regeneration program (where old, diseased, or damaged trees exist) to provide shade and scenic quality.
- Improve facilities' operating efficiency and sustainability through new construction and repairs. Consider energy efficiency through the implementation of recycled or renewable resources which produce a smaller carbon footprint.
- Complete accessibility assessments on developed recreation sites.
- Complete regular patrols at developed facilities to check for public safety, facility/resource protection, and fee compliance.

### **Scenic Resources**

- Rehabilitate areas that do not meet or exceed their desired scenic integrity objective (SIO).
- Cooperate with other entities, such as the Arizona Department of Transportation, local governments, and commercial and private entities to protect scenic integrity on and adjacent to the forest.

### **Special Areas**

#### **Wilderness**

- Rehabilitate wilderness sites or areas that have been impacted by recreation in order to restore wilderness character.
- Implement corrective measures, such as a wilderness permit system, if overuse causes unacceptable resource damage.
- Establish limits of acceptable change (LAC) for all wilderness areas.
- Implement various management actions to prevent bicycle use in wilderness including: ranger patrols, placement of bike racks near wilderness boundaries or portals, “wilderness

## Appendix B. Proposed and Probable Management Practices

ahead” signs located outside of wilderness, improved trail design, and expanded trail opportunities outside of wilderness.

- Complete regular wilderness ranger patrols in wilderness areas.
- Develop and implement management plans for wilderness areas on the forest.
- Develop and implement management plans for any newly designated wilderness areas by 5 years after the designation occurs.

### **Wild and Scenic Rivers**

- Coordinate with the ADEQ to monitor and achieve acceptable total maximum daily loads (TMDLs) for turbidity in the Verde River.
- Implement comprehensive river management plans for the Verde River and Fossil Creek Wild and Scenic Rivers.

### **Arizona National Scenic Trail**

- Maintain and reroute the trail in coordination with the Arizona Trail Association and adjacent landowners.

### **General Crook National Recreation Trail**

- Manage the 138-mile trail corridor (portion located on National Forest System land) from Fort Whipple to Fort Apache and associated historic sites and side trails for potential congressional designation as a national historic trail.
- Develop one representative visual logo for the entire trail by working with adjacent national forests and local entities.

### **National Scenic Byways**

- Coordinate activities and design of byway facilities with the appropriate byway association and byway plan.

### **Research Natural Areas and Botanical and Geological Areas**

- Prepare establishment reports for Rocky Gulch, West Clear Creek, and an eastern expansion of the San Francisco Peaks Research Natural Areas.
- Establish a site stewards program for onsite interpretation and monitoring of the Cottonwood Fumeroles Geological Area.

### **Environmental Study Areas**

- Manage trails and uses in conjunction with the curriculum needs of the associated public schools.
- Develop environmental education programs cooperatively with public schools.

## Appendix C. Species Crosswalk

The following is a crosswalk comparing the common, scientific, and other names attributed to plant and wildlife species discussed in the plan as of the date of publishing. Note that common names and scientific names can change frequently.

	Common Name	Scientific Name	Other Name
Amphibians/ Reptiles	Bullfrogs	<i>Lithobates catesbeianus</i>	American bullfrog
	Chiricahua leopard frog	<i>Lithobates chiricahuensis</i>	
	Leopard frogs	<i>Lithobates pipiens, and Lithobates yavapaiensis</i>	Rana species (former name)
	Lowland leopard frog	<i>Lithobates yavapaiensis</i>	Rana yavapaiensis (former name)
	Narrow-headed garter snake	<i>Thamnophis rufipunctatus</i>	
	Northern Mexican garter snake	<i>Thamnophis eques</i>	
	Toads	<i>Bufo microscaphus (native species)</i>	
Birds	American peregrine falcon	<i>Falco peregrinus anatum</i>	
	Bald eagle	<i>Haliaeetus leucocephalus</i>	
	Bell's vireo	<i>Vireo bellii</i>	
	Common black-hawk	<i>Buteogallus anthracinus</i>	
	Ferruginous hawk	<i>Buteo regalis</i>	
	Golden eagle	<i>Aquila chrysaetos</i>	
	Mexican spotted owl	<i>Strix occidentalis lucida</i>	
	Northern goshawk	<i>Accipiter gentilis</i>	
	Pygmy nuthatch	<i>Sitta pygmaea</i>	
	Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	
	Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	
	Woodpecker	<i>Melanerpes species, Picoides species</i>	
Fish	Desert sucker	<i>Catostomus clarki</i>	
	Gila trout	<i>Oncorhynchus gilae gilae</i>	
	Little Colorado spinedace	<i>Lepidomeda vittata</i>	
	Roundtail chub	<i>Gila robusta</i>	
	Spikedace	<i>Meda fulgida</i>	
Insects	Caddisflies	<i>Includes Atopsyche sperryi, Smicridea dispar, Polycentropus gertschi, Apatania arizona, Polycentropus arizonensis, Lepidostoma knulli, Chimarra primula, Wormaldia arizonensis, Protoptila balmorhea, Ochrotrichia ildria, Culoptila kimminsi, Ceratopsyche venada, Culoptila moselyi, Nectopsyche dorsalis, Rhyacophila chordata, Ithytrichia mexicana,</i>	

Appendix C. Species Crosswalk

	Common Name	Scientific Name	Other Name
<b>Mammals</b>	American pronghorn	<i>Antilocapra americana</i>	Pronghorn or Pronghorn antelope
	Bats	<i>Includes Euderma maculatum, Idionycteris phyllotis, Lasiurus blossevillii, Myotis auriculus, Myotis occultus, Eumops perotis californicus, Corynorhinus townsendii pallescens,</i>	<i>Corynorhinus townsendii pallescens</i> also known as Pale lump-nosed bat. <i>Idionycteris phyllotis</i> also known as Allen’s big-eared bat
	Beaver	<i>Castor canadensis</i>	American Beaver
	Black bear	<i>Ursus americanus</i>	American black bear
	Elk	<i>Cervus canadensis</i>	
	Javelina	<i>Pecari tajacu</i>	Collared peccary
	Mountain lion	<i>Puma concolor</i>	Cougar
	Mule deer	<i>Odocoileus hemionus</i>	
	Prairie dogs	<i>Specifically Cynomys gunnisoni</i>	
	Rocky Mountain bighorn sheep	<i>Ovis canadensis canadensis</i>	
	Turkey	<i>Meleagis gallopavo merriami</i>	
	White-tailed deer	<i>Odocoileus virginianus</i>	
Wupatki pocket mouse	<i>Perognathus amplus cineris</i>		
<b>Plants</b>	A sedge	<i>Carex ultra</i>	
	Agave	<i>Agave species</i>	
	Alder	<i>Alnus oblongifolia</i>	Thin-leaf alder
	Alligator juniper	<i>Juniperus deppeana</i>	
	Alpine clover	<i>Trifolium alpinum L.</i>	
	Alpine timothy	<i>Phleum alpinum L.</i>	
	Apache beardtongue	<i>Penstemon oliganthus</i>	
	Arizona alder	<i>Alnus oblongifolia Torr.</i>	
	Arizona cliffrose	<i>Purshia subintegra</i>	
	Arizona cypress	<i>Hesperocyparis arizonica</i>	
	Arizona fescue	<i>Festuca arizonica</i>	
	Arizona sneezeweed	<i>Helenium arizonicum</i>	
	Arizona sycamore	<i>Platanus wrightii S. Watson</i>	
	Arizona walnut	<i>Juglans major (Torr.) A. Heller</i>	
	Ash	<i>Fraxinus species including F. anomala, F. cuspidate and F. velutina</i>	
	Baltic rush	<i>Juncus balticus</i>	
	Bebb’s willow	<i>Salix bebbiana</i>	
	Bigtooth maple	<i>Acer gradidentatum</i>	
	Black grama	<i>Bouteloua eriopoda</i>	
	Blue grama	<i>Bouteloua gracilis</i>	
Blue spruce	<i>Picea pungens Engelm.</i>		
Box elder	<i>Acer negundo</i>		

Appendix C. Species Crosswalk

	Common Name	Scientific Name	Other Name
	Bristlecone pine	<i>Pinus aristata</i>	
	Catclaw mimosa	<i>Mimosa aculeaticarpa</i> var. <i>biuncifera</i>	
	Cherry	<i>Prunus</i> species including <i>P.emarginata</i> , <i>P. serotina</i> , and <i>P. virginiana</i>	
	Cliff fleabane	<i>Erigeron saxatilis</i>	
	Colorado blue columbine	<i>Aquilegia caerulea</i> var. <i>pinetorum</i>	
	Colorado piñon pine	<i>Pinus edulis</i>	
	Common juniper	<i>Juniperus communis</i>	
	Corkbark fir	<i>Abies lasiocarpa</i> vr. <i>arizonica</i>	
	Creosote bush	<i>Larrea tridentata</i>	
	Crucifixion thorn	<i>Canotia holacantha</i>	
	Deer grass	<i>Muhlenbergia rigens</i>	
	Diffuse knapweed	<i>Centaurea diffusa</i> Lam.	
	Dogwood	<i>Cornus sericea</i> L.	Redosier dogwood
	Douglas-fir	<i>Pseudotsuga menziesii</i>	
	Engelmann spruce	<i>Picea engelmannii</i>	
	Foxtail barley	<i>Hordeum jubatum</i> L.	
	Fremont cottonwood	<i>Populus fremontii</i> S. Watson	
	Galleta grass	<i>Hilaria jamesii</i>	
	Gambel oak	<i>Quercus gambelii</i>	
	Graceful buttercup	<i>Ranunculus inamoenus</i>	
	Grassyslope sedge	<i>Carex oreocharis</i>	
	Hairy grama	<i>Bouteloua hirsuta</i>	
	Hardstem bulrush	<i>Schoenoplectus acutus</i>	
	Kentucky blue-grass	<i>Poa pratensis</i>	
	Leafy spurge	<i>Euphorbia esula</i> L.	
	Limber pine	<i>Pinus flexilis</i>	
	Manna grass	<i>Glyceria species</i>	
	Manzanita	<i>Arctostaphylos pungens</i>	
	Mesquite	<i>Prosopis</i> L.	
	Mistletoe	<i>Arceuthobium species</i>	Witches broom
	Mountain junegrass	<i>Koeleria pyramidata</i>	
	Mountain muhly	<i>Muhlenbergia montana</i>	
	Mountain mahogany	<i>Cercocarpus montanus</i>	
	Muttongrass	<i>Poa fendleriana</i>	
	Narrowleaf cottonwood	<i>Populus angustifolia</i>	
	Needle and thread grass	<i>Hesperostipa comata</i>	
	New Mexico locust	<i>Robinia neomexicana</i> A. Gray	
	Nodding brome	<i>Bromus anomalus</i>	
	One-seeded juniper	<i>Juniperus monosperma</i>	

Appendix C. Species Crosswalk

	Common Name	Scientific Name	Other Name
	Pine dropseed	<i>Blepharoneuron tricholepis</i>	
	Ponderosa pine	<i>Pinus ponderosa</i>	
	Quaking aspen	<i>Populus tremuloides</i>	
	Red berry juniper	<i>Juniperus coahuilensis</i>	
	Red three-awn	<i>Aristida purpurea</i>	
	Rocky Mountain juniper	<i>Juniperus scopulorum</i>	
	Rusby milkvetch	<i>Astragalus rusbyi</i>	
	San Francisco Peaks ragwort	<i>Packera franciscanus</i>	<i>Senecio franciscanus</i>
	Sedges	<i>Carex spp.</i>	
	Senator Mine alumroot	<i>Heuchera eastwoodiae</i>	
	Single-leaf piñon-pine	<i>Pinus monophylla</i>	
	Southwestern white pine	<i>Pinus strobiformis Engelm.</i>	
	Spider saxifrage	<i>Saxifraga flagellaris</i>	
	Spike muhly	<i>Muhlenbergia wrightii</i>	
	Spike rush	<i>Eleocharis species</i>	
	Squirreltail	<i>Sitanion hystrix</i>	
	Subalpine fir	<i>Abies lasiocarpa</i>	
	Sumac	<i>Rhus L. species</i>	
	Sunset Crater beardtongue	<i>Penstemon clutei</i>	
	Timberland blue-eye grass	<i>Sisyrinchium longipes</i>	
	Turbinella oak	<i>Quercus turbinella</i>	
	Two-needle piñon pine	<i>Pinus edulis</i>	
	Utah juniper	<i>Juniperus osteosperma</i>	
	Verde Valley sage	<i>Salvia dorrii ssp. mearnsii</i>	
	Western wheatgrass	<i>Pascopyrum smithii</i>	
	White fir	<i>Abies concolor</i>	
	Willows	<i>Salix spp.</i>	
	Woods rose	<i>Merremia Dennst. Ex Endl.</i>	
	Yarrow	<i>Achillea L. species</i>	
<b>Other</b>	Chytrid fungus	<i>Batrachochytrium dendrobatidis</i>	
	Exotic spruce aphid	<i>Elatobium abietinum</i>	
	White pine blister rust	<i>Cronartium ribicola</i>	

# Appendix D. Other Sources of Information

This appendix includes laws, regulations, Forest Service policy and/or direction, and it references best management practices and useful, current science (at the time of writing this plan). These sources are important in designing projects and activities to achieve desired conditions. They are organized by resource area. Most, if not all, of these relevant documents are available from Forest Service offices.

## Ecosystems

### Air

#### *Executive Orders*

EO 11514, 1970 Protection and enhancement of environmental quality.

#### *Congressional Acts*

Clean Air Act, as amended 1977 and 1990, Regional Haze Rule to meet PM 2.5 and ozone standards.

#### *Forest Service Manual*

FSM 2580.2 – 2580.3 Watershed and Air Management, Chapter 80 Air Resource Management, Objectives and Policy.

#### *Other*

Arizona Regional Haze Implementation Plan

(<http://www.azdeq.gov/function/forms/docs.html#sip>); Arizona Revised Statute 49-501;

Arizona Administrative Code Title 18 Chapter 2 Article 15 Forest and Range Management

Burns (<http://www.azdeq.gov/environ/air/smoke/download/prules.pdf>).

### Aquatic Systems

#### *Executive Orders*

EO 11990, 1977 Wetlands Management; EO 11998, 1977 Floodplain Management.

#### *Congressional Acts*

Federal Water Pollution Control Act of 1956 and Amendments of 1972 (Clean Water Act); Organic Administration Act, 1897 as Amended; National Forest Management Act, 1976; Safe Drinking Water Act, 1977.

#### *Forest Service Manual*

FSM 2510-2520 Watershed and Air Management, Watershed Planning and Watershed Protection and Management; FSM 2530 Water Resource Management; FSM 2540 Water Uses and Development, Regional Supplement No. 2500–2001-1; FSM 2502–2503 Watershed and Air Management, Objectives and Policy; FSM 2541.03 Water Uses and Developments, Policy; FSM 2541.12 Instream and Standing Water Requirements; FSM 2521 Watershed Protection and Management, Watershed Condition Assessment; FSM 2502 and 2503 Watershed and Air Management, Objectives and Policy; FSM 2521.11(b) Watershed Condition Assessment, Priority Setting.

#### *Forest Service Handbook*

FSH 2509.16 Water Resource Inventory Handbook; FSH 2509.22 Soil and Water Conservation Handbook, Region 3, Chapter 10–40, FSH 2509.23 Riparian Area Handbook; FSH 2509.13 Burned-Area Emergency Rehabilitation Handbook; FSM 2526, Watershed and Air Management, Riparian Area Management.

## Biophysical Features

### *Congressional Acts*

Federal Cave Resources Protection Act of 1988, 16 U.S.C. 4301–4309.

### *Code of Federal Regulations*

36 CFR 290: Parks, Forest and Public Property, Cave Resources Management.

### *Forest Service Manual*

FSM 2800 Minerals and Geology, Geologic Resources, Hazards and Services; FSM 2356 Cave Management.

### *Other*

Coconino National Forest Cave Resource Management Guide

## Paleontological Resources

### *Congressional Acts*

Organic Act of 1897 (16 USC 551); Bankhead-Jones Tenant Act of 1937 (7 USC 1101); 1906 Antiquities Act<sup>1</sup>, FS Special Uses Manual 2701.1-2; National Environmental Policy Act of 1969: 42 U.S.C. 4321, sec. 101(b).; Forest and Rangeland Renewable Resources Planning Act of 1974, as amended; 1979 Archeological Resources Protection Act; 1988 Federal Cave Resources Protection Act; PL 101-510 (H.R. 4739, sec. 2825); Paleontological Resources Preservation Act of 2009<sup>2</sup> (PL 111-011).

### *Code of Federal Regulations*

7 CFR 2.60: Delegation of Authority from Secretary of Agriculture to Chief, Forest Service to regulate use and occupancy of National Forest System Lands; and to issue appropriate regulations under 36 CFR 261, Prohibitions; 43 CFR Part 3; 7 CFR 3100.41(a); 36 CFR 251; 36 CFR 251.53(a) and (f) permits for vertebrate fossil collection for scientific and education purposes only; 36 CFR 261.2, 261.9(i), 261.70(a)(5): Prohibitions Section, Orders, special closures, and ability for regions to issue regulations for protection of paleontological resources; 36 CFR 228.62(e) Free-use permit may be required for limited collection of petrified wood for personal use by amateur collectors and scientists. Material cannot be bartered or sold; 36 CFR 296.5(b)(2); 36 CFR 290; 36 CFR 292.41, second definition of paleontological resources; 43 CFR 3505.11.

### *Forest Service Manual*

FSM 2880 Geologic Resources, Hazards and Services; FS Manual 2701.1–2 Paleontological resources management under 1906 Antiquities Act; FSM 2860 Recreational collecting of mineral and fossil material under acquired lands.

## Soil

### *Congressional Acts*

Multiple Use-Sustained Yield Act of 1960; Bankhead-Jones Farm Tenant Act of 1937 as Amended.

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<sup>1</sup> Indicates discrepancy: the 1906 Antiquities Act does not cover paleontological resources according to the courts.

<sup>2</sup> The Forest Service, along with other interagency partners and scientists, is developing implementing regulations for the Paleontological Resources Preservation Act of 2009.

***Forest Service Manual***

FSM 2550 Watershed and Air Management, Chapter 50, Soil Management.

***Forest Service Handbook***

FSH 2509.18; Soil Management Handbook; FSH 2509.22, Soil and Water Conservation Handbook.

**Vegetation*****Congressional Acts***

Organic Act of 1897 (16 U.S.C. 475, 551); Organic Administration Act of 1897 (16 U.S.C. 475, 551); Weeks Law of 1911, as amended (16 U.S.C. 515, 552); Knutsen-Vandenberg Act of 1930 (16 U.S.C. at 576b); Anderson-Mansfield Reforestation and Revegetation Joint Resolution Act of 1949 (16 U.S.C. 581j and 581j(note)); Granger-Thye Act of 1950 (16 U.S.C. at 580g-h); Surfaces Resources Act of 1955 (30 U.S.C. 611-614); Sikes Act (Fish and Wildlife Conservation) of September 15, 1960 (16 U.S.C. at 670g); Multiple-Use Sustained Yield Act of 1960 (MUSYA) (16 U.S.C. 528-531); Wilderness Act of 1964 (16 U.S.C. §§ 1131 et seq.); Wild and Scenic Rivers Act (82 Stat. 906, as amended, 16 U.S.C. 1271 (note), 1271-1287); National Environmental Policy Act (NEPA) of 1969 (16 U.S.C. 4321 et seq.); Endangered Species Act of 1973 (P.L. 93-205, 87 Stat. 884; 16 U.S.C. 1531–1544, as amended); Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended by National Forest Management Act (NFMA) of 1976 (16 U.S.C. 1600–1614, 472a); Clean Water Act of 1977 (33 U.S.C. 1251, 1254, 1323, 1324, 1329, 1342, 1344; 91 Stat. 1566); Clean Air Act, as amended 1977 and 1990 (42 U.S.C. 7401, 7418, 7470, 7472, 7474, 7475, 7491, 7506, 7602); North American Wetland Conservation Act of 1989 (16 U.S.C. 4401 (note), 4401–4413, 16 U.S.C. 669b (note)); Healthy Forests Restoration Act (HFRA) of 2003 (16 U.S.C. at 1611–6591).

***Executive Orders***

EO 11514 Protection and enhancement of environmental quality; EO 11644 Use of off-road vehicles on the public lands; EO 11988 Floodplain management; EO 11990 Protection of wetlands; EO 13112 Invasive Species.

***Code of Federal Regulations***

35 CFR 4247 Protection and enhancement of environmental quality; 37 CFR 2877 Use of off-road vehicles on the public lands; 42 CFR 26951 Floodplain management; 42 CFR 26961 Protection of wetlands; 64 CFR 6183 Invasive Species.

***Forest Service Manual***

FSM 5100-5190; FSM 2020.

**Wildlife, Fish, Botany*****Executive Orders***

EO 13186, Responsibility of Federal Agencies to Protect Migratory Birds.

***Congressional Acts***

Bankhead-Jones Farm Tenant Act of 1937; Multiple Use-Sustained Yield Act of 1960; National Forest Management Act of 1976; Endangered Species Act of 1973; Migratory Bird Treaty Act of 1918; Sikes Act of 1960; 3150.2 State and Private Forestry, Rural Community Fire Protection Program, Objectives; Federal Noxious Weed Act of 1975.

***Code of Federal Regulations***

36 CFR 241.2 Parks, Forests, and Public Property, Fish and Wildlife, Cooperation in Wildlife Management.

***Forest Service Manual***

FSM 2402 Timber Management, Objectives; FSM 2470.2–2470.3 Timber Management, Chapter 70 Silvicultural Practices, Objectives and Policy; FSM 2670–2671 Wildlife, Fish, and Sensitive Plant Habitat Management, Chapter 70, Threatened, Endangered, and Sensitive Plants and Animals, Cooperation; FSM 2671.45 C & F 2671 Wildlife, Fish, and Sensitive Plant Habitat Management, Interim Directives; FSM 3110.2 State and Private Forestry, Cooperative Forest Fire Prevention, Objectives.

***Other***

1982 Rule Provisions, Sections 219.13–219.26; U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee Recommendations to the Secretary, March 4, 2010; Avian Power Line Interaction Committee Guidelines; *Hedeoma diffusum* Management Plan (1984); *Cimicifuga Arizona* Conservation Plan (1995); San Francisco Peaks Alpine Tundra Management Plan (1984).

## **Invasive Exotic Species**

***Executive Orders***

EO 13112, Wetlands Management.

***Congressional Acts***

Federal Noxious Weed Act of 1974, P.L. 93–629, as amended;

***Forest Service Manual***

FSM 2080.5, Noxious Weed Management; FSM 2150, Pesticide-Use Management and Coordination.

***Other***

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947; National Strategy and Implementation Plan for invasive Species Management, FS-805 (2004); U.S. Forest Service Invasive Species Program Web site: <http://www.fs.fed.us/invasivespecies/index.shtml>.

## **People and the Landscape**

### **Fire Management**

***Congressional Acts***

National Environmental Policy Act of 1969; National Forest Management Act of 1976; Federal Land Assistance, Management, and Enhancement (FLAME) Act of 2009.

***Forest Service Manual***

FSM 5110.2 Fire Management, Wildfire Prevention, Objective; FSM 5120 Fire Management, Preparedness; FSM 5130.2 Wildland Fire Suppression, Objective; Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resources in Fire Adapted Ecosystems – A Cohesive Strategy (FSM 5101, 5103, and 5108); FSM 5140.2 Fire Use, Objectives; FSM 5140.3 Fire Use, Policy; FSM 5171, Agreements with Federal Agencies; Interagency Prescribed Fire, Planning and Implementation Procedures Guide, Element 19-Smoke Management & Air Quality (USDA, USDOJ) 2008; Guidance for Implementation of Federal Wildland Fire Management Policy, 2009; FSM 3110.2

Cooperative Forest Fire Prevention, Objective; FSM 3110.3 Policy (Smokey Bear); FSM 2324.2 Wilderness Management, Management of Fire; FSM 5100, Fire Management.

***Forest Service Handbook***

FSH 5109.19 Chapter 50 Fire Management Analysis and Planning Handbook, Fire Management Planning.

***Other***

The 1995/2001 Federal Wildland Fire Management Policy and Program Review; The Wildland and Prescribed Fire Management Policy and Implementation Procedures Reference Guide; The Interagency Fire Management Plan template by the Fish and Wildlife Service, 2006 [www.fws.gov/fire/fmp/development/July08\\_FWS\\_template\\_guidance.doc](http://www.fws.gov/fire/fmp/development/July08_FWS_template_guidance.doc); National Cohesive Wildland Fire Management Strategy; USDOJ, National Fire Plan, 2001. The Coconino National Forest Fire Management Plan, 2010; Community Wildfire Protection Plans (CWPP) for Flagstaff and surrounding communities, Blue Ridge and Mogollon Rim communities, Greater Williams Area, and the Tusayan community, and the Rim Country communities.

## **Livestock Grazing**

***Congressional Acts***

Bankhead Jones Farm Tenant Act of 1937.

***Code of Federal Regulations***

36 CFR 213 Administration of Lands under Title III of the Bankhead-Jones Farm Tenant Act by the Forest Service.

***Forest Service Manual***

FSM 2202 Range Management, Objectives; FSM 2230.2 and 2230.3 Grazing and Livestock Use Permit System, Objective and Policy; FSM 2231.02 Grazing and Livestock Use Permit System, Requirements for Permits with Term Status; FSM 2240.2 and 2240.3 Range Improvements, Objective and Policy; FSM 2242.02 Structural Range Improvements, Objective; FSM 2242.03 Policy; FSM 2243.02 Nonstructural Range Improvements, Objective; FSM 2243.03 Policy; FSM 2250.2 and 2250.3 Range Cooperation, Objective and Policy; FSM 2270.3 Information Management and Reports, Policy; FSM 2237.03 Range Management, Policy; FSM 2541.03 Water Uses and Development, Policies; FSM 2253.4 Range Cooperation, Cooperation with Others; FSM Information Management and Reports, Policy.

***Forest Service Handbook***

FSH 2209.13, Chapter 12.31 Grazing Permit Administration Handbook, Permits with Term Status, Upper Limits; FSH 2209.13 Chapter 90 Rangeland Management Decision-Making.

***Other***

Interagency Technical Reference (USDA, USDOJ), Utilization Studies and Residual Measurements, 1996; Technical Reference 4400-5 Rangeland Inventory & Monitoring, Supplemental Studies, 1992; Technical Reference 4400-7 (BLM) Rangeland Monitoring Analysis, Interpretation, and Evaluation, 1985; Technical Reference 4400-8 (BLM) Rangeland Monitoring, Statistical Considerations, 1992.

## Forest Products

### *Congressional Acts*

National Environmental Policy Act of 1969; National Forest Management Act of 1976.

### *Code of Federal Regulations*

36 CFR 223.5 through 36 CFR 223.10 Parks, Forests, and Public Property, Scope of Free-Use Granted to Individuals, Cutting and Removal of Timber in Free-Use Areas, Permission for Free-Use of Timber Outside Free-Use Areas, Delegations of Authority to Approve Free Use by Individuals, Free-Use to Owners of Certain Mining Claims, Free-Use to Alaskan Settlers, Miners, Residents, and Prospectors; 36 CFR 223.2 Disposal of Timber for Administrative Use; 7 CFR 2.60 Agriculture, Chief, Forest Service; 36 CFR 223.12 Permission to Cut, Damage, or Destroy Trees without Advertisement; 36 CFR 800, National Historic Preservation Act; 36 CFR 223.261 Sale and Disposal of National Forest System Timber; Special Forest Products and Forest Botanical Products.

### *Forest Service Manual*

FSM 2000, Chapter 2020.12(5), Ecological Restoration and Resilience, Executive Orders; Chapter 2020.3(2) Policy; FSM 2400, Timber Management, Chapter 2462, Free Use of Timber; Chapter 2463, Administrative Use; FSM 2400, Chapter 2467 Sales of Special Forest Products, 36 CFR 223.1 Authority to Sell Timber; FSM 2400, Chapter 2431 Management of Timber Sale Program.

### *Forest Service Handbook*

FSH 2409.18, Timber Sale Preparation; Section; FSH 2409.18-2009-2, Section 82.5 Trees, Portions of Trees, or Forest Products Free of Charge for Indian Tribes for Non-Commercial Traditional and Cultural Purposes; FSH 2409.19 Renewable Resources Handbook; FSH 1909.15, Environmental Policy and Procedures Handbook; FSH 2409.19, Timber Sale Administration Handbook.

### *Other*

Forest Service National Resource Guide to American Indian and Alaska Native Relations, 12/05/1997; Tribal Consultation on Section 8105 of the Food, Conservation and Energy Act of 2008 (The Farm Bill); 16 U.S.C.2104 Note Stewardship End Result Contracting Projects.

## Energy and Minerals

### *Code of Federal Regulations*

36 CFR 228 Subpart E, Oil and Gas Resources.

### *Forest Service Manual*

FSM 2320 Wilderness Management; FSM 2802 and 2803 Minerals and Geology, Objectives and Policy; FSM 2814 Mining Claims, Rights, and Obligations of the United States; FSM 2822.41 Mineral Licenses, Permits, and Leases Administer by the Department of the Interior, Forest Service Evaluation and Report; 36 CFR 228 Minerals; FSM 2850 Mineral Materials; Surface Occupancy Standards and Guidelines for Oil and Gas Exploration and Development (the Gold Book) published by BLM; FSM 2822.62, Actions by Forest Service; FSM 2814.01, Mining Claims, Rights of United States; FSM 2814.23 Prevent Violations of Laws and Regulations; FSM 2822.02 Mineral Leases, Permits, and Licenses, Objective; FSM 2822.04 Responsibility; FSM 2880.3 Geologic Resources, Hazards and Services, Policy.

## **Heritage Resources, Tribal Relations, and Uses**

### ***Executive Orders***

EO 13175 Consultation and Coordination with Indian Tribal Governments; EO 13007 Indian Sacred Sites; EO 13007 Indian Sacred Sites; EO 13287 Preserve America, (Partnering to Promote Heritage Tourism in Communities: Guidance for Federal Agencies, 2003); EO 11593 Protection and Enhancement of the Cultural Environment.

### ***Congressional Acts***

National Historic Preservation Act Sections 106 and 110; The Native American Grave Protection and Repatriation Act; American Indian Religious Freedom Act, 1978; Archaeological Resources Protection Act, 1979; Food Conservation and Energy Act of 2008 (The Farm Bill).

### ***Code of Federal Regulations***

36 CFR 800 Protection of historic Properties; 36 CFR 60.4 National Register of Historic Places, Criteria for Evaluation.

### ***Forest Service Manual***

FSM 2360 Heritage Program Management; FSM 2360.7 Heritage Program Management, Program Funding Structure; FSM 2364.03 Protection and Stewardship, Policy; FSM 2364.02 Objectives, American Indian Religious Freedom Act, 1978; FSM 2360.7 Heritage Program Management, Program Funding Structure; FSM 2364.03 Protection and Stewardship, Policy; FSM 2364.02 Objectives.

### ***Other***

Region 3, First Amended Programmatic Agreement Regarding Historic Property protection and Responsibilities (and associated appendices), December 2003; U.S. Forest Service Tribal Relations Strategic Plan.

## **Roads and Facilities**

### ***Code of Federal Regulations***

36 CFR 212 Travel Management; 36 CFR 261 Prohibitions.

### ***Forest Service Manual***

FSM 5460 Right-of-Way Acquisition; FSM 7701.2 Travel Management; FSM 7702 Travel Management, Objectives; FSM 7703 Travel Management, Policy; FSM 7710 Travel Management, Travel Planning; FSM 7730 Road Operation and Maintenance.

### ***Forest Service Handbook***

FSH 2509.22 Soil and Water Conservation Handbook; FSH 7709.55 Travel Planning Handbook; FSH 7709.56 Road Preconstruction Handbook; FSH 7709.59 Road System Operations and Maintenance Handbook.

### ***Other***

Forest Service Washington Office correspondence dated November 10, 2010, RE: Travel Management, Implementation of 36 CFR, Subpart 212, Subpart A (36 CFR 212.5(b)); Forest Service Washington Office correspondence RE: Fiscal Year 2010 Final Program Direction.

## **Lands Adjustments**

### ***Code of Federal Regulations***

36 CFR 254 Landownership Adjustments.

***Forest Service Manual***

FSM 5400 Landownership; FSM 2354.51(a) Fee Title Acquisition on Designated Rivers; FSM 2354.6 Non-designated Rivers.

***Forest Service Handbook***

FSH 5409.12 Appraisal Handbook; FSH 5409.13 Land Acquisition Handbook; FSH 5409.17 Rights-of-Way Acquisition Handbook; FSH 5509.11 Title Claims, Sales, and Grants Handbook.

**Special Uses**

***Congressional Acts***

Act of 1866 General Mining Law; Act of March 3, 1925 (43 Stat. 1133, as amended); The Act of March 4, 1915, as amended July 28, 1956, (16 U.S.C. 497); The Act of November 16, 1973, (30 U.S.C. 185), amending Section 28 of the 1920 Mineral Leasing Act; Alaska National Interest Lands Conservation Act, 1980; An Act to Repeal Timber-Culture Laws, 1891; Archaeological Resources Protection Act of 1979; Bankhead-Jones Farm Tenant Act of 1937, Section 31-33; Colorado Ditch Act of 1986 (FLPMA amendment; Energy Policy Act of 2005; Education Land Grant Act; Exchange for Schools Act (Sisk Act) of December 4, 1967 (81 Stat. 531, as amended; 16 U.S.C. 484a, 521c-521i); Federal Land Policy and Management Act of 1976; Forest Service Facilities Realignment Act of 2005 (119 Stat 559-563; 16 U.S.C. 580d, as amended); General Exchange Act of 1922; Granger-Thye Act of 1950, section 7; Highway Act of August 27, 1958, (23 U.S.C. 317), supplemented by the Act of October 15, 1966 (49 U.S.C. 1651); Land and Water Conservation Fund Act of September 3, 1964; Mineral Leasing Act of 1920, as amended on November 16, 1973, (30 U.S.C. 185(1)); National Forest Roads and Trails Act 1964; Oil and Gas Pipeline amendment to the Mineral Leasing Act, Section 28 authorizes oil and gas pipelines; Organic Act of 1897 provides for rules to regulate occupancy and use of the Forest Reserves; Occupancy Permits Act (March 4, 1915); Preservation of American Antiquities Act of June 8, 1906; Small Tracts Act of January 12, 1983 (96 Stat. 2535; 16 U.S.C. 521c-i); Telecommunications Act of 1996 (Public Law 104-104); Term Permit Act of March 4, 1915, amended July 28, 1956; National Forest Townsite Act of July 31, 1958 (72 Stat. 483; 7 U.S.C. 1012a; 16 U.S.C. 478a) as amended by Section 213 of the Federal Land Policy and Management Act of 1976 (90 Stat. 2760); Water Conveyance Act of 1986 amended FLMPA; Weeks Law of March 1, 1911 (36 Stat. 961 as amended; 16 U.S.C. 516).

***Executive Orders***

EO 11990 Wetlands; EO 11988 Floodplains.

***Code of Federal Regulations***

36 CFR 251 Subpart B Land Uses, Special Uses; 36 CFR 254, subpart A.

***Forest Service Manual***

FSM 2700 Special Uses Management.

***Forest Service Handbook***

FSH 2709.11 Special Uses Handbook.

***Other***

Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines (FWS direction) (these guidelines will be superseded by the guidelines developed by the U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee, once they are finalized and adopted by the Secretary of the Interior); Suggested Practices for Raptor Protection on

Power Lines: The State of the Art in 2006, Avian Powerline Interaction Committee (APLIC) 2006; Edison Electric Institute, Washington, DC. Standard Guidance for Towers with Potential Impacts to Federally-Listed Species and Migratory Birds (document prepared by the U.S. Fish and Wildlife Service).

## **Recreation**

### **Dispersed Recreation**

#### ***Code of Federal Regulations***

36 CFR 212, Travel Management; 36 CFR 251, Land Uses; 36 CFR 261, Prohibitions; 36 CFR 294, Special Areas.

#### ***Forest Service Manual***

FSM 1802 and 1803 Senior, Youth and Volunteer Programs, Objectives and Policy.

#### ***Forest Service Handbook***

FSH 2309.18.4 Trails Management Handbook; FSM 2300, Recreation, Wilderness, and Related Resource Management.

#### ***Other***

1987 Coconino National Forest Land and Resource Management Plan, as Amended; Coconino National Forest Motor Vehicle Use Map; Travel Management Rule, 2005.

### **Developed Recreation**

#### ***Congressional Acts***

National Trails System Act, 2009.

#### ***Code of Federal Regulations***

36 CFR 213 Administration of Lands under Title III of Bankhead-Jones Farm Tenant Act by the Forest Service; 36 CFR 261 Prohibitions; EO 11988 Floodplain Management.

#### ***Forest Service Manual***

R3 Supplement to FSM 2300 Recreation, Wilderness, and Related Resource Management; FSM 2310 Planning and Data Management; FSM 2311 Resource Opportunities in Recreation Planning; FSM 2330.3 Publicly Managed Recreation Opportunities, Policy; FSM 2353.16 Trail, River and Similar Recreation Opportunities; Cooperative Agreements and Rights-of-Way; FSM 2390 Interpretive Services; FSM 5340.2 Law Enforcement, Objectives; FSM 5420 Land Purchases and Donations; FSM 7151.02 Land Surveying, Objectives; FSM 7312.1 and 7312.2 Facility Planning, Plans, and Preliminary Project Analysis; FSH 7309.11 Ch 40 Buildings and Related Facilities, Management; Forest Service Outdoor Recreation Accessibility Guidelines; FSM 7400 Public Health and Pollution Control Facilities.

#### ***Forest Service Handbook***

FSH 7409.11, Sanitary Engineering and Public Health Handbook; Forest Service Outdoor Recreation Accessibility Guidelines, 5/22/2006; FSM 2303 Recreation, Wilderness and Related Resource Management, Policy; FSM 2334 Recreation, Wilderness, and Related Resource Management, Campgrounds and Picnic Grounds.

## Scenic Resources

### *Code of Federal Regulations*

36 CFR 213.3 Part B Administration of Lands under Title III of the Bankhead-Jones Farm Tenant Act by the Forest Service: Protection, occupancy, use, administration, and exercise of reservations.

### *Forest Service Manual*

FSM 2380.13 Landscape Management, Scenic Trails and Byways; FSM 2380.6- 2380.62 Technical Publications and References, Current Publications, Superseded Reference; FSM 2380.14 Landscape Management, Wild and Scenic Rivers; FSM 2380.18 Landscape Management, Landownership Adjustments ; FSM 2380.3 Landscape Management, Policy; FSM 2380.31 Landscape Management, Resource Planning and Management; FSM 2380.43 Landscape Management, Responsibility, Forest Supervisor; FSM 2382.1 Landscape Management, Scenery Management, Scenery Management System.

### *Forest Service Handbook*

Landscape Aesthetics Handbook (US Forest Service Agriculture Handbook No. 701); FSH 1909.12 (13.13a).

## Special Areas

### Wilderness Areas

#### *Congressional Acts*

1964 Wilderness Act.

#### *Forest Service Handbook*

FSH 1909.12 Chapter 70 Wilderness Evaluation, Subsection 71.1 Criteria for Including Improvements; FSH 1909.12 Chapter 70 Wilderness Evaluation, Subsection 72.1 Capability; FSH 1909.12, FSH 1909.12 Chapter 70 Wilderness Evaluation, Subsection 72.3 factors to consider.

#### *Other*

Monitoring Selected Conditions Related to Wilderness Character: A National Framework, USDA Forest Service, Rocky Mountain Research Station, General Technical Report RMRS-GTR-151.

### Wild and Scenic Rivers

#### *Congressional Acts*

Wild and Scenic Rivers Act of 1968.

#### *Forest Service Manual*

FSM 2354.02 Trail, River, and Similar Recreation Opportunities, Objective; FSM 2354.03 Trail, River, and Similar Recreation Opportunities, Policy; FSM 2354.04 Trail, River, and Similar Recreation Opportunities, Responsibility; FSM 2354.21 Recreation, Wilderness, and Related Resource Management, Management of Study Rivers; FSM 2354.42 (a-p) Wild and Scenic River Resource Protection and Management.

#### *Other*

Wild and Scenic River Comprehensive River Management Plans.

## **National Trails and Scenic Byways**

### ***Congressional Acts***

National Historic Preservation Act Sections 106 and 110; National Trails System Act of 1968; Transportation Equity Act for the 21st Century of 1998, or most recent reauthorizing legislation.

### ***Code of Federal Regulations***

36 CFR 800 Parks, Forests, and Public Property, Advisory Council on Historic Preservation; 36 CFR 60.4 National Register of Historic Places, Criteria for Evaluation.

### ***Forest Service Manual***

FSM 2300 Recreation, Wilderness, and Related Resource Management; FSM 2353.11 Recreation, Wilderness, and Related Resource Management, Chapter 50 Trail, River, and Similar Recreation Opportunities, Relationship Between National Recreation, National Scenic, and National Historic Trails and NFS Trails; FSM 2380.13 Landscape Management, Scenic Trails and Byways.

## **Research Natural Areas (RNA), and Botanical and Geological Areas**

### ***Forest Service Manual***

FSM 4063.02 Research Natural Areas, Objectives & FSM 4063.03 Research Natural Areas, Policy; FSM 4000 Research and Development, Chapter 4060, Research Facilities and Areas, Policy; FSM 2880 Geologic Resources, Hazards and Services, Chapter Section 2882.8 Special Interest Areas and Research Natural Areas; FSM 2300 Recreation, Wilderness and related Resource Management, Chapter 2370 Special Recreation Designations.

### ***Other***

RNA Establishment Reports.



## Appendix E. Index of Other Supporting Plan Documentation

The following documents significantly contributed to development of the plan components (i.e., desired conditions, objectives, standards, guidelines, suitability, and monitoring) and/or are evaluations which were required by the 1982 planning rule provisions.

Document	Location	Index Number
Analysis of the Management Situation (AMS)	<a href="#">Coconino National Forest Planning Web site - Analysis of Management Situation and Sustainability Reports</a>	To be added for final plan.
Ecological Sustainability Report (ESR)	<a href="#">Coconino National Forest Planning Web site - Analysis of Management Situation and Sustainability Reports</a>	To be added for final plan.
Economic and Social Sustainability Assessment (ESSA)	<a href="#">Coconino National Forest Planning Web site - Analysis of Management Situation and Sustainability Reports</a>	To be added for final plan.
Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds on the Coconino, Kaibab, and Prescott National Forests	<a href="#">Coconino National Forest Web site - Past Projects Archive</a>	To be added for final plan.
Southwestern Region Climate Change Trends and Forest Planning	<a href="#">Rocky Mountain Research Station Web site – Publications Archive</a>	To be added for final plan.
Public Collaboration and Involvement/Other Planning Efforts	Appendix B in the Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan	To be added for final plan.
Potential Wilderness Area Evaluation	<a href="#">Coconino National Forest Planning Web site – Documents Archive</a>	To be added for final plan.
Wild and Scenic River Eligibility Evaluation	<a href="#">Coconino National Forest Planning Web site – Documents Archive</a>	To be added for final plan.
Research Natural Areas Evaluations	<a href="#">Coconino National Forest Planning Web site – Documents Archive</a>	To be added for final plan.



# Appendix P

**RESOLUTION OF THE  
NAVAJO NATION HUMAN RIGHTS COMMISSION**

Supporting the Submission of “Statement by the Diné Medicine People Associations” and  
Directing the Submittal of the Statement to the University of Arizona James E. Rogers College  
of Law Indigenous Peoples Law & Policy Program

**WHEREAS:**

1. Pursuant to 2 N.N.C. §§ 920 and 921, the Navajo Nation Human Rights Commission (herein referred to as “Commission”) is established in the Legislative Branch as an entity of the Navajo Nation government and organized to operate as a clearinghouse entity to administratively address discriminatory actions against citizens of the Navajo Nation; and to interface with the local, state, federal governments, and with national and international human rights organizations in accordance with the Commission’s plan of operation and applicable laws and regulations of the Navajo Nation; and
2. In 2010, the Commission with the assistance of the Diné Hataalii Association, Inc., Diné Medicine Men’s Association, Inc., and Azee’ Bee Nahaghá of Diné Nation (“Associations”) registered a complaint to the United Nations Special Rapporteur on Rights of Indigenous Peoples, Professor S. James Anaya, on the desecration of the San Francisco Peaks (“Peaks”) by the United States Department of Agriculture Forest Service (“Forest Service”) and Arizona Snowbowl Resort Limited Partnership (“Snowbowl”); and
3. In 2011, Special Rapporteur Anaya submitted his report on the desecration of the Peaks to the United Nations Human Rights Commission and reported that the United States of America (“United States”) never secured the free, prior and informed consent of the Navajo people and other indigenous peoples on the expansion and use of reclaimed wastewater by the Forest Service and Snowbowl; and
4. By Resolution NABIS-58-11, the Navajo Nation Naabik’iyat’i’ Committee, after receiving Special Rapporteur Anaya’s 2011 report on the desecration of the Peaks, authorized the Navajo Nation President and Vice-President, Speaker of the Navajo Nation Council, their designees, and Commission to do all things necessary to protect the Peaks as a sacred site for the Navajo People; and
5. By Resolution NABIJN-26-13, the Navajo Nation Naabik’iyat’i’ Committee authorized the Commission, on behalf of the Navajo Nation, to file a human rights violation with the Inter-American Commission on Human Rights through the University of Arizona James E. Rogers College of Law Indigenous Peoples Law & Policy Program as the Navajo Nation and Navajo people exhausted all domestic remedies in the United States to protect and preserve Navajo human rights and sacred sites and places on and off the Navajo Nation; and

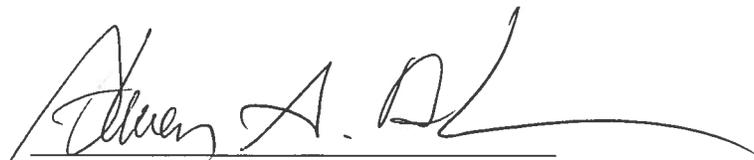
6. The Commission and its staff worked diligently with the Associations to articulate the effects on the Navajo culture, tradition and values (i.e. plant life and ceremonies) when using reclaimed wastewater to produce artificial snow by the Snowbowl on the Peaks. The Associations produced the statement entitled "*Statement by the Diné Medicine People Associations*," attached hereto as Exhibit "A"; and
7. The Commission finds it is in the best interest of the Navajo Nation and Navajo people to submit the Exhibit "A" statement to the University of Arizona James E. Rogers College of Law Indigenous Peoples Law & Policy Program seeing that the Navajo Nation secured the services of the University to prepare and represent the interests of the Navajo Nation and Navajo people with the Inter-American Commission on Human Rights.

**NOW THEREFORE BE IT RESOLVED THAT:**

1. The Navajo Nation Human Rights Commission hereby supports the "*Statement by the Diné Medicine People Associations*," attached hereto as Exhibit "A", and directs the Office of Navajo Nation Human Rights Commission to do all things necessary to submit the statement to the University of Arizona James E. Rogers College of Law Indigenous Peoples Law & Policy Program as soon as possible.
2. The Navajo Nation Human Rights Commission further hereby directs the Office of Navajo Nation Human Rights Commission to consult with the Diné Medicine People Associations to determine the proper Navajo traditional protocol to follow when presenting the attached Exhibit "A" statement to the University of Arizona James E. Rogers College of Law Indigenous Peoples Law & Policy Program, and where appropriate and necessary to engage Navajo medicine person(s).

**CERTIFICATION**

**I hereby certify that the foregoing resolution was duly considered by the Navajo Nation Human Rights Commission at a duly called meeting at St. Michaels, Navajo Nation (AZ) at which a quorum was present at that same was passed by a vote of 3 in favor and 0 opposed, this 7th day of February, 2014.**



Steven A. Darden, *Chairperson*  
Navajo Nation Human Rights Commission

**Joint Resolution of the  
Diné Hataalii Association, Inc.;  
Diné Medicine Men’s Association, Inc.;  
Azee’ Bee Nahaghá of Diné Nation; and  
Diné Culture & Health Center**

Approving and Supporting the Submission of “Statement by the Diné Medicine People Associations” and  
Submittal of the Statement to the University of Arizona James E. Rogers College of Law Indigenous Peoples  
Law & Policy Program

**Whereas:**

1. The Diné Hataalii Association, Inc., is a unique, authentic and distinguished “grassroots” Diné-based non-profit organization comprised of twenty-four (24) medicine men and women who serve six (6) Navajo regions: 1) Crownpoint, 2) Fort Defiance, 3) Chinle, 4) Tuba City, 5) Shiprock, and 6) Aneth Extension; and
2. The Diné Medicine Men’s Association, Inc., is a non-profit organization incorporated with the Navajo Nation Commerce and been in existence since the early 1970s. The Diné Medicine Men’s Association, Inc. consist of members from the grassroots level of traditional apologists as traditional spiritual Diné healers (Hataalii), prophets, cultural educators and traditionalists; and
3. The Azee’ Bee Nahaghá of Diné Nation (formerly the Native American Church of Navajoland) is a non-profit organization with memberships of approximately 20,000 to 25,000 within the Navajo Nation and is dedicated to the protection, preservation and enhancement of the spiritual way of life that goes back to the early 1900s. The Azee’ Bee Nahaghá of Diné Nation is structured and comprised of Executive Officers, Board of Directors, and local Chapter Officials all representing the interest of their membership; and
4. In 2010, the Diné Hataalii Association, Inc., Diné Medicine Men’s Association, Inc., and the Azee’ Bee Nahaghá of Diné Nation (herein referred to as “Associations”) approved and supported the communication of human rights violation to the United Nations Special Rapporteur on the Rights of Indigenous Peoples, Professor S. James Anaya, on the violation of Navajo human rights as it pertained to the desecration of the San Francisco Peaks (“Peaks”), a sacred place to the Navajo people; and
5. In August 2011, Special Rapporteur Anaya issued his report on the desecration of the Peaks. Special Rapporteur stated that Unites States of America government never secured the free, prior and informed consent of the Navajo people and other indigenous peoples on the expansion and use of reclaimed wastewater by the United States Department of Agriculture Forest Service and Arizona Snowbowl Resort Limited Partnership (“Snowbowl”); and
6. The Associations determined that it is in the best interest of the Navajo people, Navajo Life Way and the Peaks that the Navajo Nation Human Rights Commission (“Commission”), on behalf of the Navajo Nation, employ the proper means to ensure that the Peaks is protected and preserved as a sacred place for the Navajo people by registering a complaint with the Inter-American Commission on Human Rights through the University of Arizona James E. Rogers College of Law Indigenous Peoples Law & Policy Program.

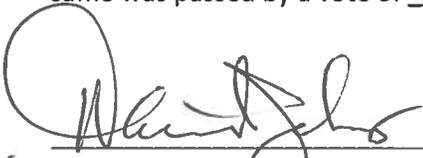
7. The Associations worked diligently with the Commission to help articulate the effects of reclaimed wastewater on plant life and ceremonies that impact the Navajo culture, tradition and values when reclaimed wastewater is used to produce artificial snow by the Snowbowl on the Peaks. The Associations produced the statement entitled "Statement by the Diné Medicine People Associations," attached hereto as Exhibit "A".

**NOW THEREFORE BE IT RESOLVED THAT:**

The Diné Hataalii Association, Inc.; Diné Medicine Men's Association, Inc.; Azee' Bee Nahaghá of Diné Nation and Diné Culture & Health Center hereby jointly approves and supports the "Statement by the Diné Medicine People Associations" to be filed with the Inter-American Commission on Human Rights as a formal complaint alleging that the United States government is violating the inherent and fundamental rights of Navajo people, and to protect and preserve the San Francisco Peaks as a sacred place from further desecration and economic and recreational exploitation by non- indigenous businesses and non-indigenous peoples.

**CERTIFICATION**

We hereby certify that the foregoing joint resolution was duly considered by the Diné Hataalii Association, Inc.; Diné Medicine Men's Association, Inc.; Azee' Bee Nahaghá of Diné Nation and Diné Culture & Health Center at a duly called meeting in St. Michaels, Navajo Nation (AZ) at which a quorum was present at that same was passed by a vote of \_\_\_ in favor, \_\_\_ opposed and \_\_\_ abstained this 23rd day of January 2014.

For:  Vice President  
Dr. Anthony Lee, Sr., President  
Diné Hataalii Association, Inc.

  
Henry Barber, President  
Diné Medicine Men's Association, Inc.

 V.P. ABNON  
Steven Benally, President  
The Azee' Bee Nahaghá of Diné Nation

  
Jack Jackson, Sr., President  
Diné Culture & Health Center

## Statement by the Diné Medicine People Associations

On behalf of the Navajo Nation Human Rights Commission, the Diné Hataaʼii Association, Inc., Diné Medicine Men's Association, Inc., and Azee' Bee Nahaghá of Diné Nation ("Associations"), we thank the University of Arizona James E. Rogers College of Law Indigenous Peoples Law & Policy Program for the opportunity to present the Associations' answer to the following two questions regarding the desecration of the San Francisco Peaks ("Peaks") by the Arizona Snowbowl Resort Limited Partnership ("Snowbowl"). The questions posed are: 1) has the snow making changed the Navajo people's spiritual or cultural practices? and 2) has the use of reclaimed wastewater to produce artificial snow prevented the Navajo people from visiting and using the mountain in ceremonies and for medicinal plant offerings and gatherings?

### Introduction

The United States Department of Agriculture Forest Service's ("Forest Service") October 2013 report entitled *Draft Land and Resource Management Plan for the Coconino National Forest* verifies, "the [Peaks] are sacred to many American Indians as a significant religious landmark and traditional cultural place that contains many shrines and sacred places... [The Peaks] is an icon that gives [American Indians] their identity as a people. The [Peaks] are one of several mountains that demarcate the boundaries of the traditional and sacred heartland of the Hopi, Navajo, Zuni, Acoma, Apache, Havasupai, and Hualapai. Many tribes continue to conduct centuries-old religious observances on the [Peaks] that are central to their culture and religion."<sup>1</sup>

The Peaks is one of six sacred mountains revered to the Navajo people and serves as a foundation to the Navajo Life Way long before the Snowbowl was established on the Peaks for recreational purposes. The fact that the Forest Service acknowledges the sacredness of the Peaks and permits the Snowbowl to use reclaimed wastewater to produce artificial snow is not only sacrilegious, but also a violation of the Navajo people's human rights of ensuring that the Peaks remain a sacred place. The use of reclaimed wastewater, which contains micro-contaminants, has a direct affect on the "ritual purity" of all Navajo traditional healing ceremonies that require the foliage, soil and aesthetic purity of the mountain environment.

### Sacredness of the San Francisco Peaks

The sacred mountains – the Mount Blanca to the East, Mount Taylor to the South, the Peaks to the West, and Mount Hesperus to the North – serve as the foundation of the Navajo Life Way and represents the elements of earth, fire, water and air. Each element symbolizes freedom, cultural integrity and dignity, language, spirituality and ceremony. Each element in, on and of the mountains is inextricably linked to a Navajo person's mental, physical, and spiritual health. The remaining two mountains are Huerfano Mesa to the Center and Gobernador Knob to the East of

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<sup>1</sup> U.S. Dep't of Agric. Forest Service Southwestern Region MB-R3-04-02, *Draft Land and Resource Management Plan for the Coconino National Forest: Coconino, Gila and Yavapai Counties, Arizona*, October 2013, at 121.

## Statement by the Diné Medicine People Associations

Center. All of the sacred mountains embody living male and female deities (*Bii'yist'iin*)<sup>2</sup> and these deities resonate within the sacred mountains. When one of these mountains and elements is desecrated, it throws the Navajo Life Way out of balance and weakens Navajo traditional healing ceremonies and prayers.

A prime example is the Navajo Blessing Way ceremony which requires physical elements from the sacred mountains. Together the elements, prayers, songs, and chants are systematically arranged and recited in a clockwise fashion according to the six sacred mountains. Elements from each mountain are gathered and contained in a sacred medicine bundle. Each bundle is individually tied according to the formation and placed in order of the sacred mountains. All Navajo ceremonies and prayers performed by a medicine person revere the sacred mountains and give strength and stability to one's thinking, planning, and life way. The mountains and their elements serve as the basis for the fundamental and natural laws that guide the Navajo people. Any man-made disruption that manipulates this balance will lessen the healing and protection of a Navajo patient.

### United States Disregard to Culture Protection Input

Although the United States government possesses a general trust responsibility towards its indigenous peoples, it has not protected the cultural properties important to the Navajo people. In fact, the United States frequently allows for the desecration and economic exploitation of indigenous peoples' sacred places for the financial and recreational benefits of non-indigenous businesses and the non-indigenous public. In November 2010, the Forest Service held several public listening sessions throughout the United States to reach out to the indigenous peoples as part of Executive Orders 13007 and 13175. This consultation process was to review existing policies and procedures, and to examine the effectiveness of current laws and regulations to ensure a consistent level of protection for sacred sites located on National Forest System lands for indigenous peoples.<sup>3</sup> Furthermore, in July 2012, the United States Department of the Interior Bureau of Indian Affairs ("Indian Affairs") followed suit and held several public listening sessions to address indigenous peoples concerns regarding sacred sites, and develop practices and policies to protect sacred sites.<sup>4</sup>

The Associations recommended to the Forest Service and Indian Affairs that they abandon and replace the words "sacred sites" with "sacred places" because "sacred places" encompassed both a sacred site and the surrounding area, and does not limited a sacred area to a specific landmark

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<sup>2</sup> *Bii'yist'iin*: "the spirit within." Navajos believe all life have a lifeline or spirit within, and that source of lively energy circulates throughout our body(ies). It is described as "breathing in air" (which is female, a feminine) and "breathing out air" (which is male, a masculine). *Bii'yist'iin* is the soul or personality not only of the mountains but also earth, fire, air, water, the universe and all living species.

<sup>3</sup> Letter from Harris D. Sherman, Under Secretary, Natural Resource and Environment, and Thomas L. Tidwell, Chief, U.S. Forest Service, Office of the Secretary, U.S. Department of Agriculture, to Interested Tribal Participant (November 3, 2010) (on file with author).

<sup>4</sup> Letter from Donald E. Laverdure, Acting Assistant Secretary – Indian Affairs, Office of the Secretary, U.S. Department of the Interior, to Tribal Leader (July 27, 2012) (on file with author).

## Statement by the Diné Medicine People Associations

or site. However, in December 2012, the Forest Service's final report<sup>5</sup> said, the "Forest Service does not intend for the concept of sacred places to replace sacred sites in [Executive Order] 13007"<sup>6</sup> because "sacred sites are limited to discrete, specific locations, while a sacred place might be larger scale geographic feature"<sup>7</sup> such as the Peaks. The definition limiting sacred sites to "specific, discrete, narrowly delineated locations"<sup>8</sup> of "religious significance"<sup>9</sup> is to narrow and inconsistent with the Associations, Commission and the Navajo people's view of sacredness. The narrowness and inconsistency of the definition of a sacred site jeopardizes sacred places for the Navajo people. The Navajo people and other indigenous nations refute and dismiss this definition as it is to narrow and inconsistent with the view of sacredness and the vastness that encompass the Peaks.

### The Impact on the San Francisco Peaks Vegetation and Ceremonies

Although the reclaimed wastewater meets both the Forest Service and Arizona's water quality standard to produce artificial snow, the Associations deem that the unregulated residual elements in the reclaimed wastewater will negatively impact the spiritual and medicinal purity of plant life on the Peaks. As Professor S. James Anaya reported in July 2011, "some of the reclaimed [wastewater] once passed through hospitals or mortuaries could carry the spirits of the dead with it. Those spirits, as part of the water draining from the Peaks, would then infiltrate plants, thus affecting [Navajo] ritual purity."<sup>10</sup> Any plant life that come in contact with reclaimed wastewater will be contaminated for medicinal purposes, as well as for use in traditional healing ceremonies needed to perpetuate the Navajo Life Way and cultural values.

The Forest Service's *Draft* report states, eighty-seven percent of the plant life on the Peaks is used for traditional healing ceremonies and/or cultural uses by American Indians.<sup>11</sup> The eighty-seven percent of plant life and ecosystem are the Mixed Conifer Types, Spruce-Fir and Alpine Tundra.<sup>12</sup> Two major plants from the Mixed Conifer Types and Spruce-Fir vegetation used in Navajo traditional healing ceremonies are the Spruce tree (*Ch'oh*) and Douglas-fir tree (*Ch'oh dootl'iizh*). Branches from these trees are utilized in a major Navajo winter ceremony, the *Yei Bei Cheii* ceremony, which lasts nine-nights. The firmness and rich purity of the branch must last the entire nine-night ceremony. It is carefully selected and taken from a tree with assurances that its purpose is for healing and restoring mental and spiritual balance to the patient. In addition,

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<sup>5</sup> U.S. Dep't of Agric. Forest Service Off. of Tribal Relations, *Report to the Secretary of Agriculture. USDA Policy and Procedures Review and Recommendations: Indian Sacred Sites*, December 2012, available at <http://www.fs.fed.us/spf/tribalrelations/documents/sacredsites/SacredSitesFinalReportDec2012.pdf>

<sup>6</sup> *Id.* at 18.

<sup>7</sup> *Id.* at 18.

<sup>8</sup> Exec. Order No. 13007, Fed. Reg. 26771 (May 24, 1996).

<sup>9</sup> *Id.*

<sup>10</sup> U.N. Off. of the U.N. High Comm'r for Human Rights, Letter dated July 6, 2011 from Special Rapporteur on the rights of indigenous peoples to the Special Procedures of the Human Rights Council, REFERENCE: AL Indigenous (2001-8) USA 10/2011 (July 6, 2011).

<sup>11</sup> U.S. Dep't of Agric. Forest Service, *supra* note 1, at 58-71.

<sup>12</sup> *Id.*

## Statement by the Diné Medicine People Associations

seasonal offerings (*Sodizin*) are given at the base of the Spruce trees growing on the Peaks. These offerings differ and are not all the same. Some offerings are made to restore and strengthen the patient's healing of mind and body. Other offerings are to bring natural rainfall and snowfall. The sacred reciprocation of nurturance, use and restoration involves a deep extrasensory relation between the natural and supernatural beings that exist on and in the Peaks.

Furthermore, the pine tree (*Nidishchii'*) is used in at least six traditional healing ceremonies for the Navajo people: the Wind Way (*Nilch'iji*), Enemy Way (*Anaa'ji*), Evil Way (*Hochxó'iji*), Night Way Chant (*Tl'ééji na'akai*), Red Ant Way (*Wóláchii'ji*) and Big Star Way (*Sq'tsohji*). The pine tree, in part, is used in preparation and administration of emetic and curing herbs. It is mixed with other plant life such as the rabbit brush (*Ch'ildiilyésii*), juniper tree needles (*Gadni'yeeli*), sagebrush (*Ts'ah*), and primrose bush (*Awée'ts'áál*). The emetic and curing herbs are ingested and applied to the patient in two Navajo ceremonies, the Evil Way or Ghost Way, the *Hochxó'iji* ceremonies. The rocky mountain juniper (*Gad ni'eelii*) is another plant life used for traditional ceremonies in the Blessing Way (*Hózhóóji*) and Evil Way. The rocky mountain juniper is carried at night during certain ceremonies to protect the Navajo patient against evil spirits. The mistletoe (*Dahts'aa'*) is one of the plant life used in the Enemy Way medicine and is used to protect the hogan from lightening. The mountain mahogany (*Tsé'ésdaazii*) is another plant life used as an emetic in five- and nine-night ceremonies. It is used to treat and restore blood disorders such as diabetes, anemia, increase red and white blood count, or stabilize high blood pressure. In addition, the mountain mahogany is used to make ceremonial equipment or medicine in the Mountain Chant (*Dzil'k'iji*), Plume Way (*'Ats'osee*) and Wind Way.

The use of reclaimed wastewater to produce and spray artificial snow by Snowbowl on the Peaks not only impacts the plant life near the Snowbowl but the entire plant life on the Peaks especially when high winds carry the residual contaminates of the reclaimed wastewater snow from one area to another. This in turn affects the purity of the plant life on the Peaks that are used in Navajo ceremonies. Moreover, the use of reclaimed wastewater will prevent a medicine person from effectively treating their patients because the emetic and curing herbs require ingesting. Medicine persons are presently cautious in gathering plant life from the Peaks to treat their patients because of the reclaimed wastewater contaminates that are now on the Peaks. Moreover, the cultural integrity of the Navajo people depends on the Peaks remaining pure.

As the plant life on the Peaks is impacted due to the use of reclaimed wastewater, the "ritual purity" of Navajo ceremonies is denigrated. The operation of the Snowbowl is one example of the irreparable harm that results from the denigration and destruction of a people's identity. The Navajo people have been subjected to abandon their tradition, culture and values, and accept fragmented forms of ceremonial practices. Sanctioning the operation of the Snowbowl signifies to the Navajo people that it is acceptable and appropriate to degrade Navajo tradition, culture and values. The Snowbowl has cultivated this belief by offering employment and advertising itself as a luxury necessity of recreation and relaxation over the expense of the Navajo people's right to manifest, protect and pass from generation to generation their tradition, culture and values. The

## **Statement by the Diné Medicine People Associations**

deseccration of the Peaks impacts the Navajo people in that it created a deviation from the original pristine Navajo ceremonies. Navajo ceremonies have been practiced since time immemorial and there were a set of ritual standards and avoidance of these ceremonial standards. As a result, present day Navajo ceremonies are riddled with fragmentations and are abbreviated, which is attributed to the lack of the ritual purity, and degradation of cultural and intellectual properties that the Navajo people hold sacred.

### **Conclusion**

In answering the questions, 1) has the snow making changed the Navajo people's spiritual or cultural practices? and 2) has the use of reclaimed wastewater to produce artificial snow prevent the Navajo people from visiting and using the mountain in ceremonies and for medicinal plant offerings and gatherings?, the answers to both questions is emphatically and profoundly yes. Allowing the Snowbowl to continue to produce artificial snow with the permit-approval by the Forest Service allows for the ritual purity of all Navajo ceremonies to be disparaged by the use of reclaimed wastewater. The eighty-seven percent of the plant life that is used for traditional healing ceremonies will diminish in purity and in turn will affect a medicine person from properly healing their patient as the plant life is ingested or applied. The respect for the original pristine Navajo ceremonies has diminished and the ritual standards and avoidance of these ceremonies that were strictly prohibited are now fragmented and abbreviated due to the lessening of the "ritual purity" of Navajo ceremonies.

# Appendix Q

United States  
Department of  
Agriculture

Forest  
Service

Southwestern  
Region



February  
2005

# Final Environmental Impact Statement for Arizona Snowbowl Facilities Improvements Volume 1

## Coconino National Forest Coconino County, Arizona

### Legal Description:

Northeast corner of section 1, Township 22 North, Range 6 East  
Southeast corner of section 36, Township 23 North, Range 6 East  
Southern half of section 31, Southwestern corner of section 32,  
Township 23 North, Range 7 East  
Northern portion of section 6, Northwestern portion of section 5,  
Township 22 North, Range 7 East

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To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14<sup>th</sup> and Independence Avenue, SW, Washington, DC 20250-9410, or call (202) 720-5967 (voice or TDD). USDA is an equal opportunity provider and employer.

# FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE

## ARIZONA SNOWBOWL FACILITIES IMPROVEMENTS PROPOSAL

COCONINO NATIONAL FOREST  
COCONINO COUNTY, ARIZONA

*FEBRUARY 2005*

**Lead Agency:** USDA Forest Service

**Responsible Official:** Nora B. Rasure, Forest Supervisor  
1824 S. Thompson St.  
Flagstaff, AZ 86001  
(928) 527-3600

**For Information Contact:** Gene Waldrip, District Ranger  
Peaks Ranger District  
5075 N. Highway 89  
Flagstaff, AZ 86004  
(928) 526-0866

**Or:** Ken Jacobs  
Project Leader  
Mormon Lake Ranger Station  
4373 S. Lake Mary Road  
Flagstaff, AZ 86001  
(928) 214-2464

**Abstract:** This Final Environmental Impact Statement (FEIS) has been prepared to analyze and document the environmental effects of a proposal to provide a consistent/reliable operating season through snowmaking and to enhance the overall recreational experience at the Arizona Snowbowl ski area. The Arizona Snowbowl is located on the Coconino National Forest in Coconino County, Arizona and operates in accordance with the terms and conditions of a Ski Area Term Special Use Permit issued by the US Forest Service. The Proposed Action includes installation of snowmaking infrastructure to support approximately 205.2 acres of season-long snow coverage; realignment and/or lengthening of the Sunset, Hart Prairie, and Aspen lifts; installation of one new chairlift and four surface lifts; development of new skiing terrain, increasing skiable acreage within the SUP area from approximately 138 acres to approximately 204 acres; development of a snowplay/tubing area, with associated surface lifts, parking, and guest service facilities; the creation of a halfpipe; and improvement of service facilities and ski

area infrastructure. Forest Plan Amendment #21 is incorporated to allow for changed circumstances within the SUP area and to relate to the Master Development Plan based on NEPA analysis and approvals. This FEIS discusses the purpose and need for the Proposed Action; alternatives to the Proposed Action; potential direct, indirect, and cumulative impacts of implementing each alternative; and mitigation measures. Three alternatives are analyzed in the EIS. The Decision Maker's selected alternative is documented in the accompanying Record of Decision (ROD).

**Appeals:** The decision documented in the ROD is subject to appeal pursuant to 36 CFR 215.11. Any appeal of this decision must be fully consistent with 36 CFR 215.14, "Content of Notice of Appeal," and it must be received within 45 days of the date of publication of the legal notice in the Arizona Daily Sun.

The written Notice of Appeal must be sent to:

Appeal Deciding Officer  
USDA Forest Service  
Region 3, Southwestern Region  
333 Broadway SE  
Albuquerque, NM 87102

# EXECUTIVE SUMMARY

**Coconino National Forest  
Peaks Ranger District**



# EXECUTIVE SUMMARY

## INTRODUCTION

A Draft Environmental Impact Statement (DEIS) for the Arizona Snowbowl Facilities Improvements proposal was released to the public in February 2004. In response to the DEIS, a total of 9,887 comments were submitted by various mediums, including: letters; form letters; faxes, emails; phone calls; and petitions. The total number of commentors totaled 5,716. The Forest Service has prepared this Final EIS (FEIS) - Volume 1 - which includes updates to the original analysis, as based on substantive comments received. Numerous changes have been incorporated into the analysis between DEIS and FEIS, with the most substantial changes occurring in the Environmental Justice analysis contained in Section 3N. The Response to Comments (RTC) submitted on the DEIS is contained in Volume 2 of the FEIS. Finally, a Record of Decision (ROD) has been prepared and accompanies volumes 1 and 2. The ROD documents the Decision Maker's Selected Alternative and rationale for the decision.

The Arizona Snowbowl (hereinafter referred to as "Snowbowl") is owned and operated by Arizona Snowbowl Resort Limited Partnership. The Snowbowl is located entirely on the Coconino National Forest (CNF) on the western flank of the San Francisco Peaks. The ski area is operated under a 777-acre Forest Service-issued Special Use Permit (SUP), which is renewed on a 40-year basis. Snowbowl is approximately 15 miles north of Flagstaff, one of the four largest metropolitan areas in Arizona (refer to Figure 1-1). Snowbowl is surrounded on three sides by the 18,963-acre Kachina Peaks Wilderness, which was designated by the U.S. Congress in 1984.

Skiers<sup>1</sup> have been using the Snowbowl since 1938, when the ski area's original base area was established in Hart Prairie. In addition to wintertime skiing and snowboarding, the Snowbowl offers summertime scenic chairlift rides on the (Sky ride program) Agassiz Chairlift. Guided horseback rides, banquets and restaurant facilities are also available.

## PURPOSE AND NEED FOR THE PROPOSED ACTION

The Forest Service and Snowbowl cooperatively determined general categories important for improving the Snowbowl's facilities. From these categories, a list of proposed projects was created, and the Proposed Action ultimately emerged. The Proposed Action responds to the goals and objectives outlined in the Forest Plan,<sup>2</sup> and helps move the project area towards desired conditions described in it.

The overall Purpose and Need for these projects responds to two broad categories: 1) to provide a consistent/reliable operating season, and 2) to improve safety, skiing conditions, and

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<sup>1</sup> At ski areas, one may see people using Alpine, snowboard, telemark, cross-country, and other specialized ski equipment, such as that used by disabled or other skiers. Accordingly, the terms "ski, skier, and skiing" in this document encompass all lift-served sliding sports typically associated with a winter sports resort.

<sup>2</sup> USDA Forest Service, 1987

recreational opportunities by bringing terrain and infrastructure into balance with existing demand.

## **SUMMARY OF THE ALTERNATIVES ANALYZED IN THE FEIS**

All alternatives include a provision by where a new Master Development Plan (MDP) would be developed for Arizona Snowbowl to provide for operation and maintenance of existing facilities into the future. The reader is referred to Table 2-4 for a comparison of alternative components.

### **FOREST PLAN AMENDMENT**

In addition, Alternatives 1, 2 and 3 include amending the Coconino Forest Plan with a non-significant amendment<sup>3</sup> clarifying the direction in Management Area 15 – Developed Recreation Sites. Page 188 of the Forest Plan makes reference to the 1979 FEIS as guidance for the management of the Snowbowl ski area. This management direction necessitates being updated to reference the Arizona Snowbowl’s Master Development Plan based on NEPA analyses and subsequent approvals. The original management emphasis did not allow for the changed circumstances that may initiate a new environmental analysis of the ski area operations. The reader is referred to Appendix B for more information.

### **ALTERNATIVE 1 - NO ACTION**

As required by NEPA, a No Action Alternative has been included in this analysis for review alongside the action alternatives.<sup>4</sup> The No Action Alternative reflects a continuation of existing management practices without changes, additions, or upgrades. Therefore, no new facilities, trail improvements, or snowmaking would occur under the No Action Alternative and the Snowbowl would continue to operate at its existing Comfortable Carrying Capacity (CCC) of 1,880 skiers-at-one-time. The No Action Alternative provides a baseline for comparing the effects of the Proposed Action and Alternative 3.

### **ALTERNATIVE 2 - THE PROPOSED ACTION**

In response to the purpose and need, the following Proposed Action was assembled by Snowbowl and the Forest Service. Because Forest Plan direction for management of the Snowbowl SUP area does not specifically allude to amenities such as snowtubing and snowmaking, a non-significant Forest Plan amendment is included as a portion of the Proposed Action in order to allow the Forest Service and Snowbowl to respond to key portions of the Purpose and Need.

#### **Snowmaking**

- Approximately 205 acres of snowmaking coverage throughout the SUP area utilizing Class A reclaimed water as a source

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<sup>3</sup> Regulations at 36 CFR 219.10(f) direct the Forest Service to consider whether a proposed amendment to a forest plan would be considered a significant change.

<sup>4</sup> 40 CFR 1502.14(d)

- A 10 million-gallon snowmaking water reservoir near the top terminal of the existing Sunset Chairlift, and catchment pond below the Hart Prairie Lodge
- Construct a reclaimed water pipeline between Flagstaff and the Snowbowl with booster stations and pumphouses
- Construct a 3,000 to 4,000 square foot snowmaking control building in the vicinity of the existing maintenance shop

### **Snowplay/Tubing Facility**

- A professionally designed and managed snowplay/tubing facility at the base area including sculpted lanes, lifts and a lodge

### **Lifts/Uphill Capacity**

- Replace of the Sunset Chairlift with a high speed, detachable chair
- Relocate the existing Sunset Chairlift as the Humphreys Chairlift, accessing a pod of proposed ski trails
- Upgrade and extension of the Hart Prairie Chairlift with a high-speed, detachable lift
- Upgrade and realignment of the Aspen Chairlift
- Install three surface conveyors in the area north of the Hart Prairie Lodge
- Install a handle tow is proposed to service a halfpipe and terrain park

### **Terrain**

- Additional terrain, bring total skiable acreage at the Snowbowl to approximately 204 acres
- Approximately 47 acres of thinning to created improved glades
- Approximately 87 acres of terrain improvements (grading/stumping and smoothing)
- Create a dedicated teaching area near the Hart Prairie Lodge
- Construct a halfpipe

### **Guest Service Facilities**

- Enlarge the Hart Prairie Lodge by approximately 6,000 square feet to a *total* of 24,900 square feet
- Construct a new 10,000 square foot guest services facility adjacent to the Agassiz Lodge<sup>5</sup>
- Construct a 2,500 square foot Native American cultural and education center constructed in or near the Agassiz Lodge
- Replace existing on-mountain ski team buildings

### **Summer Trails**

- Construct a hiking trail from the existing Agassiz Chairlift mid-station to the top terminal
- Construct an Americans with Disabilities Act (ADA) compliant summer access trail into Hart Prairie from the parking lot near Agassiz Lodge

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<sup>5</sup> Facilities in both the Hart Prairie and Agassiz lodges would be brought into ADA compliance.

## **Infrastructure and Utilities**

- Construct a 14.8-mile pipeline to transport reclaimed water from Flagstaff to Snowbowl
- Install snowmaking pipelines buried within existing and proposed trails
- Redesign the entrance circle, which would have signs directing guests to parking lots, day lodges, and snowplay parking
- Construct a 400-space parking area to service the proposed tubing facility
- Combine parking lots #1 and #2 by re-grading and leveling them
- Develop approximately 1,110 feet of additional on-mountain access road
- Reconstruct approximately 3,650 feet of existing two-track mountain access road
- Decommission approximately 3,050 feet of existing two-track mountain access road
- Install buried 10,000-gallon water storage tanks at each of the lodges and at the snowplay building to facilitate the use of reclaimed water
- Construct a pedestrian underpass

## **ALTERNATIVE 3 - NO SNOWMAKING OR SNOWPLAY**

By excluding all snowmaking infrastructure and the associated use of reclaimed water on the San Francisco Peaks, Alternative 3 was designed to respond to tribal and public concerns over effects to cultural and spiritual values as well as effects to water quality within the watershed.

Alternative 3 also responds to cultural issues related to scarring of the San Francisco Peaks with reduced ground and vegetation disturbance. When compared to the Proposed Action, Alternative 3 reduces permanent and temporary ground disturbance. Alternative 3 includes all components as described in the Proposed Action with the exception of snowmaking, the snowtubing facility, and the realignment of the Aspen Chairlift or associated vegetation clearing in the northwestern portion of Hart Prairie.

## **ALTERNATIVES CONCEPTS CONSIDERED BUT NOT ANALYZED IN DETAIL**

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not analyzed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the established project purpose and need. Some of these alternatives may have been outside the scope of the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered but eliminated from detailed consideration. Refer to Chapter 2 for a more detailed description of these alternatives considered but eliminated from the EIS.

- Remove the Ski Area
- Night Lighting
- Reduced Development of Additional Skiable Terrain - Humphreys Pod
- Reduced Snowmaking Coverage
- Alternative On-Site and Nearby Water Sources
- Additional / Alternative Summer Recreational Opportunities
- Alternative Snowmaking Water Pipeline Alignments

## **PUBLIC INVOLVEMENT**

### **PUBLIC SCOPING AND COMMENTS ON THE DEIS**

On September 23, 2002, a scoping notice describing the Forest Service's Proposed Action was mailed to approximately 350 community residents, interested individuals, public agencies, and other organizations. This notice was designed to elicit comments, concerns, and issues pertaining to the Proposed Action. A press release and legal notice were distributed to key local and regional media. On October 7, 2002, the Forest Service published a required Notice of Intent (NOI) to prepare an EIS in the Federal Register. In addition, two public open houses were held at the Flagstaff High School on October 10, and 26, 2002 to formally introduce the Proposed Action. Approximately 1,200 comment letters were received by the Forest Service by the end of the comment period. Based upon the responses received during scoping, the Forest Service Interdisciplinary Team (ID Team) prepared a list of resource issues and areas to be analyzed within DEIS.

As previously indicated, the DEIS was released to the public in February 2004. Substantive comments were extracted and responded to, either individually or "thematically" in the Response to Comments contained in Volume 2 of the FEIS

### **TRIBAL SCOPING AND CONSULTATION**

The Forest has been consulting with approximately 13 tribes or chapters - representing the Hopi, Navajo, Zuni, Acoma, Apache, Hualapai, Havasupai, Yavapai, and Southern Paiute - about the cultural significance of the San Francisco Peaks since the 1970's. The Forest Service initiated tribal consultation on the Proposed Action in June 2002 with a formal letter from the Forest Supervisor to 13 tribal leaders. Also in June 2002, the District Ranger contacted tribal representatives from Cultural Preservation Offices of 13 formally recognized tribes to discuss the Snowbowl proposal and suggest pre-proposal meetings. Phone contacts between the District Archaeologist and several tribal Cultural Preservation Officers (Hopi, Navajo, Hualapai, San Carlos Apache, Yavapai-Apache) were made during the months of June-December 2002. In addition, follow-up phone calls to interested tribes were made by the District Archaeologist to ensure receipt of letters. Overall, numerous phone calls and letters have been sent to tribes and the tribal public requesting input.

Two formal public meetings were held on the Hopi and Navajo Indian Reservations (Tuba City and Kykotsmovi) on Monday, December 9, 2002. The emphasis of these two public meetings was to explain the Proposed Action to tribal members and to elicit comment/concerns on behalf of individuals and the tribe. Throughout the Tribal consultation process specific to the Proposed Action, the Forest Service estimates that approximately 205 phone calls were made, 41 meetings were held and 245 letters were exchanged.

## **ISSUES, RESOURCES REQUIRING ADDITIONAL ANALYSIS, AND INDICATORS**

Based on the results of internal and public scoping, the Forest Service identified specific areas (resources) of concern. The two issues that emerged from the scoping process were related to heritage resources. These issues warranted the creation of an additional alternative. Beyond

these two issues, 17 additional “resources requiring additional analysis and disclosure” were identified. Issues and resources requiring additional analysis and disclosure have been assigned indicators for use in addressing them. While some indicators are necessarily qualitative in nature, every effort was made to use indicators that are quantitative, measurable, and predictable. The project record includes all comments letters that were submitted during the scoping period, as well as a synthesis comments which was used by the Forest Service ID Team to identify issues. A summary of the issues and resources requiring additional analysis follows. Indicators used for the analysis of each resources area can be found in Chapter 1 and their effects throughout Chapter 3.

## **HERITAGE RESOURCES**

**Issue #1** - *The installation and operation of snowmaking infrastructure as described in the Proposed Action, and the use of reclaimed wastewater as a water source, may impact cultural and spiritual values associated with the San Francisco Peaks (Issue).*

**Issue #2** - *Proposed ground disturbances and vegetation removal may result in permanently evident, visible alterations (i.e., “scarring”) of the San Francisco Peaks’ landscape (Issue).*

*Some people feel the effects of the Proposed Action cannot be adequately described until the significant qualities of the San Francisco Peaks are identified as part of the National Register nomination process (Resource requiring additional analysis).*

## **NOISE**

*The proposed snowmaking system may increase noise levels potentially disturbing residents, recreationists, and/or wildlife (Resource requiring additional analysis).*

## **TRAFFIC AND ACCESS**

*The Proposed Action may affect traffic volumes and/or congestion on U.S. Highway 180 and/or the Snowbowl Road (Resource requiring additional analysis).*

## **AESTHETIC IMPACTS**

*Proposed ground disturbance and vegetation removal within the SUP may incrementally affect the aesthetic quality of the west face of the San Francisco Peaks (Resource requiring additional analysis).*

## **SOCIO-ECONOMICS**

*Implementation of the Proposed Action may have social and economic effects on Flagstaff and Coconino County (Resource requiring additional analysis).*

## **RECREATIONAL OPPORTUNITIES AND EXPERIENCES**

*The Proposed Action may affect the quality, distribution, and opportunity for winter and summer recreational experiences within the SUP area (Resource requiring additional analysis).*

## **WILDERNESS VALUES**

*Implementation of the Proposed Action may affect the experience of wilderness users within the surrounding Kachina Peaks Wilderness (Resource requiring additional analysis).*

## **SKI AREA INFRASTRUCTURE AND UTILITIES**

*The Proposed Action may affect ski area infrastructure and supporting utilities within and beyond the SUP area (Resource requiring additional analysis).*

## **WATERSHED RESOURCES**

*The application of Class A reclaimed water for snowmaking within the SUP area may affect water quality within the receiving subwatersheds (Resource requiring additional analysis).*

*Use of reclaimed water for snowmaking purposes between November and February of each year may affect aquifer recharge (Resource requiring additional analysis).*

## **SOILS AND GEOLOGY**

*The Proposed Action has potential to change soil chemistry and moisture due to the application of machine produced snow (Resource requiring additional analysis).*

## **VEGETATION**

*Plant communities (including T, E and S plant species, and regionally important plants) within the SUP area may be altered as a result of the proposed projects (Resource requiring additional analysis).*

*The Proposed Action has potential to change vegetation composition within the SUP area due to the application of machine-produced snow (Resource requiring additional analysis).*

## **WILDLIFE**

*The Proposed Action may result in the alteration and/or removal of habitat for terrestrial wildlife species within the SUP (Resource requiring additional analysis).*

*Proposed snowmaking activities may result in a longer-duration snowpack and additional water storage for wildlife in the SUP area (Resource requiring additional analysis).*

## **GEOTECHNICAL ANALYSIS**

*Geotechnical feasibility and associated hazards associated with construction of the proposed snowmaking impoundment on the ridge above the Sunset Chairlift must be analyzed (Resource requiring additional analysis).*

## **AIR RESOURCES**

*Snowplay activities at Snowbowl may increase vehicular traffic and may negatively impact air quality in the region (Resource requiring additional analysis).*

## **AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

A useful description of the affected environment and environmental consequences for each resource area analyzed in Chapter 3 not appropriate for a summary. The reader is referred to Table 2-5.

# TABLE OF CONTENTS

**Coconino National Forest  
Peaks Ranger District**



# TABLE OF CONTENTS

## 1. PURPOSE AND NEED

INTRODUCTION .....	1-1
DOCUMENT STRUCTURE .....	1-1
BACKGROUND .....	1-2
PURPOSE AND NEED FOR THE PROPOSED ACTION.....	1-6
SUMMARY OF THE PROPOSED ACTION.....	1-9
DECISION FRAMEWORK .....	1-10
PUBLIC INVOLVEMENT .....	1-10
ISSUES, RESOURCES REQUIRING ADDITIONAL ANALYSIS AND INDICATORS .....	1-14
<i>The Human Environment</i> .....	1-14
<i>The Physical and Biological Environment</i> .....	1-19

## 2. DESCRIPTION OF ALTERNATIVES

INTRODUCTION .....	2-1
ALTERNATIVES CONSIDERED IN DETAIL .....	2-1
<i>Forest Plan Amendment</i> .....	2-1
<i>Alternative 1 – No Action</i> .....	2-2
<i>Alternative 2 – Proposed Action</i> .....	2-5
<i>Alternative 3 – No Snowmaking or Snowplay</i> .....	2-17
<i>Mitigation Measures and Best Management Practices</i> .....	2-21
ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL .....	2-32
COMPARISON OF ALTERNATIVES.....	2-40
DATA INTEGRITY .....	2-62

## 3. THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION .....	3-1
SCOPE OF ANALYSIS .....	3-1
EXISTING CONDITIONS .....	3-1
DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES .....	3-1
CUMULATIVE EFFECTS .....	3-1
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES .....	3-2
FOREST PLAN CONSISTENCY .....	3-2

### 3A. HERITAGE AND CULTURAL RESOURCES..... 3-3

SCOPE OF THE ANALYSIS .....	3-3
EXISTING CONDITIONS .....	3-3
ENVIRONMENTAL CONSEQUENCES.....	3-16
<i>Direct and Indirect Effects</i> .....	3-16
<i>Cumulative Effects</i> .....	3-25
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-29

### 3B. NOISE..... 3-31

SCOPE OF THE ANALYSIS .....	3-31
EXISTING CONDITIONS .....	3-31
ENVIRONMENTAL CONSEQUENCES.....	3-35
<i>Direct and Indirect Effects</i> .....	3-35
<i>Cumulative Effects</i> .....	3-37
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-39

<b>3C. TRAFFIC AND SKI AREA ACCESS .....</b>	<b>3-40</b>
SCOPE OF THE ANALYSIS .....	3-40
EXISTING CONDITIONS .....	3-40
ENVIRONMENTAL CONSEQUENCES .....	3-45
<i>Direct and Indirect Effects</i> .....	3-45
<i>Cumulative Effects</i> .....	3-49
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-51
<b>3D. AESTHETIC RESOURCES.....</b>	<b>3-52</b>
SCOPE OF THE ANALYSIS .....	3-52
FOREST PLAN DIRECTION .....	3-52
EXISTING CONDITIONS .....	3-56
ENVIRONMENTAL CONSEQUENCES .....	3-57
<i>Direct and Indirect Effects</i> .....	3-57
<i>Cumulative Effects</i> .....	3-69
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-72
<b>3E. SOCIAL AND ECONOMIC RESOURCES .....</b>	<b>3-73</b>
SCOPE OF THE ANALYSIS .....	3-73
EXISTING CONDITIONS .....	3-73
ENVIRONMENTAL CONSEQUENCES .....	3-83
<i>Summary of Environmental Consequences and Conclusions</i> .....	3-83
<i>Detailed Analysis of Direct and Indirect Effects</i> .....	3-87
<i>Cumulative Effects</i> .....	3-126
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-128
<b>3F. RECREATION .....</b>	<b>3-129</b>
SCOPE OF THE ANALYSIS .....	3-129
EXISTING CONDITIONS .....	3-129
ENVIRONMENTAL CONSEQUENCES .....	3-138
<i>Direct and Indirect Effects</i> .....	3-138
<i>Cumulative Effects</i> .....	3-148
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-149
<b>3G. INFRASTRUCTURE AND UTILITIES .....</b>	<b>3-150</b>
INTRODUCTION .....	3-150
SCOPE OF THE ANALYSIS.....	3-150
EXISTING CONDITIONS .....	3-150
ENVIRONMENTAL CONSEQUENCES .....	3-153
<i>Direct and Indirect Effects</i> .....	3-153
<i>Cumulative Effects</i> .....	3-158
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-159
<b>3H. WATERSHED RESOURCES .....</b>	<b>3-160</b>
SCOPE OF THE ANALYSIS .....	3-160
EXISTING CONDITIONS .....	3-163
<i>Hydrogeologic Setting</i> .....	3-163
<i>Wastewater Treatment and Reuse</i> .....	3-175
<i>Rio de Flag Water Reclamation Facility</i> .....	3-201
<i>Water Quality of the Rio de Flag WRF</i> .....	3-203
ENVIRONMENTAL CONSEQUENCES .....	3-206
<i>Summary of Environmental Consequences and Conclusions</i> .....	3-206
<i>Detailed Analysis of Direct and Indirect Effects</i> .....	3-208

<i>Cumulative Effects</i> .....	3-219
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-224
<b>3I. SOILS AND GEOLOGY .....</b>	<b>3-225</b>
SCOPE OF THE ANALYSIS .....	3-225
EXISTING CONDITIONS .....	3-225
ENVIRONMENTAL CONSEQUENCES .....	3-240
<i>Summary of Environmental Consequences and Conclusions</i> .....	3-240
<i>Detailed Analysis of Direct and Indirect Effects</i> .....	3-242
<i>Cumulative Effects</i> .....	3-270
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-279
<b>3J. VEGETATION .....</b>	<b>3-280</b>
SCOPE OF THE ANALYSIS .....	3-280
EXISTING CONDITIONS .....	3-280
ENVIRONMENTAL CONSEQUENCES .....	3-285
<i>Summary of Environmental Consequences and Conclusions</i> .....	3-285
<i>Detailed Analysis of Direct and Indirect Effects</i> .....	3-287
<i>Cumulative Effects</i> .....	3-294
<i>Irreversible and Irretrievable Commitment of Resources</i> .....	3-299
<b>3K. WILDLIFE.....</b>	<b>3-300</b>
SCOPE OF THE ANALYSIS .....	3-300
EXISTING CONDITIONS .....	3-300
ENVIRONMENTAL CONSEQUENCES .....	3-316
<i>Summary of Environmental Consequences and Conclusions</i> .....	3-316
<i>Detailed Analysis of Direct and Indirect Effects</i> .....	3-317
<i>Cumulative Effects</i> .....	3-328
<i>Irreversible and Irretrievable Commitment of Resources</i> .....	3-334
<b>3L. GEOTECHNICAL .....</b>	<b>3-335</b>
SCOPE OF THE ANALYSIS .....	3-335
EXISTING CONDITIONS .....	3-335
ENVIRONMENTAL CONSEQUENCES .....	3-340
<i>Direct and Indirect Effects</i> .....	3-340
<i>Cumulative Effects</i> .....	3-350
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-350
<b>3M. AIR QUALITY .....</b>	<b>3-351</b>
INTRODUCTION .....	3-351
SCOPE OF THE ANALYSIS .....	3-351
FEDERAL AND STATE AIR QUALITY REGULATIONS .....	3-351
EXISTING CONDITIONS .....	3-353
ENVIRONMENTAL CONSEQUENCES .....	3-357
<i>Direct and Indirect Effects</i> .....	3-357
<i>Cumulative Effects</i> .....	3-360
<i>Irreversible and Irretrievable Commitments of Resources</i> .....	3-361
<b>3N. ENVIRONMENTAL JUSTICE .....</b>	<b>3-362</b>
EXECUTIVE ORDER 12898 .....	3-362
COUNCIL ON ENVIRONMENTAL QUALITY ENVIRONMENTAL JUSTICE GUIDANCE .....	3-363
U.S. DEPARTMENT OF AGRICULTURE ENVIRONMENTAL JUSTICE REGULATIONS .....	3-365
CULTURAL AND DEMOGRAPHIC INFORMATION RELATED TO THE ARIZONA SNOWBOWL.....	3-366

DETERMINATION OF ENVIRONMENTAL JUSTICE ISSUES.....	3-366
<b>4. PREPARERS AND CONTRIBUTORS</b>	
FOREST SERVICE .....	4-1
<i>Forest Service ID Team</i> .....	4-1
CONSULTANT TEAM .....	4-2
<i>Prime Contractor: SE Group (Frisco, CO office)</i> .....	4-2
<i>Specialty Sub-Consultant Team</i> .....	4-2
<i>Northland Research, Inc. Flagstaff, AZ</i> .....	4-2
ACKNOWLEDGEMENTS: .....	4-3
<b>5. AGENCIES, ORGANIZATIONS, TRIBAL GOVERNMENTS, AND PERSONS RECEIVING COPIES OF THE FEIS</b>	
FEDERAL GOVERNMENT .....	5-1
TRIBAL GOVERNMENTS .....	5-1
STATE GOVERNMENT .....	5-1
LOCAL GOVERNMENT.....	5-2
LOCAL MEDIA .....	5-2
ORGANIZATIONS.....	5-2
OTHER INTERESTED INDIVIDUALS .....	5-3
<b>6. REFERENCES</b>	
<b>7. GLOSSARY OF TERMS</b>	
<b>8. INDEX</b>	
<b>APPENDIX A: CONCEPTUAL SNOWMAKING WATER IMPOUNDMENT DESIGN</b>	
<b>APPENDIX B: PROPOSED FOREST PLAN AMENDMENT</b>	
<b>APPENDIX C: CUMULATIVE EFFECTS TABLE</b>	
<b>APPENDIX D: MEMORANDUM OF AGREEMENT BETWEEN THE USDA FOREST SERVICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND THE ARIZONA STATE HISTORIC PRESERVATION OFFICER</b>	

# LIST OF TABLES

TABLE 1-1: EXISTING TERRAIN DISTRIBUTION.....	1-8
TABLE 2-1: PROPOSED TERRAIN BREAKDOWN (ACRES) .....	2-9
TABLE 2-2: MITIGATION MEASURES AND BMPs.....	2-23
TABLE 2-3: RESPONSE TO ISSUES .....	2-40
TABLE 2-4: ALTERNATIVES MATRIX .....	2-40
TABLE 2-5: SUMMARY OF DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES .....	2-43
TABLE 3A-1: PROPOSED ACTION GROUND AND VEGETATION DISTURBANCE.....	3-20
TABLE 3A-2: ALTERNATIVE 3 GROUND AND VEGETATION DISTURBANCE .....	3-23
TABLE 3B-1: TYPICAL SOUND LEVELS FROM VARIOUS SOURCES .....	3-32
TABLE 3B-2: HUD REGULATIONS FOR EXTERIOR NOISE .....	3-34
TABLE 3B-3: NOISE LEVELS (DBA) FOR COMMON NOISE SOURCES .....	3-34
TABLE 3C-1: AADT FOR U.S. HIGHWAY 180 IN THE VICINITY OF SNOWBOWL 1998 - 2002 .....	3-42
TABLE 3C-2: SNOWBOWL SKIER VISITS 1998/99 – 2002/03.....	3-42
TABLE 3C-3: ADT ON U.S. HIGHWAY 180.....	3-43
TABLE 3C-4: ADT FOR SNOWBOWL ROAD .....	3-43
TABLE 3C-5: AADT FOR U.S. HIGHWAY 180 .....	3-46
TABLE 3D-1: VIEWSHED .....	3-69
TABLE 3E-1: TOTAL POPULATION CHANGE ARIZONA, COCONINO COUNTY, FLAGSTAFF (1990 – 2002) .....	3-74
TABLE 3E-2: RACIAL DISTRIBUTION OF THE POPULATION ARIZONA, COCONINO COUNTY, FLAGSTAFF (1990, 2000) .....	3-75
TABLE 3E-3: POPULATION PROJECTIONS ARIZONA, COCONINO COUNTY, FLAGSTAFF (2000 – 2015) .....	3-75
TABLE 3E-4: TOTAL HOUSING UNITS ARIZONA, COCONINO COUNTY, FLAGSTAFF (1990, 2000) .....	3-76
TABLE 3E-5: HOUSING STOCK DETAILS ARIZONA, COCONINO COUNTY, FLAGSTAFF (2000) .....	3-76
TABLE 3E-6: VACANT HOUSING STOCK ARIZONA, COCONINO COUNTY, FLAGSTAFF (2000) .....	3-77
TABLE 3E-7: DISTRIBUTION OF EMPLOYMENT BY INDUSTRY AND AVERAGE WAGES COCONINO COUNTY, ARIZONA .....	3-78
TABLE 3E-8: LABOR FORCE AND UNEMPLOYMENT RATES FLAGSTAFF, COCONINO COUNTY, FLAGSTAFF MSA, ARIZONA (1998 – 2003).....	3-79
TABLE 3E-9: VISITATION AND ECONOMIC IMPACTS OF TOURISM ACTIVITY ARIZONA (1996 – 2001) .....	3-80
TABLE 3E-10: ANNUAL SKIER VISIT TOTALS U.S., PACIFIC WEST REGION, ARIZONA, ARIZONA SNOWBOWL (1996/97 – 2002/03) .....	3-81
TABLE 3E-11: ARIZONA AND ARIZONA SNOWBOWL SKIER VISITS AS PERCENTAGE OF LARGER MARKETS (1996/97 – 2002/03).....	3-82
TABLE 3E-12: CURRENT ECONOMIC IMPACT ARIZONA SNOWBOWL.....	3-90
TABLE 3E-13: SUMMARY OF IMPACTS OF ALTERNATIVES.....	3-92
TABLE 3E-14: SHORT-TERM IMPACTS ALTERNATIVE 1.....	3-93
TABLE 3E-15: LONG-TERM INCREMENTAL IMPACTS ALTERNATIVE 1.....	3-94
TABLE 3E-16: ARIZONA SNOWBOWL PAYMENTS TO FOREST SERVICE (1998 – 2002).....	3-94
TABLE 3E-17: SALES TAXES PAID BY ARIZONA SNOWBOWL (1998 – 2003).....	3-95
TABLE 3E-18: PERSONAL PROPERTY TAX PAYMENT MADE BY ARIZONA SNOWBOWL TO COCONINO COUNTY (1998 – 2002).....	3-96
TABLE 3E-19: ESTIMATED ANNUAL PERSONAL PROPERTY PAYMENTS ALTERNATIVE 1 .....	3-96
TABLE 3E-20: PROJECT CAPITAL EXPENDITURES BY ALTERNATIVE.....	3-97
TABLE 3E-21: SHORT-TERM IMPACTS ALTERNATIVE 2-THE PROPOSED ACTION.....	3-98

TABLE 3E-22: LONG-TERM INCREMENTAL IMPACTS ALTERNATIVE 2-THE PROPOSED ACTION.....	3-98
TABLE 3E-23: ESTIMATED ANNUAL PERSONAL PROPERTY TAX PAYMENTS ALTERNATIVE 2 .....	3-100
TABLE 3E-24: SHORT-TERM IMPACTS ALTERNATIVE 3.....	3-102
TABLE 3E-25: LONG-TERM INCREMENTAL IMPACTS ALTERNATIVE 3 .....	3-102
TABLE 3E-26: ESTIMATED ANNUAL PERSONAL PROPERTY PAYMENTS ALTERNATIVE 3 .....	3-104
TABLE 3E-27: DISTRIBUTION OF NON-FARM EMPLOYMENT COCONINO COUNTY (2002) .....	3-117
TABLE 3E-28: SNOWFALL, SNOWBOWL SKIER VISITS AND WINTER TOURISM PROXY HISTORIC DATA SETS .....	3-119
TABLE 3E-29: BBB TAX COLLECTIONS GENERATED BY SNOWBOWL VISITORS AS A PERCENTAGE OF TOTAL BBB TAX COLLECTIONS .....	3-124
TABLE 3F-1: COMPARISON OF ANNUAL SNOWFALL, DAYS OPEN AND VISITATION AT SNOWBOWL .....	3-130
TABLE 3F-2: EXISTING TERRAIN BREAKDOWN BY ABILITY LEVEL.....	3-131
TABLE 3F-3: EXISTING LIFT NETWORK .....	3-132
TABLE 3F-4: TERRAIN DENSITY ANALYSIS (EXISTING) .....	3-132
TABLE 3F-5: KACHINA PEAKS WILDERNESS PERMITS .....	3-136
TABLE 3F-6: KACHINA PEAKS WILDERNESS USE.....	3-137
TABLE 3F-7: TOTAL SKIABLE ACREAGE UNDER ALTERNATIVES 1, 2 AND 3.....	3-141
TABLE 3F-8: TERRAIN DENSITY ANALYSIS (PROPOSED ACTION).....	3-143
TABLE 3G-1: ELECTRICAL REQUIREMENTS FOR EXISTING LIFTS .....	3-151
TABLE 3G-2: ELECTRICAL REQUIREMENTS FOR PROPOSED LIFTS.....	3-156
TABLE 3H-1: RIO DE FLAG STATE OF ARIZONA NUMERIC WATER QUALITY CRITERIA (µG/L).....	3-178
TABLE 3H-2A: NATIONAL PRIMARY DRINKING WATER STANDARDS .....	3-184
TABLE 3H-2B: NATIONAL SECONDARY DRINKING WATER STANDARDS.....	3-186
TABLE 3H-3: USGS RECONNAISSANCE SCREENING OF ORGANIC WASTEWATER CONSTITUENTS FOR HUMAN DRUG COMPOUNDS .....	3-192
TABLE 3H-4: USGS RECONNAISSANCE SCREENING OF ORGANIC WASTEWATER CONSTITUENTS - VETERINARY AND HUMAN ANTIBIOTICS (µG/L) .....	3-194
TABLE 3H-5: USGS RECONNAISSANCE SCREENING OF ORGANIC WASTEWATER CONSTITUENTS - INDUSTRIAL AND HOUSEHOLD WASTES (µG/L) .....	3-195
TABLE 3H-6: PROJECTED HYDROLOGIC CONDITIONS IN THE SNOWBOWL SUB-AREA .....	3-211
TABLE 3H-7: PROJECTED HYDROLOGIC CONDITIONS IN THE AGASSIZ SUB-WATERSHED .....	3-212
TABLE 3H-8: PROJECTED HYDROLOGIC CONDITIONS IN THE HART PRAIRIE WATERSHED .....	3-214
TABLE 3H-9: COMPARATIVE GROUNDWATER RECHARGE ESTIMATES ANALYSIS OF FOUR-MONTH PROJECTED RECHARGE TO THE REGIONAL AQUIFER AS BASED ON AVERAGE YEAR PRECIPITATION .....	3-223
TABLE 3I-1: MONTHLY PRECIPITATION ARIZONA SNOWBOWL PROJECT AREA .....	3-226
TABLE 3I-2: MONTHLY TEMPERATURES ARIZONA SNOWBOWL PROJECT AREA .....	3-227
TABLE 3I-3: SUB-WATERSHED CHARACTERISTICS.....	3-228
TABLE 3I-4: AVERAGE YEAR WATER BALANCE .....	3-233
TABLE 3I-5: DRY YEAR WATER BALANCE.....	3-233
TABLE 3I-6: WET YEAR WATER BALANCE .....	3-234
TABLE 3I-7: AREA-NORMALIZED WATER BALANCE.....	3-234
TABLE 3I-8: MAPPED SOIL UNITS ARIZONA SNOWBOWL SUP AREA .....	3-236
TABLE 3I-9: MAPPED SOILS UNITS MANAGEMENT AND USAGE LIMITATIONS .....	3-239
TABLE 3I-10: ANTICIPATED SNOWMAKING WATER USE.....	3-243
TABLE 3I-11: ALTERNATIVE 2 TRAIL CLEARING AND SNOWMAKING BY WATERSHED .....	3-244
TABLE 3I-12: ALTERNATIVE 2 AVERAGE YEAR WATER BALANCE CHARACTERISTICS .....	3-245
TABLE 3I-13: ALTERNATIVE 2 CHANGE IN AVERAGE YEAR WATER BALANCE CHARACTERISTICS .....	3-245
TABLE 3I-14: ALTERNATIVE 2 DRY YEAR WATER BALANCE CHARACTERISTICS .....	3-246
TABLE 3I-15: ALTERNATIVE 2 CHANGE IN DRY YEAR WATER BALANCE CHARACTERISTICS.....	3-246
TABLE 3I-16: ALTERNATIVE 2 WET YEAR WATER BALANCE CHARACTERISTICS .....	3-247

TABLE 3I-17: ALTERNATIVE 2 CHANGE IN WET YEAR WATER BALANCE CHARACTERISTICS .....	3-247
TABLE 3I-18: ALTERNATIVE 3 TRAIL CLEARING.....	3-248
TABLE 3I-19: ALTERNATIVE 3 AVERAGE YEAR WATER BALANCE CHARACTERISTICS .....	3-248
TABLE 3I-20: ALTERNATIVE 3 CHANGE IN AVERAGE YEAR WATER BALANCE CHARACTERISTICS .....	3-249
TABLE 3I-21: ALTERNATIVE 3 DRY YEAR WATER BALANCE CHARACTERISTICS .....	3-249
TABLE 3I-22: ALTERNATIVE 3 CHANGE IN DRY YEAR WATER BALANCE CHARACTERISTICS.....	3-250
TABLE 3I-23: ALTERNATIVE 3 WET YEAR WATER BALANCE CHARACTERISTICS .....	3-250
TABLE 3I-24: ALTERNATIVE 3 CHANGE IN WET YEAR WATER BALANCE CHARACTERISTICS .....	3-251
TABLE 3I-25: ALTERNATIVE 2 GRADED TERRAIN BY SLOPE CLASS .....	3-254
TABLE 3I-26: ALTERNATIVE 2 WEPP MODEL PREDICTED EROSION RATE (SLOPE CLASS, TONS/ACRE).....	3-255
TABLE 3I-27: PROPOSED ACTION GRADED AREAS - POTENTIAL INCREASED SEDIMENT DETACHMENT ABOVE EXISTING CONDITIONS.....	3-256
TABLE 3I-28: ALTERNATIVE 3 - GRADED TERRAIN BY SLOPE CLASS .....	3-258
TABLE 3I-29: ALTERNATIVE 3 - WEPP MODEL PREDICTED EROSION RATE (BY SLOPE CLASS, TONS/ACRE) .....	3-258
TABLE 3I-30: ALTERNATIVE 3 GRADED AREAS POTENTIAL INCREASED SEDIMENT DETACHMENT ABOVE EXISTING CONDITIONS .....	3-259
TABLE 3I-31: SOILS COLUMN PHYSICAL PROPERTIES .....	3-261
TABLE 3I-32: MOISTURE AND DENSITY FROM ADVANCED TERRA TESTING .....	3-261
TABLE 3I-33: COLUMN TEST SOILS CHEMISTRY .....	3-262
TABLE 3I-34: COLUMN TEST WATER CHEMISTRY .....	3-263
TABLE 3I-35: NUTRIENT ANALYSIS OF SNOWBOWL SOILS.....	3-266
TABLE 3I-36: ALTERNATIVE 1 AVERAGE YEAR WATER BALANCE CUMULATIVE EFFECTS .....	3-273
TABLE 3I-37: ALTERNATIVE 1 DRY YEAR WATER BALANCE CUMULATIVE EFFECTS.....	3-273
TABLE 3I-38: ALTERNATIVE 1 WET YEAR WATER BALANCE CUMULATIVE EFFECTS .....	3-274
TABLE 3I-39: ALTERNATIVE 2 - AVERAGE YEAR WATER BALANCE CUMULATIVE EFFECTS .....	3-275
TABLE 3I-40: ALTERNATIVE 2 - DRY YEAR WATER BALANCE CUMULATIVE EFFECTS.....	3-275
TABLE 3I-41: ALTERNATIVE 2 - WET YEAR WATER BALANCE CUMULATIVE EFFECTS .....	3-276
TABLE 3I-42: ALTERNATIVE 3 - AVERAGE YEAR WATER BALANCE CUMULATIVE EFFECTS .....	3-278
TABLE 3I-43: ALTERNATIVE 3 - DRY YEAR WATER BALANCE CUMULATIVE EFFECTS.....	3-278
TABLE 3I-44: ALTERNATIVE 3 - WET YEAR WATER BALANCE CUMULATIVE EFFECTS .....	3-279
TABLE 3J-1: APPROXIMATE AREA OF SUBALPINE GRASSLAND, SPRUCE-FIR FOREST, AND ALPINE TUNDRA IN THE SUP AND ON THE SAN FRANCISCO PEAKS <sup>A</sup> .....	3-281
TABLE 3J-2: FOREST SERVICE SENSITIVE PLANT SPECIES ELIMINATED FROM FURTHER ANALYSIS .....	3-282
TABLE 3J-3: NOXIOUS PLANT SPECIES DOCUMENTED WITHIN THE ANALYSIS AREA AND THEIR DISTRIBUTION... 3-285	
TABLE 3J-4: VOLUME OF SNOWMAKING AND NITROGEN DEPOSITION RATE WITHIN THE SNOWBOWL SUB- WATERSHED IN DRY, AVERAGE, AND WET YEARS .....	3-291
TABLE 3J-5: SUMMARY OF STUDIES ON THE EFFECTS OF NITROGEN ADDITION ON PLANT COMMUNITIES .....	3-293
TABLE 3J-6: PLANT SPECIES INCLUDED IN SEED-MIXES FOR SKI TRAIL RECLAMATION.....	3-295
TABLE 3K-1: SENSITIVE WILDLIFE SPECIES ELIMINATED FROM FURTHER ANALYSIS.....	3-301
TABLE 3K-2: COCONINO NATIONAL FOREST MANAGEMENT INDICATOR SPECIES .....	3-307
TABLE 3K-3: MANAGEMENT INDICATOR SPECIES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS ... 3-308	
TABLE 3K-4: MIGRATORY BIRD SPECIES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS .....	3-314
TABLE 3M-1: STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS .....	3-351

# LIST OF FIGURES

FIGURE 1-1: LOCATION MAP .....	1-5
FIGURE 1-2: COMPARISON OF NATURAL SNOWFALL AND SKIER VISITS (1981/82 THROUGH 2003/04) .....	1-7
FIGURE 2-1: NO ACTION ALTERNATIVE .....	2-4
FIGURE 2-2: ALTERNATIVE 2 – PROPOSED ACTION .....	2-12
FIGURE 2-3: ALTERNATIVE 2 – SNOWMAKING PLAN .....	2-13
FIGURE 2-4: PROPOSED RECLAIMED WATER PIPELINE ROUTE .....	2-14
FIGURE 2-5: ALTERNATIVE 2 – GRADING PLAN.....	2-15
FIGURE 2-6: ALTERNATIVE 2 – UTILITY MAP.....	2-16
FIGURE 2-7: ALTERNATIVE 3.....	2-18
FIGURE 2-8: ALTERNATIVE 3 – GRADING PLAN.....	2-19
FIGURE 2-9: ALTERNATIVE 3 – UTILITY MAP.....	2-20
FIGURE 2-10: ALTERNATIVE PIPELINE ROUTES CONSIDERED BUT ELIMINATED.....	2-39
FIGURE 3B-1: SOUND LEVEL VERSUS DISTANCE.....	3-33
FIGURE 3D-1: PHOTO SIMULATION – KACHINA PEAKS WILDERNESS.....	3-62
FIGURE 3D-2: PHOTO SIMULATION – FOREST ROAD 151 .....	3-64
FIGURE 3D-3: PHOTO SIMULATION – HIGHWAY 180.....	3-66
FIGURE 3D-4: PHOTO SIMULATION – INTERSTATE 40.....	3-68
FIGURE 3E-1: NATURAL SNOWFALL AT ARIZONA SNOWBOWL (1981/82 – 2002/03).....	3-106
FIGURE 3E-2: COMPARISON OF NATURAL SNOWFALL AND SKIER VISITS (1981/82 THROUGH 2003/04).....	3-107
FIGURE 3E-3: COMPARISON OF DAYS OF OPERATION AND SKIER VISITS (1990/91 – 2003/04).....	3-108
FIGURE 3E-4: NET PROFIT SEASON TO SEASON (1992/93 – 2002/03).....	3-109
FIGURE 3E-5: COMPARISON OF SKIER VISITS AND NET PROFIT 1992/93 – 2002/03).....	3-110
FIGURE 3E-6: RELATIONSHIP OF FLAGSTAFF ANNUAL TOURISM AND ANNUAL SNOWFALL .....	3-121
FIGURE 3E-7: RELATIONSHIP OF FLAGSTAFF MONTHLY TOURISM AND MONTHLY PRECIPITATION .....	3-122
FIGURE 3E-8: RELATIONSHIP OF ANNUAL FLAGSTAFF TOURISM TO U.S. UNEMPLOYMENT RATE.....	3-123
FIGURE 3H-1: STUDY AREA FOR WATERSHED RESOURCE ANALYSIS .....	3-161
FIGURE 3H-2: CONCEPTUAL BLOCK DIAGRAM FOR HART PRAIRIE WATERSHED.....	3-165
FIGURE 3H-3: WELL AND SPRING LOCATION MAP .....	3-168
FIGURE 3H-4: GENERALIZED STRATIGRAPHIC COLUMN, FLAGSTAFF REGION, ARIZONA .....	3-170
FIGURE 3I-1: DELINEATED WATERSHEDS.....	3-229
FIGURE 3I-2: PROJECT AREA SOILS MAPPING .....	3-237
FIGURE 3L-1: DAM BREACH FLOOD MAP .....	3-341

# LIST OF ACRONYMS

AADT	Average Annual Daily Traffic
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
AF	Acre-feet
AMSL	Above Mean Sea Level
APP	Aquifer Protection Permit
APS	Arizona Public Service
APU	Auxiliary Power Unit
ATR	Automatic Traffic Recorder
ADT	Average Daily Traffic
A&W	Aquatic and Wildlife
A&Wedw	Aquatic and Wildlife for effluent-dependent water
AZPDES	Arizona Pollutant Discharge Elimination System
BA	Biological Assessment
BBB	Bed, Board, & Booze
BBS	Breeding Bird Survey
BE	Biological Evaluation
BOD	Biological Oxygen Demand
BMP	Best Management Practice
CAA	Clean Air Act
CCC	Comfortable Carrying Capacity
CEQ	Council on Environmental Quality
CFM	Cubic Feet per minute
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CNF	Coconino National Forest
CO	Carbon Monoxide
COE	US Army Corps of Engineers
CPI	Consumer Price Index
CWA	Clean Water Act
DBA	Noise
DB	Decibel
DBP	Disinfection By-Products
DBH	Diameter at Breast Height
DDT	Dichloro Diphenyl Trichloroethane
DEM	Digital Elevation Model
DEQ	Department of Environmental Quality
DMR	Discharge Monitoring Report
DWS	Drinking Water Source
EA	Environmental Assessment
EDCs	Endocrine Disrupting Compounds
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FBC	Full-Body Contact
FC	Fish Consumption

FICON	Federal Interagency Committee on Noise
FPS	Feet per Second
FS	Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
FTE	Full-time Equivalents
GIS	Geographic Information System
GMU	Game Management Unit
GPD	Gallons per Day
GPM	Gallons per Minute
GPS	Global Positioning System
HUD	US Housing and Urban Development Department
IBA	Important Bird Areas
IDT	Interdisciplinary Team
IF	Isolated Find
IRA	Inventoried Roadless Area
kV	Kilovolt
Ldn	Day Night Average Sound Level
LRMP	Land and Resource Management Plan
MA	Management Areas
MCE	Maximum Credible Earthquake
MGD	Million Gallons per Day
mg/l	Milligrams per liter
MIS	Management Indicator Species
MSA	Metropolitan Statistical Area
MSO	Mexican Spotted Owl
NAAQS	National Ambient Air Quality Standards
NASB	Northern Arizona Seismic Belt
NAU	Northern Arizona University
NDIS	Natural Diversity Information System
NEPA	National Environmental Policy Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxide
NOI	Notice of Intent
NRHP	National Register of Historic Places
NPDES	National Pollutant Discharge Elimination System
O <sub>3</sub>	Ozone
OFE	Overland Flow Elements
PAC	Protected Activity Centers
Pb	Lead
PBC	Partial-Body Contact
PFA	Post-fledgling Family Areas
PM <sub>2.5</sub>	Particulate Matter under 2.5 microns
PM <sub>10</sub>	Particulate Matter under 10 microns
PMF	Probable Maximum Flood
PPCP	Pharmaceuticals and Personal Care Products

PRISM	Parameter Elevation Regressions on Independent Slopes Model
PSD	Prevention of Significant Deterioration
RGL	Regulatory Guidance Letter
ROD	Record of Decision
SAOT	Skiers-At-One-Time
SD	Standard Deviation
SFE	Single-Family Equivalent
SH	State Highway
SIL	Scenic Integrity Level
SIP	State Implementation Plan
SIU	Significant Industrial User
SMRF	Self-Monitoring Report Forms
SMS	Scenery Management System
SO <sub>2</sub>	Sulfur Dioxide
SOP	Standard Operating Procedure
SUP	Special Use Permit
TCP	Traditional Cultural Property
TDS	Total Dissolved Solids
TES	Threatened, Endangered, and Sensitive species
TLA	Three Letter Acronym
TIN	Triangulated Irregular Network
TOC	Total Organic Carbon
TRC	Total Residual Chlorine
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
µg/m <sup>3</sup>	Micrograms per cubic meter
USC	United States Code
USCA	United States Code Annotated
USDA	United States Department of Agriculture
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VMS	Visual Management System
VQO	Visual Quality Objective
VOC	Volatile Organic Compound
WEPP	Water Erosion Prediction Project
WET	Whole Effluent Toxicity
WRENSS	Water Resources Evaluation of Non-Point Silvicultural Sources
WRP	Water Reclamation Plant
WWTP	Wildcat Hill Wastewater Treatment Plant

# CHAPTER 1

## PURPOSE AND NEED

Introduction .....	1-1
Document Structure .....	1-1
Background .....	1-2
Purpose and Need for the Proposed Action.....	1-6
Summary of the Proposed Action .....	1-9
Decision Framework .....	1-10
Public Involvement .....	1-10
Issues, Resources Requiring Additional Analysis and Indicators .....	1-14

**Coconino National Forest  
Peaks Ranger District**



# 1. PURPOSE AND NEED

## INTRODUCTION

A Draft Environmental Impact Statement (DEIS) for the Arizona Snowbowl Facilities Improvements proposal was released to the public in February 2004. The comment period extended through April 13, allowing the public 60 days to review the document and submit comments to the Forest Service. The number of commentors on the DEIS totaled 5,716, received by various mediums, including: letters; form letters; faxes, emails; phone calls; and petitions (the reader will note that this number accounts for people who submitted multiple forms of comments). The reader is referred to Volume 2 – Response to Comments (RTC) for more information on the DEIS comment period.

The Forest Service has prepared this Final EIS (FEIS) - Volume 1 - which includes updates to the original analysis, as presented in the DEIS, as based on substantive comments received. Numerous changes have been incorporated into the analysis between DEIS and FEIS, however, the majority of them are considered minor and do therefore do not change overall conclusions. The exception is the Environmental Justice analysis contained in Section 3N, which has undergone a wholesale revision since the DEIS was published. The RTC is contained in Volume 2 of this FEIS. Finally, a Record of Decision (ROD) has been prepared and accompanies volumes 1 and 2 of this FEIS. The ROD documents the Decision Maker's Selected Alternative and rationale for the decision.

## DOCUMENT STRUCTURE

The proposed projects analyzed in this document constitute a federal action (i.e., a decision), which has the potential to affect the quality of the human environment on public lands administered by the Forest Service. Therefore, the action must be analyzed pursuant to the National Environmental Policy Act (NEPA). Under NEPA, Federal Agencies must carefully consider environmental concerns in the decision making process and provide relevant information to the public for review and comment.

This FEIS discloses the direct, indirect, and cumulative environmental impacts anticipated to result from implementation of the Proposed Action and alternatives. Volume 1 of the FEIS is organized into five Chapters and five technical appendices:

- Chapter 1 - Purpose and Need: includes information on the history of the project proposal, the purpose of and need for the project, and the proposal for achieving that purpose and need. Chapter 1 also details how the Forest Service informed the public of the proposal and how the public responded.
- Chapter 2 – Description of Alternatives: provides a detailed description of the Proposed Action as well as alternatives that were formed in response to issues raised. This discussion also includes alternatives considered but eliminated from further analysis and mitigation

measures. Finally, Chapter 2 provides a summary table of the environmental consequences anticipated with each alternative.

- Chapter 3 - Affected Environment and Environmental Consequences: provides a description of the affected environment (i.e., existing conditions) according to resources area and describes the environmental effects of implementing the Proposed Action and other alternatives. Chapter 3 is organized by resource topic.
- Chapter 4 – Preparers and Contributors: provides a list of preparers and contributors during the development of this EIS.
- Chapter 5 – Agencies, Organizations and Persons Who Received Copies of the FEIS
- Technical appendices:
  - (A) Conceptual Snowmaking Water Impoundment Design
  - (B) Proposed Forest Plan Amendment
  - (C) Cumulative Effects Table
  - (D) Memorandum of Agreement between the USDA Forest Service, Advisory Council on Historic Preservation, and the Arizona State Historic Preservation Officer

Additional documentation, including more detailed analyses of project area resources, may be found in the project administrative record located on the Coconino National Forest (CNF).

## **BACKGROUND**

The San Francisco Volcanic Field covers approximately 1,800 square miles in northern Arizona. The field lies along the southern perimeter of the Colorado Plateau, defined by the Mogollon Rim to the south of Flagstaff. The most prominent peak within the field is Humphreys Peak, which at 12,633 feet is the highest point in Arizona. Collectively, Humphreys Peak, Agassiz Peak (12,356 feet), Doyle Peak (11,460), and Fremont Peak (11,696 feet) are identified on USGS maps as the San Francisco Mountain. However the mountain is more commonly referred to as the San Francisco Peaks by the local population and for the purpose of this analysis shall be hereafter referred to as such.

The Arizona Snowbowl (hereinafter referred to as “Snowbowl”) is owned and operated by Arizona Snowbowl Resort Limited Partnership. Snowbowl is located entirely on the CNF on the western flank of the San Francisco Peaks. The ski area is operated under a 777-acre Forest Service-issued Special Use Permit (SUP), which is renewed on a 40-year basis. Snowbowl is approximately 15 miles north of Flagstaff, one of the four largest metropolitan areas in Arizona (refer to Figure 1-1). Snowbowl is surrounded on three sides by the 18,960-acre Kachina Peaks Wilderness, which was designated by the U.S. Congress in 1984.

Skiers<sup>1</sup> have been using the Snowbowl since 1938, when the ski area's original base area was established in Hart Prairie. The foundation of the base lodge (which was destroyed by fire in 1952) can still be seen just above the first tower of the Hart Prairie Chairlift. Originally a dirt road, the Snowbowl Road was constructed by the Civilian Conservation Corps. A rope tow, powered by a car engine, was the only means of uphill transport. In 1954 the road was extended to the site of the Agassiz Lodge and in 1956 the Agassiz Lodge was constructed. A Poma surface lift was installed in 1958 and part of that lift line is now the *Blackjack* (trail #17). The original Agassiz Chairlift was installed by the Riblet Corporation in 1962. Relatively little activity was seen until the 1970's when Summit Properties purchased the area with plans for a base village, however, a land use plan issued in 1971 restricted development to the existing permit area. In 1977 the area was purchased by Northland Recreation and a Master Concept Plan was filed with the Forest Service. This plan was tested in the courts and the US Supreme Court refused to hear the case, effectively upholding the decision of the US Court of Appeals.. In 1982 the Hart Prairie Chairlift was built. Fairfield Communities purchased the ski area in November of that same year and began an improvement program in 1983, including construction of the Hart Prairie Lodge, Sunset Chairlift and transfer of the rope tow back to Hart Prairie. In 1985 parking lots #5 and #6 were completed along with a new maintenance shop. In 1986 a new CTEC triple chairlift was installed on the site of the original Agassiz Chairlift; the rope tow and the Poma were removed and the Aspen Chairlift was installed in Hart Prairie. A two-year Snowbowl Road improvement and paving project began in 1988.

Arizona Snowbowl Resort Limited Partnership purchased the ski area in December 1992 and proceeded to make immediate improvements to the facilities and ski trails. Hart Prairie Lodge was expanded by constructing a new guest service office, rental shop, and children's ski school. *Logjam* (trail #25) was widened and new trails – *Lava* (trail #43c) and *Volcano* (trail #43a) were constructed.

In addition to wintertime skiing and snowboarding, the Snowbowl offers summertime scenic chairlift rides on the (Sky ride program) Agassiz Chairlift. Guided horseback rides, banquets, and restaurant facilities are also available.

## **RELATIONSHIP OF THE CURRENT PROPOSAL TO PREVIOUS NEPA ANALYSIS AND APPROVALS**

In 1979 a master plan for upgrading Snowbowl was produced, which provided for the installation of new lifts, trails, and facilities. These projects were analyzed in the 1979 Arizona Snowbowl Ski Area Proposal Final Environmental Statement (1979 Environmental Statement) and ultimately approved via an associated Record of Decision (ROD). Two of the approved lifts were subsequently installed – Hart Prairie and Sunset. In addition, the Hart Prairie Lodge and new parking were added in accordance with the 1979 Environmental Statement.

Many of the projects analyzed in this current EIS are consistent with the 1979 Master Plan. However, because of the length of time that has passed since the approval of the 1979 Master

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<sup>1</sup> At ski areas, one may see people using Alpine, snowboard, telemark, cross-country, and other specialized ski equipment, such as that used by disabled or other skiers. Accordingly, the terms “ski, skier, and skiing” in this document encompass all lift-served sliding sports typically associated with a winter sports area.

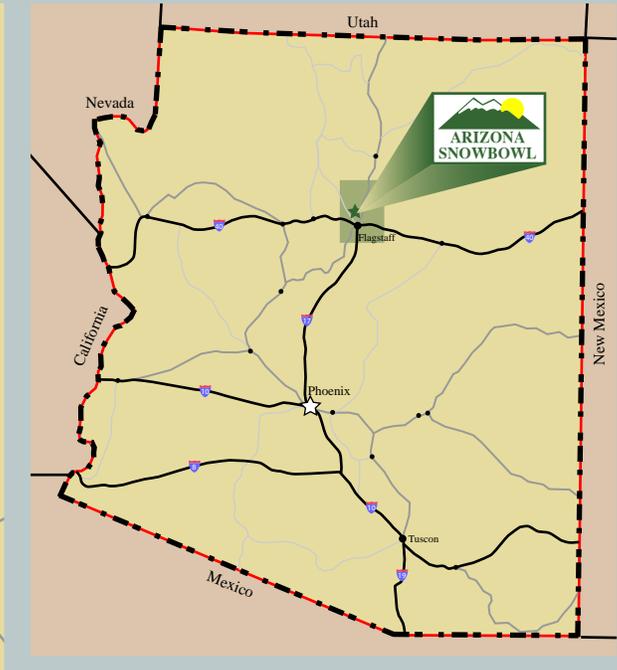
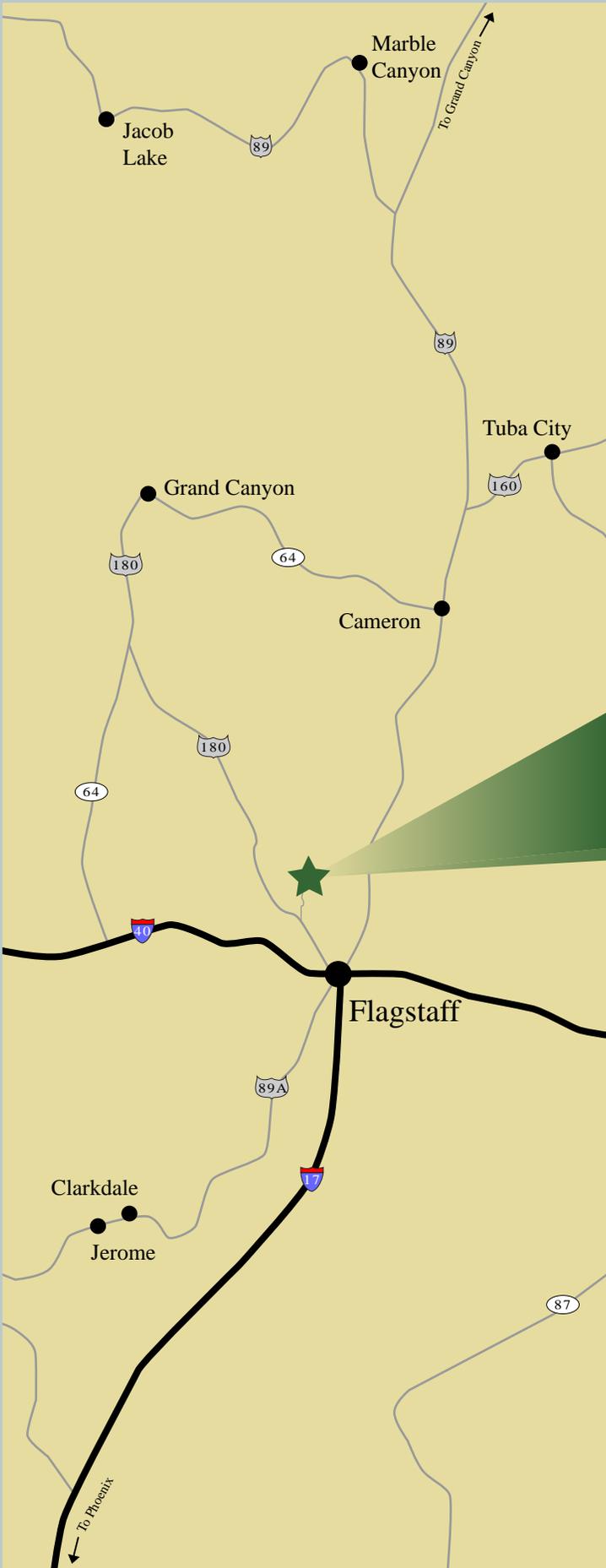
Plan, the advent of new procedural requirements, and potentially changed conditions, these approvals are no longer valid without additional site-specific environmental analysis. Currently proposed projects that were not specifically approved in the 1979 ROD have been designed to remain within the contextual scope of the 1979 decision. From the selected alternative identified in the 1979 ROD, this analysis carries forward the size of the ski area (777 acres) and the comfortable carrying capacity (CCC)<sup>2</sup> of 2,825.

The 1987 CNF Forest Plan<sup>3</sup> (hereinafter referred to as “the Forest Plan”) adopted the 1979 Environmental Statement into its management direction for Management Area 15, which provides direction for developed recreation areas, including the SUP area. Throughout the Forest Plan, the Arizona Snowbowl is referred to as the Fairfield Snowbowl.

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<sup>2</sup> CCC is defined as the number of guests that can be comfortably accommodated by a ski area at any point in time. It provides for a pleasant recreational experience by not overburdening a ski area’s facilities (including, but not limited to, parking, restaurant seating, restrooms, and uphill/downhill capacity). CCC is used by ski area planners and the Forest Service as a planning tool and *does not constitute a cap on visitation*. Facilities are typically designed to accommodate 125 percent of a ski area’s CCC in order to preserve the guest experience on peak visitation days, which are anticipated periodically throughout the season.

<sup>3</sup> USDA Forest Service, 1987 as amended



**ARIZONA SNOWBOWL**

**FIGURE 1 - 1**

**Location Map**

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## **PURPOSE AND NEED FOR THE PROPOSED ACTION**

The Forest Service and Snowbowl cooperatively determined general categories important for improving the Snowbowl's facilities. From these categories, a list of proposed projects was created, and the Proposed Action ultimately emerged. The Proposed Action responds to the goals and objectives outlined in the Forest Plan,<sup>4</sup> and helps move the project area towards desired conditions described in it.

The overall Purpose and Need for these projects responds to two broad categories: 1) to provide a consistent/reliable operating season, and; 2) to improve safety, skiing conditions, and recreational opportunities by bringing terrain and infrastructure into balance with existing demand.

### **PURPOSE #1:**

*To ensure a consistent and reliable operating season, thereby maintaining the economic viability of the Snowbowl, and stabilizing employment levels and winter tourism within the local community.*

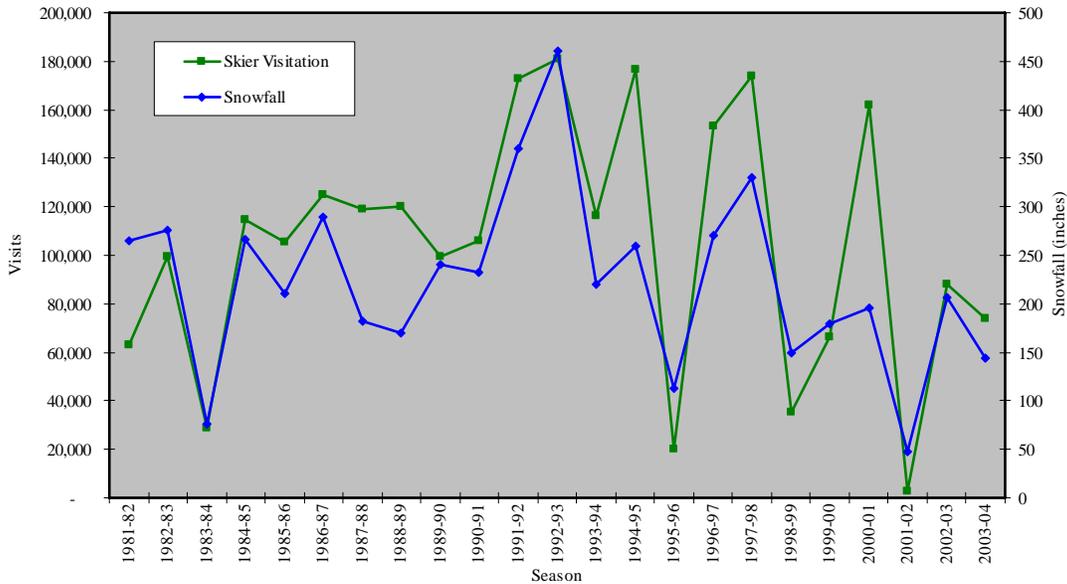
### **Existing Condition:**

Inconsistent annual snowfall has historically led to a sporadic operating season and therefore broad fluctuations in annual visitation. This has created unstable employment levels at the ski area and has greatly affected local winter tourism. Snowbowl's ability to maintain or improve its current level of service and endure the business conditions caused by unreliable snowfall is questionable. Figure 1-2 correlates annual snowfall (inches) with annual visitation for the past 22 seasons at Snowbowl:

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<sup>4</sup> USDA Forest Service, 1987

**Figure 1-2  
Comparison of Natural Snowfall and Skier Visits  
(1981/82 through 2003/04)**



**Need:**

The installation and operation of snowmaking infrastructure would provide a reliable and consistent operating season helping to stabilize Snowbowl’s investment, increase local employment levels, and boost winter tourism within the community.

**PURPOSE #2:**

*To improve safety, skiing conditions, and recreational opportunities, bringing terrain and infrastructure into balance with current use levels.*

**Existing Condition:**

Currently, areas of intermediate and beginner terrain are inadequately sized to accommodate the public’s demand for terrain of these ability levels on peak days. This lack of terrain often results in significant use of the existing terrain and high skier densities on peak days. This creates safety issues because of overcrowded ski runs. When compared to ski industry norms (and guest expectations), Snowbowl exhibits a deficit of intermediate and beginner level terrain and a surplus of novice level terrain as shown in Table 1-1.

**Need:**

Improve the quantity and distribution of beginner and intermediate (including low intermediate and advanced intermediate) terrain and skier safety by developing additional terrain within the existing SUP area.

**Table 1-1  
Existing Terrain Distribution**

<b>Skier/Rider Ability Level</b>	<b>Total Skiable Terrain (acres)</b>	<b>Terrain Capacity by Ability Level (guests)</b>	<b>Skier Distribution Across Terrain (percent)</b>	<b>Typical Skier Market Distribution Across Terrain (percent)</b>	<b>Difference</b>
Beginner	0.5	15	1%	5%	-4
Novice	44.0	790	44%	15%	+29
Low Intermediate	31.3	438	25%	25%	0
Intermediate	38.1	381	22%	35%	-13
Adv. Intermediate	15.4	108	6%	15%	-9
Expert	9.4	28	2%	5%	-3
<b>Total</b>	<b>138.6</b>	<b>1,760</b>	<b>100%</b>	<b>100%</b>	

**Existing Condition:**

Public demand at Snowbowl has grown significantly in the past 20 years, increasing from 63,000 annual visits in 1981/82 to 162,175 during the 2000/01 season, an increase of 157 percent. The inadequate size and limited conditions of on-mountain facilities have resulted in a crowded, undesirable guest experience in many areas, such as in the lodges and on the chairlifts. Additionally, Snowbowl frequently experiences peak demand days which significantly exceed the current CCC of the existing facilities and infrastructure.

**Need:**

To increase the capacities of the day lodges, chairlifts, and other ski area infrastructure, bringing it into proper balance with *current* use levels, while remaining within the ski area’s previously approved CCC of 2,825 skiers.

**Existing Condition:**

Approximately 30,000 visitors ride the summer Scenic Sky ride annually. Although numerous summer visitors express interest, guests are not allowed to hike down the mountain due to the steep grades and cobbled surface.

**Need:**

To allow guests to hike from the top back to the base area by providing an established hiking trail from the top of the Agassiz Chairlift. Additionally, this trail would allow Snowbowl lift maintenance personnel to periodically access the top terminal of the Agassiz Chairlift using all terrain vehicles during the summer.

**Existing Condition:**

In the past, numerous snowplayers illegally parked along the Snowbowl Road and at the ski area to sled, slide, and saucer in existing openings off the edge of the road and at the ski area. This unmanaged, dispersed use often leads to injuries, traffic management issues, garbage, and sanitation problems. In 2002 the Forest Service prohibited parking along the Snowbowl road which eliminated these unmanaged snowplay activities. This action relocated the displaced

snowplayers to other unmanaged areas on the forest, primarily along Highway 180, but has produced numerous management challenges associated with widespread, unregulated snowplay.

### Need:

To develop a managed and professionally designed snowplay/tubing facility at the ski area to fill the demonstrated public demand for snowplay. The facility should provide restrooms, a warming building, ticketing, concessions, parking, and trash receptacles.

## **SUMMARY OF THE PROPOSED ACTION**

In response to the purpose and need, the following Proposed Action was assembled by Snowbowl and the Forest Service. A detailed description of the Proposed Action is provided in Chapter 2.

### **SNOWMAKING**

- Approximately 205 acres of snowmaking coverage throughout the SUP area utilizing Class A reclaimed water as a source
- A 10 million-gallon snowmaking water reservoir near the top terminal of the existing Sunset Chairlift, and catchment pond below the Hart Prairie Lodge
- Construct a reclaimed water pipeline between Flagstaff and the Snowbowl with booster stations and pumphouses
- Construct a 3,000 to 4,000 square foot snowmaking control building in the vicinity of the existing maintenance shop

### **SNOWPLAY/TUBING FACILITY**

- A professionally designed and managed snowplay/tubing facility at the base area including sculpted lanes, lifts, and a lodge

### **LIFTS/UPHILL CAPACITY**

- Replace of the Sunset Chairlift with a high speed, detachable chair
- Relocate the existing Sunset Chairlift as the Humphreys Chairlift, accessing a pod of proposed ski trails
- Upgrade and extension of the Hart Prairie Chairlift with a high-speed, detachable lift
- Upgrade and realignment of the Aspen Chairlift
- Install three surface conveyors in the area north of the Hart Prairie Lodge
- Install a handle tow is proposed to service a halfpipe and terrain park

### **TERRAIN**

- Approximately 66 acres of new trails
- Approximately 47 acres of thinning to created improved glades
- Approximately 87 acres of terrain improvements (grading/stumping and smoothing)
- Create a dedicated teaching area near the Hart Prairie Lodge
- Construct a halfpipe

## **GUEST SERVICE FACILITIES**

- Enlarge the Hart Prairie Lodge by approximately 6,000 square feet to a *total* of 24,900 square feet
- Construct a new 10,000 square foot guest services facility adjacent to the Agassiz Lodge<sup>5</sup>
- Construct a 2,500 square foot Native American cultural and education center constructed in or near the Agassiz Lodge
- Replace existing on-mountain ski team buildings

## **SUMMER TRAILS**

- Construct a hiking trail from the existing Agassiz Chairlift mid-station to the top terminal
- Construct an Americans with Disabilities Act (ADA) compliant summer access trail into Hart Prairie from the parking lot near Agassiz Lodge

## **INFRASTRUCTURE AND UTILITIES**

- Construct a 14.8-mile pipeline to transport reclaimed water from Flagstaff to Snowbowl
- Install snowmaking pipelines buried within existing and proposed trails
- Redesign the entrance circle, which would have signs directing guests to parking lots, day lodges, and snowplay parking
- Construct a 400-space parking area to service the proposed tubing facility
- Combine parking lots #1 and #2 by re-grading and leveling them
- Develop approximately 1,110 feet of additional on-mountain access road
- Reconstruct approximately 3,650 feet of existing two-track mountain access road
- Decommission approximately 3,050 feet of existing two-track mountain access road
- Install 10,000-gallon buried water storage tanks at each of the lodges and at the snowplay building to facilitate the use of reclaimed water
- Construct a pedestrian underpass

## **DECISION FRAMEWORK**

This FEIS is not a decision document. Its primary purpose is to disclose the environmental consequences which are anticipated to occur through implementation of the alternatives under consideration. The Selected Alternative is documented in the ROD. The Selected Alternative provides the framework for a new master development plan (MDP), which will guide the future development of the Snowbowl.

## **PUBLIC INVOLVEMENT**

### **PUBLIC SCOPING AND COMMENTS ON THE DEIS**

On September 23, 2002, a scoping notice was mailed to approximately 350 community residents, interested individuals, public agencies, and other organizations. This notice was designed to elicit comments, concerns, and issues pertaining to the Proposed Action. A press release and legal notice were distributed to key local and regional media. On October 7, 2002, the Forest Service published a Notice of Intent (NOI) to prepare an EIS in the Federal Register. In addition,

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<sup>5</sup> Facilities in both the Hart Prairie and Agassiz lodges would be brought into ADA compliance.

two public open houses were held at the Flagstaff High School on October 10, and 26, 2002. Forest Service representatives and members of the consultant team were present to answer questions and collect comments. In response to public and tribal scoping (described below), including the open houses, approximately 1,200 comment letters were received. Based upon the responses received during scoping, the Forest Service Interdisciplinary Team (ID Team) prepared a list of resource issues and areas to be analyzed within DEIS.<sup>6</sup>

The DEIS was released to the public in February 2004. On February 25, a public open house was held at the Flagstaff High School (302 people signed in). As indicated in the Introduction, 5,716 people submitted comments during the 60-day DEIS comment period. Substantive comments were extracted and responded to, either individually or “thematically” in the RTC. The total number of substantive comments was 9,887. Volume 2 of the FEIS not only provides responses to all substantive comments received, but also includes a table with the names and general comments themes of all commentors. The reader is referred to Volume 2 of the FEIS for additional clarification on how substantive comments were extracted, grouped, and responded to.

### **TRIBAL SCOPING AND CONSULTATION**

The Forest has been consulting with approximately 13 tribes or chapters - representing the Hopi, Navajo, Zuni, Acoma, Apache, Hualapai, Havasupai, Yavapai, and Southern Paiute - about the cultural significance of the San Francisco Peaks since the 1970’s. The Forest Service initiated tribal consultation on the Proposed Action in June 2002 with a formal letter from the Forest Supervisor to 13 tribal leaders. Also in June 2002, the District Ranger contacted tribal representatives from Cultural Preservation Offices of 13 affiliated tribes to discuss the Snowbowl proposal and suggest pre-proposal meetings. Phone contacts between the District Archaeologist and several tribal Cultural Preservation Officers (Hopi, Navajo, Hualapai, San Carlos Apache, Yavapai-Apache) were made during the months of June-December 2002. In addition, follow-up phone calls to interested tribes were made by the District Archaeologist to ensure receipt of letters. Overall, numerous phone calls and letters have been sent to tribes and the tribal public requesting input.

Two formal public meetings were held on the Hopi and Navajo Indian Reservations (Tuba City and Kykotsmovi) on Monday, December 9, 2002. The emphasis of these two public meetings was to explain the Proposed Action to tribal members and to elicit comment/concerns on behalf of individuals and the tribe.

Throughout the Tribal scoping process, specific to the Snowbowl’s Proposed Action, the Forest Service estimates that approximately 205 phone calls were made, 41 meetings were held and 245 letters were exchanged.<sup>7</sup> Meetings that took place between Forest Service representatives, tribes and consultants are indicated below.<sup>8</sup>

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<sup>6</sup> The scoping comment disposition analysis is available in the project file.

<sup>7</sup> 115 of these phone calls, meetings and letters are estimated to have occurred in a manner that is consistent with government-to-government relationship.

<sup>8</sup> “\*” denotes meetings that were of a government-to-government nature.

*July 18, 2002	Pre-proposal CRATT (Cultural Resource Advisory Task Team) meeting at Hopi
August 6, 2002	Forest Service, Shereen Lerner, and representatives from Yavapai-Apache (all Apache tribes invited; only Camp Verde attended)
August 18, 2002	Heather Cooper and Mae Franklin (Navajo liaison) set up information booth at Tuba City Flea Market as part of the Western Navajo Fair
August 21, 2002	Forest Service, Shereen Lerner, and Hopi Land Team
September 19, 2002	Forest Service, Shereen Lerner and Hopi Cultural Resource Advisory Team
October 3, 2002	Snowbowl public meeting – Flagstaff
October 8, 2002	Mae Franklin attended Gap/Bodaway Chapter House meeting on Navajo Reservation and collects comments regarding Snowbowl proposal
October 13, 2002	Mae Franklin attended Cameron Chapter House meeting and collects comments regarding Snowbowl proposal
October 16, 2002	Cooper (CNF) and Franklin (Navajo Liaison) meet in Cameron to discuss Snowbowl Proposal and consultation plan/public outreach for Navajo.
October 26, 2002	Snowbowl public meeting – Flagstaff
October 23, 2002	Shereen Lerner, Forest Service and representatives from the Hopi Tribe
November 13, 2002	Franklin (Navajo Liaison) attends 2 Chapter House Meetings: Cameron and Bodaway/Gap
November 23, 2002	Mae Franklin and Heather Cooper attended Leupp Chapter House meeting and collect comments regarding Snowbowl proposal
November 26, 2002	Heather Cooper presents “Collaborative Management of the San Francisco Peaks” to the Hopi Cultural Resources Advisory Team
*December, 4 2002	Waldrip, Cooper, Jacobs (CNF) meet with Talayumtewa and Morgart from Hopi to discuss details of Tribal public meetings
December 9, 2002	Tribal meeting held at Tuba City High School. Representatives include: Forest Service personnel (including Forest Supervisor Jim Golden and Peaks District Range Gene Waldrip); SE GROUP; Shereen Lerner; and members of the Hopi Tribe and Navajo Nation
December 9, 2002	Tribal meeting held at Kykotsmovi Community Center. Representatives include: Forest Service personnel (including Forest Supervisor Jim Golden and Peaks District Range Gene Waldrip); SE GROUP; Shereen Lerner; and members of the Hopi Tribe

December 14, 2002 Mae Franklin, Gene Waldrip, and Heather Cooper attend Western Navajo Agency Council meeting, requesting comments on Snowbowl proposal

\*November 19, 2003 Pilles, Rasure and Waldrip (CNF) meet Kuwanwisiwma at Hopi for CRATT presentation – CRATT does not show up because they were not correctly informed

December 08, 2003 Rasure, Waldrip, Cooper, and other CNF staff meet with the Save The Peaks Coalition to discuss the DEIS

January 15, 2004 Cooper (CNF) meets with Franklin (Navajo Liaison) to discuss release of DEIS and what information we’re looking for during comment period

\*February 12, 2004 Morgart (Hopi) stops by Peaks RD to get one box of DEISs and drop off press release which states Hopi’s opposition to the preferred alternative

February 12, 2004 Franklin (Navajo Liaison) stops by Peaks RD to get one box of DEISs

February 25, 2004 Public Meeting at Flagstaff High School. Several tribal members attend, in addition to Save the Peaks Coalition, and discuss cultural issues with Pilles and Cooper (CNF)

\*March 12, 2004 Rasure, Waldrip, Cooper (CNF) meet with Chairman Taylor (Hopi), Kuwanwisiwma, and Morgart at the Chairman’s office in Flagstaff to discuss the DEIS and MOA

March 25, 2004 Cooper (CNF) meets with Franklin (Navajo Liaison) and Thomas (Navajo translator) in Cameron to discuss the Cameron public meeting

\*April 16, 2004 Morgart (Hopi CPO) visited Cooper (CNF) at the Peaks RD to talk about DEIS and the Hopi response to that document

April 16, 2004 Franklin (Navajo Liaison) visits Cooper (CNF) at Peaks RD and leaves documentation of her Chapter House visits

April 30, 2004 Public Meeting in Cameron to discuss DEIS and gather comments

May 23, 2004 DEIS public meeting at the Veteran’s Center on Second Mesa (Hopi)

June 30, 2004 Rasure, Waldrip and Cooper (CNF) meet with Richard Begay and Timothy Begay (Navajo Cultural Preservation Office) at the CNF Supervisor’s Office to discuss the DEIS and MOA

\*August 06, 2004 Rasure, Waldrip, Pilles and Cooper (CNF) meet with Hualapai Chairman, Vice Chairman, Cultural Preservation Officer and traditional healer in Peach Springs to discuss DEIS and MOA

## ISSUES, RESOURCES REQUIRING ADDITIONAL ANALYSIS AND INDICATORS

Based on the results of internal and public scoping, the Forest Service identified specific areas (resources) of concern. The two issues that emerged from the scoping process were related to heritage resources. Both of these issues warranted the creation of an additional alternative. Beyond these two issues, 17 additional “resources requiring additional analysis and disclosure” were identified. Issues and resources requiring additional analysis and disclosure have been assigned indicators for use in addressing them. While some indicators are necessarily qualitative in nature, every effort was made to use indicators that are quantitative, measurable, and predictable. The project record includes all comments letters that were submitted during the scoping period, as well as a synthesis comments which was used by the Forest Service ID Team to identify issues.

### THE HUMAN ENVIRONMENT

#### Heritage Resources

The San Francisco Peaks are central to the cultures and religious practices of many Native American tribes. In 2000, the Peaks were determined eligible for nomination to the National Register of Historic Places (the Register) for their traditional cultural values. In analyzing alternatives, 36 CFR 800 requires that the potential effect of a proposed undertaking be evaluated against the qualities that make a cultural property eligible for the Register. Consequently, in discussions to date with representatives from various tribes, it is evident that the Proposed Action will adversely affect cultural values. Issues raised in response to identified (potential) cultural impacts include the following.

***Issue #1: The installation and operation of snowmaking infrastructure as described in the Proposed Action, and the use of reclaimed wastewater as a water source, will impact cultural and spiritual values associated with the San Francisco Peaks.***

#### **Background:**

The region’s Indian Tribes are opposed to the concept of creating snow by an artificial means, particularly through the use of reclaimed water. Although the reclaimed water proposed for use in making snow meets both the EPA and ADEQ water quality standards, the tribes believe the water to be impure which would negatively affect the spiritual values of the Peaks. Any negative effects that occur to the Peaks will be reflected by the plants, animals, water, and soil of the entire mountain. Additionally, the tribes are opposed to snowmaking because it is a disruption of natural processes.

#### **Study Area:**

- Direct: SUP area
- Indirect: San Francisco Peaks

**Indicator:**

- Qualitative discussion of the cultural values of the San Francisco Peaks and the potential for incremental change as a result of implementation of the Proposed Action

***Issue #2: Proposed ground disturbances and vegetation removal may result in permanently evident, visible alterations (i.e., “scarring”) of the San Francisco Peaks’ landscape.***

**Background:**

Ground disturbances associated with grading, vegetation clearing, and snowmaking pipeline installation, could alter the landscape of the San Francisco Peaks – both permanently and temporarily. From the Native American perspective, ground disturbing activities within the SUP could “scar” the sacred landscape/mountain which is believed to be a living entity. The more extensive the disturbance, the greater the adverse effect to cultural values.

**Study Area:**

- Direct: SUP area
- Indirect: San Francisco Peaks

**Indicators:**

- Narrative description of existing and historic vegetation and ground disturbance within the SUP area
- Quantification of existing and additional proposed temporarily and permanently evident vegetation disturbances/removals
- Quantification of existing and additional proposed temporary and permanently evident ground disturbances
- Qualitative discussion of the cultural significance of proposed ground and vegetative disturbances and removal within the SUP area

***Some people feel the effects of the Proposed Action cannot be adequately described until the significant qualities of the San Francisco Peaks are identified as part of the National Register nomination process.***

**Background:**

The Coconino National Forest has committed to completing the National Register nomination of the Peaks for its traditional cultural values. Analysis and potential approval of the Proposed Action is considered to be independent of the National Register nomination and potential designation processes. Additionally, completion of the nomination/designation processes is not considered to be prerequisite for the analysis or potential approval of the Proposed Action. Since the Peaks have already been determined eligible for National Register nomination for its traditional cultural values, various alternatives may be evaluated according to how they affect traditional values, even if the nomination process has not been completed.

**Study Area:**

- San Francisco Peaks

**Indicators:**

- Narrative discussion why the Proposed Action is not dependent upon completion of the National Register nomination/designation processes
- Narrative discussion of the ability for the proposed projects to coexist with a National Register designation if nomination is approved

**Noise**

*The proposed snowmaking system would increase noise levels potentially disturbing residents, recreationists, and/or wildlife.*

**Background:**

There were concerns that noise emissions from single or multiple snowmaking guns and operation of the pumping stations may be audible from Hart Prairie, Thorpe Park, Mars Hill, Observatory Mesa, Fort Valley, or the Kachina Wilderness, potentially disturbing residents, recreationists, and/or wildlife.

**Study Area:**

- Audible area

**Indicators:**

- Modeled analysis of snowmaking-related noise emissions above ambient background levels (decibels)
- Modeled analysis of noise dispersion to define audible areas

**Traffic and Access**

*The Proposed Action could affect traffic volumes and/or congestion on U.S. Highway 180 and/or the Snowbowl Road.*

**Background:**

Although daily skier visitation is not proposed to increase as a result of the Proposed Action, the proposed snow tubing facility has potential to increase daily traffic volumes and/or the frequency of congested periods on U.S. Highway 180 and the Snowbowl Road.

**Study Area:**

- U.S. Highway 180 between Flagstaff and Snowbowl Road, Snowbowl Road

**Indicators:**

- Historic and projected traffic counts for U. S. Highway 180
- Comparison of anticipated winter traffic volumes with existing winter traffic volumes and the design capacities of U.S. Highway 180 and the Snowbowl Road
- Relative comparison of existing and anticipated winter traffic with current summer traffic volumes

## **Aesthetic Impacts**

*Proposed ground disturbance and vegetation removal within the SUP may incrementally affect the aesthetic quality of the west face of the San Francisco Peaks.*

### **Background:**

Removal of forested vegetation and ground disturbing activities within the SUP area associated with the proposed projects would be evident in the foreground, middle ground, and background views from various locations. Additionally, there was concern that construction of the proposed water transmission line could result in removal of trees for a new utility corridor affecting aesthetic qualities of the area.

### **Study Area:**

- Foreground, middle ground, and background views<sup>9</sup> of Snowbowl's SUP area.

### **Indicators:**

- The incremental aesthetic effects of the proposed projects compared to historic landscape alterations within the SUP area
- Visual simulations, from identified representative viewpoints, of the proposed landscape alterations as compared to the existing condition. Viewpoints modeled are:
  - Hart Prairie (151 Rd) – Summer
  - U. S. Highway 180 at the Nordic Center– Summer
  - Humphreys Trail (Wilderness area) - Summer
  - Interstate 40 East of Williams - Winter

## **Socio-Economics**

*Implementation of the Proposed Action may have social and economic effects on Flagstaff and Coconino County.*

### **Background:**

A correlation exists between the consistent operation of the ski area and the Flagstaff/Coconino County economy. This correlation encompasses: seasonal tourism; employment and income levels; and tax revenues. The strength of this correlation needs to be assessed and disclosed.

Socially, Snowbowl provides a source of wintertime recreation for a large number of people in northern and central Arizona. The relative importance of this local source of wintertime recreation needs to be assessed.

### **Study Area:**

- City of Flagstaff/Coconino County

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<sup>9</sup> Foreground, middle ground and background, as defined by the Forest Service, are detailed in Chapter 3, Section D.

**Indicators:**

- Discussion of the potential for the Proposed Action to affect a change in key local economic indicators (population; long- and short-term employment, housing, and tax revenues)
- Analysis of the correlation between Snowbowl annual skier visitation and annual retail and Bed, Board and Booze (BBB) and tax revenues
- Narrative description of the recreational/social function which Snowbowl serves
- The effects of dry roads/fair weather on tourism in Flagstaff and the BBB
- Presentation of historical data analyzing the relationship between winter tourism levels for the City of Flagstaff, with annual snowfall, and annual skier visitation at Snowbowl
- The percentage of the total economy represented by winter tourism
- Financial viability of the ski area under all alternatives

**Recreational Opportunities and Experiences**

*The effects of the Proposed Action on the quality, distribution, and opportunity for winter and summer recreational experiences within the SUP area.*

**Background:**

Snowbowl has provided a source of winter and summer recreational activities since 1938, when the ski area's original base area was established in Hart Prairie. Since that time, an expanding population in the state of Arizona has led to increased pressure on Snowbowl. Inconsistent snowfall in northern Arizona and coupled with increased demand has reduced the ski area's ability to provide a consistent skiing/riding product. As a result, local and regional skiers have expressed a desire for a more reliable and consistent snowpack at Snowbowl.

The Proposed Action would increase skiable terrain and allow the area to meet the CCC of 2,825, and would improve recreational opportunities. By increasing the consistency of the snow pack even through dry winters, the Proposed Action is intended provide more opportunities for skiers in an environment of increasing recreational demand. Summertime hiking opportunities would also be added.

**Study Area:**

- San Francisco Peaks and SUP area

**Indicators:**

- Comparison of historic winter and summer recreation visitation versus that anticipated under the Proposed Action
- Narrative description of the quality of winter and summer recreational opportunities under all alternatives.

## **Wilderness Values**

*Implementation of the Proposed Action may affect the experience of wilderness users within the surrounding Kachina Peaks Wilderness.*

### **Background:**

The Proposed Action would increase use and noise levels within the SUP area during the winter operating season. This could affect the experience of the public recreating within the Kachina Peaks Wilderness.

### **Study Area:**

- San Francisco Peaks and SUP area

### **Indicators:**

- Quantification of seasonal Wilderness use and visitation
- Narrative discussion of the anticipated effects of the Proposed Action to Wilderness users

## **Ski Area Infrastructure and Utilities**

*Effects of the Proposed Action on ski area infrastructure and supporting utilities within and beyond the SUP area.*

### **Background:**

The Proposed Action necessitates additions to Snowbowl's existing infrastructure, including parking, buildings, power, water, and sanitation, as well as installation of a 14 mile pipeline connecting the ski area to the City of Flagstaff's reclaimed water system.

### **Study Area:**

- SUP area and proposed reclaimed water pipeline corridor

### **Indicators:**

- Disclosure of current versus anticipated requirements for: guest seating, power, domestic water supply, and wastewater treatment.

## **THE PHYSICAL AND BIOLOGICAL ENVIRONMENT**

### **Watershed Resources**

*The application of Class A reclaimed water for snowmaking within the SUP area may affect water quality within the receiving subwatersheds.*

### **Background:**

Snowbowl's proposed snowmaking operations would use reclaimed water from the City of Flagstaff's Rio de Flag Water Reclamation Plant (WRP), which would differ in water quality characteristics than sources currently present within the receiving watershed area. Although the

reclaimed water proposed for use meets both EPA and ADEQ water quality standards and has been approved by the ADEQ for snowmaking use, concerns were raised that the water may contain low levels of unregulated and unmeasured residual constituents (e.g. pathogens, pharmaceuticals, or hormones) which may cause health problems in humans and wildlife.

**Study Area:**

- Primary watersheds: Hart Prairie Watershed and Agassiz Subwatershed
- Snowbowl Sub-area (consisting of four subwatersheds - Snowbowl, Sunset, Hart Prairie, and Humphreys) each includes snowmaking coverage

**Indicators:**

- Description of the certification process for allowing Class A water to be used for snowmaking
- Literature search on use of reclaimed water for various recreational and municipal purposes uses
- Literature search and narrative description of the potential presence of pharmaceuticals, pathogens, and hormones in Class A reclaimed water
- Documentation of compliance with State and Federal water quality standards regarding Class A wastewater and its purposes
- Analysis of potential water quality effects of using reclaimed water in the snowmaking system to down gradient users

*Use of reclaimed water for snowmaking purposes between November and February of each year could affect aquifer recharge.*

**Background:**

Concerns were raised regarding the appropriateness of using reclaimed water for snowmaking purposes. The use of reclaimed water for snowmaking could potentially affect recharge to the regional aquifer due to reduced discharges into the Rio de Flag. Additionally, concern was expressed that the use of the reclaimed water for snowmaking would limit its availability to other users in the community.

**Study Area:**

- Primary watersheds: Hart Prairie Watershed and Agassiz Subwatershed
- Snowbowl Sub-area (consisting of four subwatersheds - Snowbowl, Sunset, Hart Prairie, and Humphreys) each includes snowmaking coverage

**Indicators:**

- Quantification of anticipated snowmaking water use in average dry, median, and wet years
- Description and quantification of the Rio de Flag WRP's historic seasonal discharges
- Description and quantification of current uses of reclaimed water within the City of Flagstaff by season
- Discussion of existing water rights and the ability to implement the proposed snowmaking with or without procuring additional water rights

- Narrative description of both the City of Flagstaff’s well field and reclaimed water uses and their hydrologic relationship to the regional aquifer
- Discussion of the applicability of the Rio de Flag Water WRP NPDES permit to the proposed snowmaking application
- Quantification of anticipated total consumptive water losses (i.e., evaporation, evapotranspiration, sublimation) resulting from proposed snowmaking

### **Soils and Geology**

*The Proposed Action has potential to change soil chemistry and moisture due to the application of machine produced snow.*

#### **Background:**

The proposed application of machine-produced snow may have the effect of increasing total water availability, potentially leading to an increase in the duration, intensity, and/or quantity of total annual snowmelt.

#### **Study Area:**

- Eight sub-watersheds in the vicinity of the SUP area having potential to change under the Proposed Action<sup>10</sup>

#### **Indicators:**

- Anticipated volume of machine-produced snow applied under various scenarios: dry year, average year, and wet year
- Modeled anticipated changes in the duration and intensity of annual snowmelt compared to historic natural variation
- Modeled (WEPP ) anticipated changes in erosion/sedimentation due to predicted changes in total snowpack
- WEPP modeling to include all proposed areas of ground disturbance
- Analysis of potential changes to soil chemistry due to anticipated increases in soil moisture consistency and nutrient loading

### **Vegetation**

*Plant communities (including T, E, and S plant species, and regionally important plants) within the SUP area may be altered as a result of the proposed projects.*

#### **Background:**

The Proposed Action would necessitate impacts to vegetation communities within the SUP area. Mixed conifer forests occupy a small percent of the State, and are rare in the higher elevations of northern Arizona. Snowbowl includes the upper reaches of the largest contiguous patch of montane grassland on the San Francisco Peaks. Additionally, the San Francisco groundsel (*Senecio franciscanus*) is found on the San Francisco Peaks. In addition, the construction and operation of the proposed projects may cause disturbance to federally threatened and endangered as well as regionally sensitive plants (T, E, and S plants) and/or their habitats.

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<sup>10</sup> Defined in Chapter 3, Section I

**Study Area:**

- Area of potential effects from proposed construction activities

**Indicators:**

- Acres of mixed conifer forest on the San Francisco Peaks, within the SUP, and potentially effected by the Proposed Action
- Potential impacts to montane grasslands within the SUP as a proportion of total grasslands on the San Francisco Peaks
- Disclosure of effects to potentially occurring T, E, and S plant species or potential habitat

*The Proposed Action has potential to change vegetation composition within the SUP area due to the application of machine-produced snow.*

**Background:**

The application of machine-produced snow may artificially increase total annual snowpack depth. Machine-produced snow typically has a higher moisture content on a percentage basis. These factors may lead to a slower melting of the snowpack and a corresponding acceleration or delay in the greening of vegetation on the ski trails.

In addition, reclaimed water may contain elevated levels of nitrogen, which could raise pH levels, making soil more acidic and less productive for vegetation. Nitrogen is mobile and with coarser textured soils, has the ability to move fairly deep into the soil profile.

**Study Area:**

- SUP area

**Indicators:**

- Description of likely snowmaking scenarios for dry, wet, and average snow years
- Analysis of potential changes to botanical composition due to anticipated increases in soil moisture consistency and/or delayed snowpack desiccation
- Description of the certification process for allowing Class A water to be used for snowmaking
- Literature search on use of reclaimed water for various recreational and municipal purposes uses
- Documentation of compliance with State and Federal water quality standards regarding Class A wastewater and its uses
- Description of nitrogen constituents of Class A wastewater

## **Wildlife**

*The Proposed Action may result in the alteration and/or removal of habitat for terrestrial wildlife species within the SUP.*

### **Background:**

Modification or removal of habitat may impact terrestrial and/or T, E, and S wildlife species.

### **Study Area:**

- SUP area (varies by species)

### **Indicators:**

- Identification of any T, E, and S; MIS<sup>11</sup>; and other wildlife species and habitats present within the SUP area and along the pipeline corridor
- Disclosure/quantification of anticipated effects to those species and habitats present within the SUP area and along the pipeline corridor

*Proposed snowmaking activities may result in a longer-duration snowpack and additional water storage for wildlife in the SUP area.*

### **Background:**

Snowmaking and the proposed water impoundment may create improved spring foraging habitat for grazing ungulates. Although this may be beneficial to certain wildlife species, wildlife may congregate in the area due to the increased presence of moisture, particularly during drought conditions.

### **Study Area:**

- SUP area

### **Indicators:**

- Acreage of proposed snowmaking coverage
- Comparison of natural snowpack duration with the extended snowpack due to snowmaking
- Effects of both longer-duration snowpack and water storage (impoundment) on wildlife in the analysis area

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<sup>11</sup> MIS, or “management indicator species” are defined in the Forest Plan in accordance with National Forest Management Act (NFMA) – 36 CFR 219.19.

## **Geotechnical Analysis**

*Geotechnical feasibility and associated hazards associated with construction of the proposed snowmaking impoundment on the ridge above the Sunset Chairlift must be analyzed.*

### **Background:**

Ten million gallons of capacity in the proposed impoundment equates to approximately 30 acre feet of water, which could classify it as a Forest Service Class D dam. The ultimate design of the impoundment and its orientation on the ridge will dictate the hazard rating according to Forest Service standards. For example, it would be classified as a high hazard if analysis shows that a breach would result in draining towards the Hart Prairie Lodge and Snowbowl Road and, most likely a moderate hazard if it were to drain to the south away from the Hart Prairie Lodge.

Potential geologic hazards that need to be considered in this analysis include landslide, debris flow, avalanche, rockfall, subsidence, expansive soils, and earthquake.

### **Study Area:**

- Potential flow path under multiple dam breach scenarios

### **Indicators:**

- Hazard classification
- Failure Risk
- Dam breach and downstream inundation analysis

## **Air Resources**

*Snowplay activities at Snowbowl could increase vehicular traffic and may negatively impact air quality in the region.*

### **Background:**

The Environmental Protection Agency has promulgated primary and secondary National Ambient Air Quality Standards (NAAQS) for six criteria pollutants (carbon monoxide, nitrogen dioxide, particulate matter, ozone, sulfur dioxide, and lead). Primary and secondary standards are adopted to protect public health and welfare, respectively. States are required to adopt ambient air quality standards which are at least as stringent as the federal NAAQS, however, the state standards may be more stringent. Arizona has adopted the federal NAAQS.

### **Study Area:**

- The Snowbowl SUP area and the proximate Class 1 airshed <sup>12</sup>

### **Indicator:**

- Compliance with local, state and federal regulations regarding air quality

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<sup>12</sup> The nearest Class I airshed is Sycamore Canyon Wilderness. The Kachina Peaks Wilderness is not classified as a Class I airshed, though it is treated as if it were.

# CHAPTER 2

## DESCRIPTION OF ALTERNATIVES

Introduction .....	2-1
Alternatives Considered in Detail .....	2-1
<i>Forest Plan Amendment</i> .....	2-1
<i>Alternative 1 - No Action</i> .....	2-2
<i>Alternative 2 - Proposed Action</i> .....	2-5
<i>Alternative 3 - No Snowmaking or Snowplay</i> .....	2-17
<i>Mitigation Measures and Best Management Practices</i> .....	2-21
Alternatives Considered but not Analyzed in Detail.....	2-32
Comparison of Alternatives .....	2-40
Data Integrity .....	2-62

**Coconino National Forest  
Peaks Ranger District**



## 2. DESCRIPTION OF ALTERNATIVES

### INTRODUCTION

Chapter 2 describes the alternatives considered within this environmental analysis and summarizes the environmental consequences anticipated to result with the implementation of each. As required by the Council on Environmental Quality (CEQ), the alternatives considered are presented in comparative form.<sup>1</sup> Mitigation measures and best management practices (BMPs), designed to lessen or avoid impacts anticipated to occur as a result of implementation of the action alternatives, are also detailed.

The National Environmental Policy Act (NEPA) requires that an environmental analysis examine a range of alternatives, which are “reasonably related to the purpose of the project.”<sup>2</sup> Both CEQ Regulations and Forest Service Handbook direction emphasize that alternatives must meet the “reasonableness” criteria in order to warrant detailed analysis. Alternatives which were considered within the analysis process, but were determined not reasonable were eliminated from detailed study with a brief discussion of the rationale for their elimination.<sup>3</sup>

The process used to develop alternatives to the Proposed Action followed external public and internal agency scoping. The issues raised during the scoping process were used as the basis for determining the need for alternatives to the Proposed Action. A Comment Disposition Analysis, documenting the categorization and responses to all comments submitted, was prepared as a key component of the scoping and alternatives formulation process. The Comment Disposition Analysis is contained in the Project Record.

### ALTERNATIVES CONSIDERED IN DETAIL

In addition to the Proposed Action, a second action alternative (Alternative 3) and the required No Action Alternative are analyzed in detail within this EIS.

#### FOREST PLAN AMENDMENT

A component of Alternatives 1, 2 and 3 includes amending the Coconino Forest Plan with a non-significant amendment<sup>4</sup> clarifying the direction in Management Area 15 – Developed Recreation Sites. Page 188 of the Forest Plan makes reference to the 1979 FEIS as guidance for the management of the Snowbowl ski area. This management direction necessitates being updated to reference the Arizona Snowbowl’s Master Development Plan based on NEPA analyses and subsequent approvals. The original management emphasis did not allow for the changed

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<sup>1</sup> 40 CFR 1502

<sup>2</sup> 40 CFR 1502.14a

<sup>3</sup> Id.

<sup>4</sup> 36 CFR 219.10(f) directs the Forest Service to determine if a proposed amendment to a forest plan would be considered a significant change.

circumstances that may initiate a new environmental analysis of the ski area operations. The reader is referred to Appendix B for more information.

## **ALTERNATIVE 1 – NO ACTION**

As required by NEPA, a No Action Alternative has been included in this analysis for review alongside the action alternatives.<sup>5</sup> The No Action Alternative reflects a continuation of existing management practices without changes, additions, or upgrades. Selection of Alternative 1 would result in creation of a new Master Development Plan (MDP) which would provide for operation and maintenance of existing facilities. No new facilities, trail improvements, or snowmaking would occur under the No Action Alternative and the Snowbowl would continue to operate at its existing Comfortable Carrying Capacity (CCC) of 1,880 skiers-at-one-time. Peak day visitation would continue to reach in excess of 3,400 skiers-at-one-time.<sup>6</sup> The No Action Alternative provides a baseline for comparing the effects of the Proposed Action and Alternative 3.

All costs associated with the operation and maintenance would be fully the responsibility of the Arizona Snowbowl.

The No Action Alternative is illustrated on Figure 2-1.

### **Snowplay**

Dispersed snowplay (sledding, tubing, building snowmen) is not permitted within the Snowbowl SUP area or at any point along the Snowbowl Road. Parking along the Snowbowl road was recently prohibited in order to manage the level of dispersed snowplay activities and their attendant issues. Under the No Action Alternative, snowplay would continue to be prohibited within the Snowbowl SUP and along the Snowbowl Road.

### **Lifts/Uphill Capacity**

Under the No Action Alternative, the Snowbowl would continue to operate five lifts: Agassiz (triple); Sunset (triple); Hart Prairie (double); Aspen (double); and Spruce (portable surface). Over time, as the lifts age, their periodic replacement would become necessary and would occur.

### **Terrain**

Under the No Action Alternative, Snowbowl's terrain would remain in its current configuration with 32 formal (named) trails covering approximately 139 acres.

### **Guest Service Facilities**

Existing on-mountain visitor services are provided in two buildings: the Hart Prairie Lodge (at the base of the Hart Prairie and Sunset chairlifts) and the Agassiz Lodge at the base of the Agassiz Chairlift. In total, these two buildings comprise approximately 23,500 square feet of guest service and administrative space. There are presently a total of 614 indoor, cafeteria style seats, and 648 outdoor seats available between the two buildings. Under the No Action

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<sup>5</sup> 40 CFR 1502.14(d)

<sup>6</sup> Refer to the Recreation section presented in Chapter 3 for additional details regarding daily and annual visitation.

Alternative, neither building would change, with the exception of minor modifications and routine maintenance.

### **Summer Activities**

Under Alternative 1, no change would occur to the Scenic Sky Ride program that operates daily on the Agassiz Chairlift. As is currently the case, hiking from the top of the lift back to the base area is not allowed, guests would therefore continue to be required to return back to the base area via the lift.

### **Infrastructure and Utilities**

#### **Sewer and Wastewater**

Snowbowl's existing septic system is adequate to meet the current demands of the ski area. Snowbowl currently relies on vehicular delivery for 100 percent of its potable and non-potable water demands. It is estimated that over 60 percent of the potable water transported to the ski area is ultimately consumed by toilet services. Under the No Action Alternative, this practice would continue.

#### **Roads**

Under the No Action Alternative, Snowbowl would not construct any new on-mountain maintenance roads.

#### **Parking**

Approximately 10.3 acres of parking are currently provided in the parking lots adjacent to the Hart Prairie Lodge, and the upper lots below the Agassiz Lodge. The combined capacity of the lots is approximately 1,200 vehicles. No additional parking areas would be constructed under Alternative 1.

#### **Pedestrian Access**

Under the No Action Alternative, pedestrian movement across the main access road (between the Hart Prairie lodge/parking areas and the Sunset Chairlift) would not change.



Facilities Improvements  
Environmental Impact Statement

Figure 2-1  
No Action Alternative

LEGEND

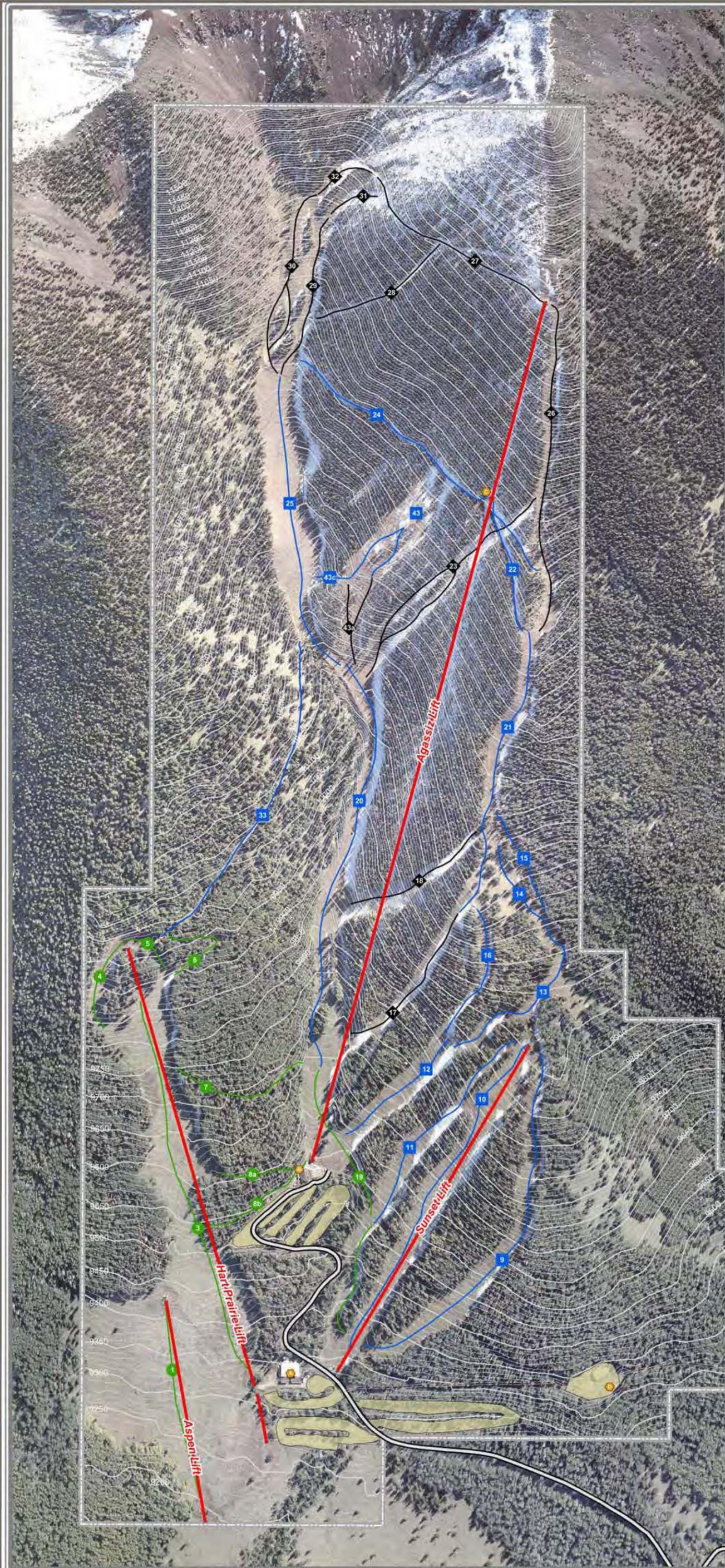
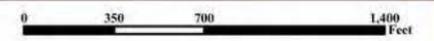
- Existing Lift
- Existing Facility
- Existing Parking
- Special Use Permit Boundary

Trail Symbology

- Trail - Easier
- Trail - More Difficult
- Trail - Most Difficult

FACILITIES

- Hart Prairie Lodge
- Agassiz Lodge
- Agassiz Lift Mid-Station
- Existing Maintenance Facilities



## **ALTERNATIVE 2 – PROPOSED ACTION**

Alternative 2 would result in the creation of a MDP that includes all projects outlined in the following Proposed Action description.

Under the Proposed Action, the Snowbowl's CCC would increase to the approved<sup>7</sup> level of 2,825 skiers-at-one-time. Peak day visitation would continue to reach in excess of 3,400 skiers-at-one-time.

All costs associated with the planning, development, construction, operation, and maintenance of all proposed infrastructure would be fully the responsibility of the Arizona Snowbowl.

The Proposed Action is illustrated on figures 2-2 through 2-6.

### **Snowmaking**

Snowbowl proposes to install the necessary snowmaking infrastructure to cover 205.3 acres of terrain throughout the duration of its winter operating season (refer to Figure 2-3). Snowbowl would almost certainly cover the full extent of this area during the pre- and early season (approximately November through December) each year in order to create a sufficient base layer that would subsequently be covered by natural snowfall. However, the ski area may continue to produce snow throughout the winter to compensate for inadequate natural snowfall, depending on weather trends.

The City of Flagstaff has agreed to provide the ski area with up to 1.5 million gallons per day (gpd) of Class A reclaimed water from the Rio De Flag Water Reclamation Plant (WRP) between November 1<sup>st</sup> and the end of February, for a period of five years from March 20, 2002. Terms of the agreement allow for renewal for three (3) additional five (5) year periods. Currently, reclaimed water from the Rio De Flag WRP is used to irrigate city parks, school playgrounds, and golf courses during the summer, but goes unused throughout the winter, being allowed to flow down Rio de Flag channel. The Arizona Department of Environmental Quality (ADEQ) allows reclaimed water with an "A" rating to be used for snowmaking purposes. The reclaimed water produced by the Rio de Flag WRP currently exceeds this standard.<sup>8</sup>

The reclaimed water originating from the Rio de Flag WRP would be transported to the ski area via an approximate 14.8-mile buried pipeline (refer to Figure 2-4). The waterline would be connected to the reclaimed water circulation system currently used by the City of Flagstaff near Thorpe Park and follow existing utility easements and rights-of-way across a mix of federal, state, and private lands to the intersection of U.S. Highway 180 and Snowbowl Road. From this point the waterline would follow the Snowbowl Road to the ski area and subsequently be routed up a ski trail to a proposed 10 million gallon impoundment (explained below). Two booster stations would be installed along the pipeline to maintain appropriate pressure. These would

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<sup>7</sup> Approved in the 1979 Arizona Snowbowl Ski Area Proposal Final Environmental Statement and subsequently incorporated by reference the CNF Forest Plan.

<sup>8</sup> Should additional water quality standards be promulgated by EPA and/or ADEQ subsequent to, or following, an approval to use reclaimed water, the Arizona Snowbowl would be held in compliance with this standard.

likely be located near Thorpe Park and along Snowbowl Road. Each pump station would entail the construction of a small pump house building/vault.

The currently proposed pipeline route was identified after discussions with Transwestern Pipeline Company, the Forest Service, Arizona State Land Department, and Lowell Observatory. Lowell Observatory is very interested in providing fire hydrants on observatory property west of their campus and also in replacing a private and antiquated potable water delivery system to the campus from Flagstaff. In accordance with Forest Plan direction to locate additional uses within existing utility corridors, the proposed reclaimed water pipeline route follows the Transwestern Lateral Natural Gas Pipeline from west of the observatory to the intersection of U.S. Highway 180 and Snowbowl Road. The remainder of the proposed pipeline route is located on Observatory private property and existing Forest Service Road 515 in Section 7. The proposed route was also selected to minimize impacts and inconveniences to traffic and private property during construction of the pipeline.

A 10 million gallon water storage impoundment (approximately 30.7 acre-feet in volume and 1.9 acres in surface area) is proposed to be constructed near the top terminal of the existing Sunset Chairlift for operation of the snowmaking system (refer to Appendix A for more detail on the proposed impoundment's design specifications). Ten million gallons of capacity would not only provide for early and mid-season snowmaking, but would help ensure a sufficient water supply of snowmaking water past the end of February, when the City of Flagstaff would discontinue reclaimed water service. An analysis of the snowmaking system sizing and capacity was conducted in the initial project planning stages. This analysis is contained in its entirety in the project Record. The sizing analysis examined three different potential impoundment capacities at 1.5, five, and 10 million gallons. The system analysis, which considered: operational temperatures, system throughput, and the rate of re-claimed water delivery; concluded that a 10 million gallon storage volume would provide an optimal system capacity within the available space and siting constraints for the storage reservoir. Necessary pumps and a compressor would be installed within a primary pumphouse building to be located near the impoundment. Preliminary discussions with City officials have identified a potential desire to maintain pressure throughout the snowmaking pipeline throughout the year to provide a water source for fire suppression needs within the residential communities proximate to the pipeline between Flagstaff and the ski area. Hydrants could be situated along the pipeline to provide access to this water.<sup>9</sup> Additionally, a residual pool would be maintained within the impoundment during the summer months to allow for potential use by wild land fire suppression.

Generally, "airless" style fan-gun snowmaking technology would be used in the base area, while high-tech air/water tower guns are proposed for the upper portions of the mountain. Construction of the snowmaking system would involve the burial of air, water, and power lines along the edges of trails to be covered, as well as the construction of a 3,000 to 4,000 square foot snowmaking control building in the vicinity of the existing maintenance shop (refer to Figure 2-3).

Because of rocky terrain, it is anticipated that burying the snowmaking water lines to a depth that prevents freezing would be impractical and expensive. Therefore, the proposed snowmaking

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<sup>9</sup> The exact number and locations of hydrants is yet to be determined.

system has been designed to back drain after each snowmaking period. This would allow for the water lines to be buried at shallower depths because the entire network of snowmaking lines could be drained after each use. Depending on location, orientation, and distance of the water lines from the snowmaking water impoundment, the back drainage system would return the reclaimed water to the main snowmaking water impoundment or an addition smaller catchment pond (approximately one acre-foot capacity) proposed to be located north of the snowtubing parking lots.

Approximately 178 million gallons of water would be available to Snowbowl between November 1 and February 28 of each year.<sup>10</sup> At 325,852 gallons of water per acre foot (AF), this equates to approximately 548 AF of water available to Snowbowl each season.

However, annual water use for the snowmaking system would vary according to natural conditions, and has been modeled according to dry, wet and average precipitation years.<sup>11</sup>

### **Snowplay/Tubing Facility**

Snowbowl proposes the development of a managed and professionally designed snowplay/tubing facility at the base area. The snowtubing area would entail dedicating approximately eight acres of terrain in Hart Prairie area to development of six to eight tubing lanes (refer to Figure 2-2). These lanes would be serviced by a combination of four surface lifts. While the surface of the snowtubing area would be graded, construction of the individual lanes would be completed with snow each season (and is dependant upon snowmaking). The snowtubing facility has been designed with a capacity of approximately 600 tubers-at-one-time.

A 400-space parking area (approximately 3.3 acres) would be constructed to service the proposed tubing facility (skiers would be prohibited from parking in this lot). From the parking area, guests would have foot access to a proposed guest service facility adjacent to the tubing area. Constructed and located specifically for snowplaying activities, this 5,000 square foot building would offer food service, restrooms (necessitating construction of an on-site septic system), ticket sales, and a sun deck. A buried 10,000-gallon water storage tank is proposed to be located proximate to the facility containing reclaimed water for use in toilets.

### **Lifts/Uphill Capacity**

Antiquated lift equipment is proposed to be replaced with more modern and efficient chairlift technology as detailed below (refer to Figure 2-2):

#### **Sunset Chairlift**

The Sunset Chairlift would be replaced and realigned with a high speed chair. It would also be realigned and lengthened with a new top-drive terminal located at 10,900 feet in elevation – approximately 300 feet south/southwest of the existing mid-station on the Agassiz Chairlift.

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<sup>10</sup> 1.5 million gpd x 119 days.

<sup>11</sup> Refer to either the Watershed (Section H) or Soils (Section I) analyses of Chapter 3 for additional details.

### Humphreys Chairlift

The existing Sunset Chairlift would be relocated and installed as the proposed Humphreys Chairlift, accessing a new pod of proposed ski trails. The lift would start near the Agassiz Lodge and extend approximately 3,000 linear feet to terminate at an elevation of approximately 10,400 feet. The Humphreys Chairlift would require vehicular access to both terminals. Permanent access to the top terminal would be via the existing mountain access road and temporary access would be via a portion of one of the proposed ski trails. Power would be supplied to the bottom terminal via a spur from the Agassiz Lodge power line.

### Hart Prairie Chairlift

The Hart Prairie Chairlift would be upgraded to a high-speed, detachable lift; it would remain top-driven with the bottom terminal being relocated approximately 200 feet downhill and 250 feet north of the present terminal site. The resulting lift alignment would require only incidental vegetative clearing.

### Aspen Chairlift

The Aspen Chairlift would be upgraded and realigned, swinging the bottom terminal approximately 500 feet north, within the existing SUP boundary. This realignment would also improve on-fall-line skiing within the pod.

### Surface Lifts

Three 150-foot surface conveyor (Magic carpet) type lifts are proposed for the area north of the Hart Prairie Lodge, which would be redesigned and designated as a beginner/learning area. One additional 300-foot handle tow (surface lift) is proposed to service the planned halfpipe and terrain park (detailed below).

### Snowtubing Surface Lifts

As noted, a combination of four surface lifts would service the snowtubing facility. Snowtubing lifts are designed and engineered specifically for pulling snowtubes.

### Terrain

Approximately 65.6 acres of additional skiing terrain is proposed for beginner and intermediate (including low and advanced intermediate) skill levels, as well as some advanced terrain, bringing total developed skiable terrain (i.e., excluding glades) at the Snowbowl to approximately 204.2 acres. Specific areas planned for additional skiing terrain include an extension of the *Spur Catwalk* (trail #27), widening of the existing lift line below the *Spur Catwalk* paralleling the Agassiz Chairlift (trail #43B), widening of *White Lightning* (trail #28) and *Tiger* (trail #18), the creation of new trails under the proposed Sunset and Humphreys chairlifts, the construction of one new trail connecting *Lower Ridge* (trail #21) with *Wild Turkey* (trail #20), and the development of a skiway (trail #44) (providing skier, ski patrol, and maintenance/construction access) from *Upper Logjam* (trail #25) to the top terminal of the proposed Humphreys Chairlift.

Additionally, approximately 47.4 acres of tree thinning/glading would occur within the Agassiz

and Sunset pods to create improved gladed skiing opportunities. Thinning within these pods is proposed to address recreational, fuel reduction, and forest health objectives. Timber removal would be concentrated on unhealthy/dead trees. Overall, the thinning has been designed to maintain 80 percent of the existing overstory vegetation.

Table 2-1 describes the nature of the proposed terrain additions.

**Table 2-1  
Proposed Terrain Breakdown (acres)**

Ability Level	Acreage
Beginner	2.0
Novice	44.0
Low Intermediate	34.5
Intermediate	51.0
Advanced Intermediate	41.9
Expert	31.8
<b>Total</b>	<b>204.2</b>

In association with the creation of additional terrain and snowmaking coverage, a number of areas are proposed to be graded and smoothed to improve the skiing experience. Two separate methods of earthwork are proposed for specific areas; grading and stumping/smoothing. Graded areas would be carefully stripped of topsoil resources, reshaped and re-contoured, followed by redistribution of topsoil and immediate revegetation. In areas to be stumped/smoothed, rocks and stumps protruding from the surface would be disposed of. Disturbed areas would be promptly revegetated per mitigation measures outlined in Table 2-2.

A dedicated teaching area would be developed near the Hart Prairie Lodge in order to better accommodate beginner skiers. Construction of the teaching area would require re-contouring approximately three acres.

A halfpipe<sup>12</sup> would also be built approximately 300 feet southeast of the bottom terminal of the Sunset Chairlift. The contour of the halfpipe would be rough-shaped out of dirt to minimize the total snowmaking coverage necessary for its use. Additionally, a small surface lift would be installed immediately parallel to the proposed halfpipe.

### **Guest Service Facilities**

In order to better accommodate existing use levels, both the Hart Prairie and Agassiz day lodges would be enlarged and upgraded. The Hart Prairie Lodge would increase by approximately 6,000 square feet. A new guest services facility totaling approximately 10,000 square feet would be developed immediately adjacent to the existing Agassiz Lodge. The increased building space would allow for the provision of critical guest functions such as additional restrooms, lockers, dining and kitchen areas, and first aid services. This would increase Snowbowl's total

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<sup>12</sup> Halfpipes are linear, U-shaped terrain features constructed down appropriately steep slopes used for freestyle skiing and snowboarding. Halfpipes are common amenities at ski areas all over the world.

guest/administrative square footage from approximately 23,500 square feet to approximately 39,500 square feet. All guest services would be designed to meet ADA requirements.

Snowbowl proposes the development of a 2,500 square foot Native American cultural and education center, which would be incorporated into the design of the Agassiz Lodge.

On the mountain, three new ski team buildings are proposed to replace the existing buildings. The start and finish race facilities would be approximately 100 square feet each; the start would be located on *Phoenix* (trail #16) just below the split with *Lower Ridge* (trail #21), and the finish would be located on the skier's right near the bottom of *Agassiz* (trail #12). The third building would be a clubhouse approximately 640 square feet in size located approximately 150 feet south of the Agassiz Lodge.

### **Summer Trails**

Snowbowl proposes the construction of a trail from the existing Agassiz Chairlift mid-station to the top terminal.<sup>13</sup> Hikers would primarily use the trail; however, the trail would be wide enough to permit ski area maintenance personnel to access the top terminal using all terrain vehicles (e.g., four wheelers). Additionally, the proposed trail would provide a method of moving guests from the upper reaches of the Agassiz Chairlift should a summer lift evacuation be necessary. This trail would be approximately 5,280 feet in length and constructed to a width of five feet (slightly wider at switchbacks) to allow for ATV use. Vegetation removal associated with construction of this trail would be focused on understory and dead/dying trees, however, incidental removal of live overstory trees may be necessary to maintain proper grades along the trail alignment.

The proposed trail has been designed to allow guests to hike from the observation deck at the top of the Agassiz Chairlift down to the mid-station, then follow *Midway Catwalk* (trail #24 – refer to Figure 2-2 for specific location) north to proposed trail #44. Guests could then descend through the proposed Humphreys pod to proposed trail #33 for access to Hart Prairie. The main base area could be accessed through Hart Prairie.

Additionally, Snowbowl proposes an Americans with Disabilities Act (ADA) compliant summer access trail into Hart Prairie from the parking lot near Agassiz Lodge.

### **Infrastructure and Utilities**

#### **Wastewater**

Snowbowl is currently dependent on vehicular delivery for 100 percent of its water needs (potable and non-potable alike). This results in potable water being used for non-potable uses.<sup>14</sup> In order to reduce the environmental impacts and costs associated with the vehicular delivery, Snowbowl proposes to install a spur from the reclaimed water pipeline to the Hart Prairie and Agassiz day lodges, as well as the snowplay facility to service non-potable uses such as toilets.

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<sup>13</sup> Thirty percent of guests who participate in the summer Sky Ride express an interest in being allowed to hike off the mountain.

<sup>14</sup> Arizona Snowbowl estimates that over 60 percent of the potable water transported to the ski area is ultimately consumed by toilet services.

A buried 10,000-gallon water storage tank would be constructed at each of the lodges and at the snowplay building to facilitate the use of reclaimed water.

## Roads

Snowbowl proposes a redesigned entrance circle which would have signage directing guests to parking lots, day lodges, and snowplay parking. Additionally, the traffic circle would allow the ski area to more effectively manage capacity by providing a safe location to turn vehicles around once the parking areas are full.

In order to construct and maintain the proposed snowmaking water impoundment, Snowbowl would require permanent access to the facility. This is proposed to be achieved by using a portion of an existing, although infrequently used, two-track road between the maintenance area and the top of the Sunset Chairlift. Approximately 3,650 feet of the existing two-track road would be used after bringing it up to a Forest Service maintenance level II road standard in order to accommodate construction and maintenance equipment with adequate drainage and surfacing, as needed. However, an approximate 1,100-foot spur of new road would be constructed between the existing maintenance road that traverses *Sunset Boulevard* (trail #10) and *Southern Belle* (trail #9) and the upgraded impoundment access road. In total the road length would be approximately 4,760 feet. However, with the proposed road construction and reconstruction, a 3,050-foot segment of the existing two-track road would be obliterated and reclaimed. In association with this proposal, a roads analysis (Road Analysis Process, RAP) was completed by the Forest Service and is contained in the project file.

## Parking

### **Skier Parking**

To increase parking lot efficiency, facilitate snow removal, and improve pedestrian safety, Snowbowl proposes to combine existing parking lots #1 and #2 by re-grading and leveling them. See Figure 2-2, item “F” for parking area location. This would add a marginal number of parking spaces – approximately 35 spaces across 0.3 acre.

### **Snowplay Parking**

Snowbowl proposes the development of a 400-space parking lot to the north of the proposed entrance loop. As discussed in the snowplay/tubing section, skiers would be prohibited from parking in this lot.

## Pedestrian Access

A pedestrian underpass is proposed to allow skiers to pass directly to and from the Hart Prairie lodge/parking areas and the Sunset Chairlift without walking across the main access road.



Facilities Improvements  
Environmental Impact Statement

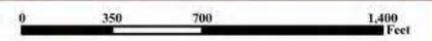
Figure 2-2  
Alternative 2 - Proposed Action

LEGEND

- Existing Lift
- Proposed Lift
- Existing Facility
- Proposed Facility
- Existing Parking
- Proposed Parking
- Special Use Permit Boundary
- Proposed Trail Clearing
- Proposed Vegetation Clearing
- Proposed Hiking Trail
- Proposed Road Reconstruction
- Proposed New Road Construction
- Proposed Road Obliteration

FACILITIES

- Hart Prairie Lodge
- Agassiz Lodge
- Agassiz Lift Mid-Station
- Existing Maintenance Facilities
- Proposed Building Expansion
- Proposed Parking Lot Reconfiguration
- Proposed Half Pipe and Surface Lift
- Proposed Pedestrian Underpass
- Proposed Snowplay Facilities
- Proposed Snowplay Parking
- Proposed Snowplay Area
- Proposed Snowmaking Control Building
- Proposed Pumphouse
- Proposed Snowmaking Water Impoundment
- Proposed Snowmaking Catchment Pond
- Proposed Valve House





Facilities Improvements  
Environmental Impact Statement

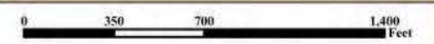
Figure 2-3  
Snowmaking Plan  
Alternative 2 - Proposed Action

LEGEND

- Existing Lift
- Proposed Lift
- Existing Facility
- Proposed Facility
- Special Use Permit Boundary
- Proposed Snowmaking Coverage
- Proposed Snowmaking Pipeline
- Proposed Road Reconstruction
- Proposed New Road Construction
- Proposed Road Obliteration

FACILITIES

- Proposed Snowmaking Water Impoundment
- Proposed Snowmaking Catchment Pond
- Proposed Snowmaking Control Building
- Proposed Pumphouse
- Proposed Valve House





Facilities Improvements  
Environmental Impact Statement

Figure 2-4  
Proposed Reclaimed Water  
Pipeline Route

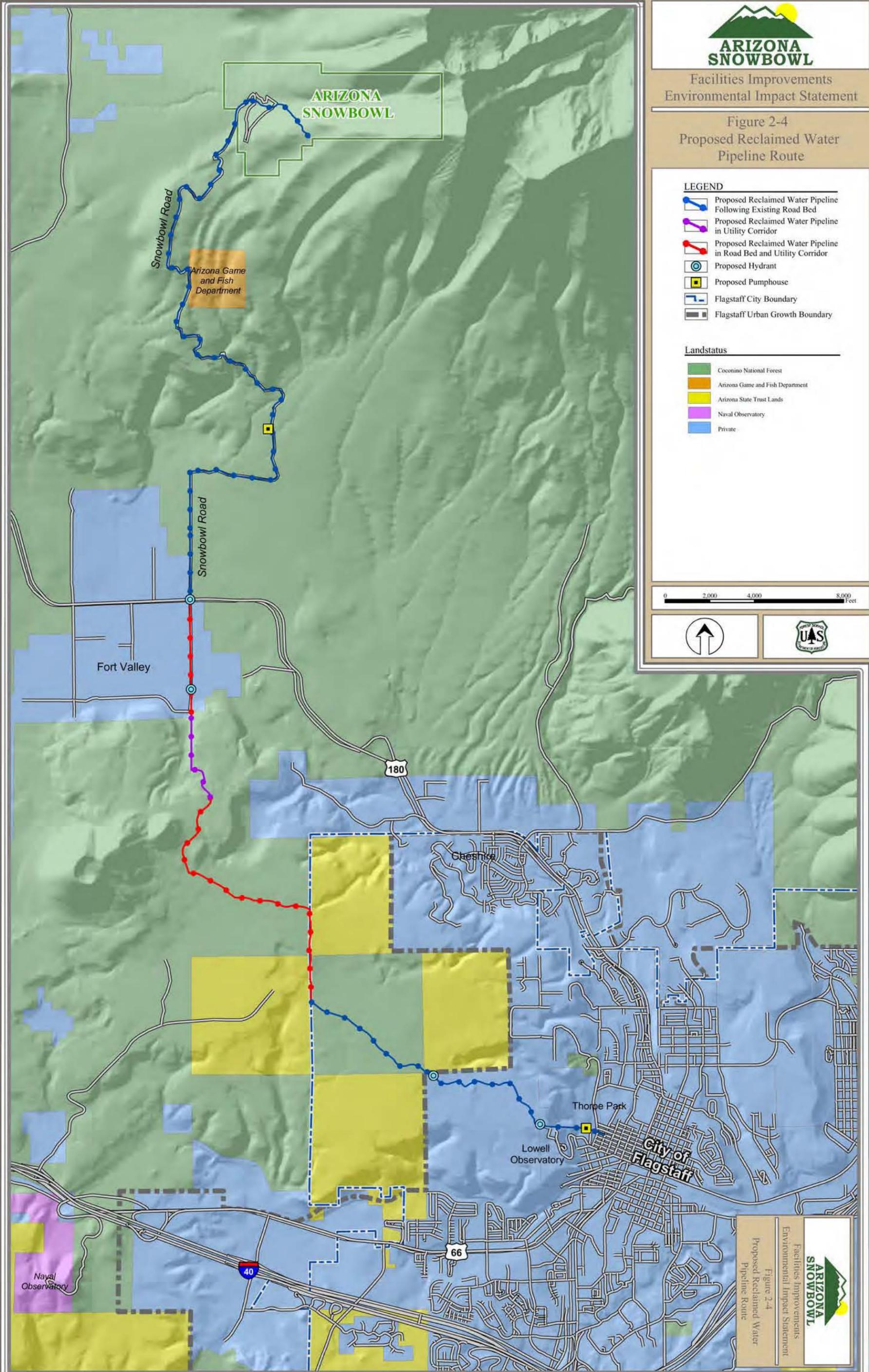
LEGEND

- Proposed Reclaimed Water Pipeline Following Existing Road Bed
- Proposed Reclaimed Water Pipeline in Utility Corridor
- Proposed Reclaimed Water Pipeline in Road Bed and Utility Corridor
- Proposed Hydrant
- Proposed Pumphouse
- Flagstaff City Boundary
- Flagstaff Urban Growth Boundary

Landstatus

- Coconino National Forest
- Arizona Game and Fish Department
- Arizona State Trust Lands
- Naval Observatory
- Private

0 2,000 4,000 8,000 Feet





Facilities Improvements  
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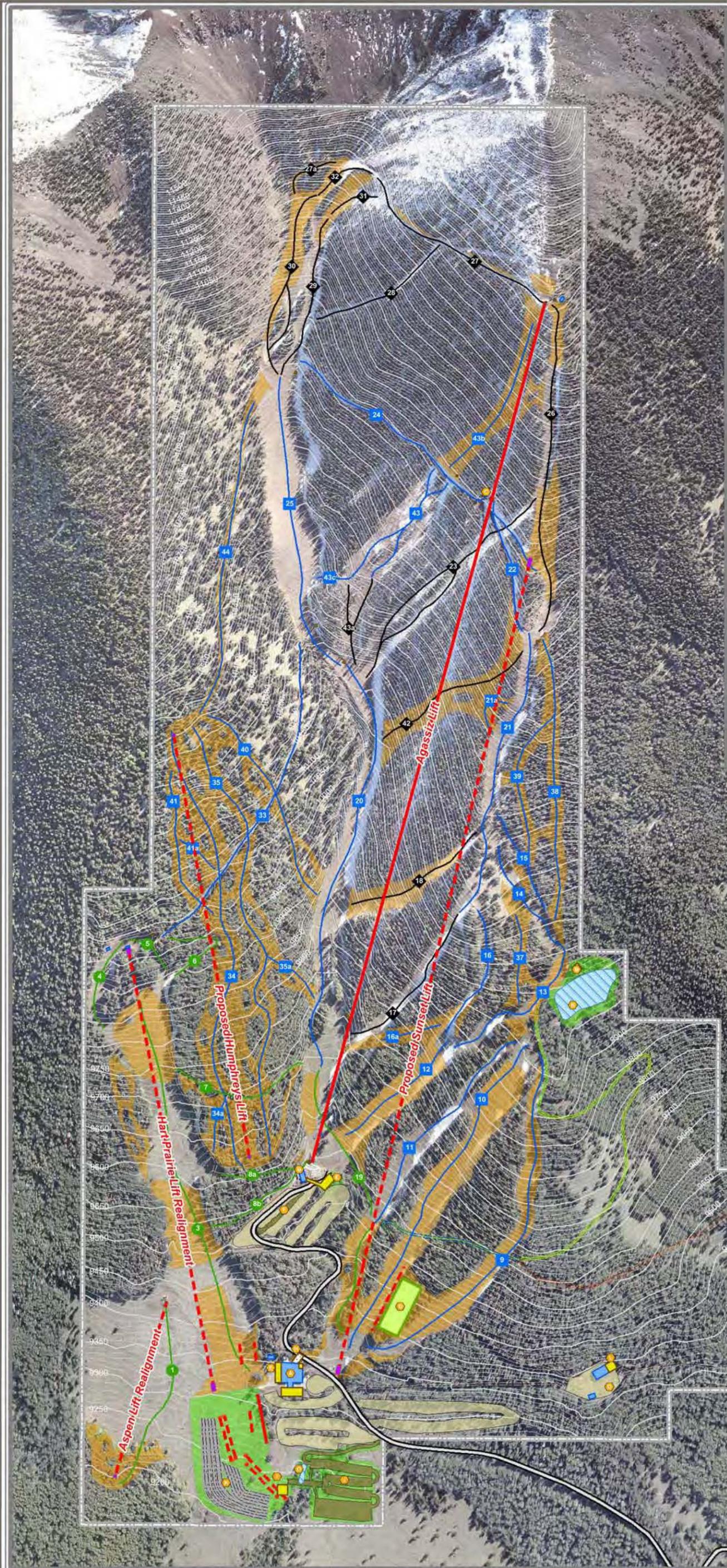
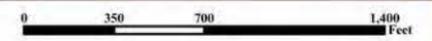
Figure 2-5  
Grading Plan  
Alternative 2 - Proposed Action

LEGEND

- Existing Lift
- Proposed Lift
- Existing Facility
- Proposed Facility
- Existing Parking
- Proposed Parking
- Special Use Permit Boundary
- Proposed Trail Grading and Smoothing
- Proposed Grading
- Proposed Road Reconstruction
- Proposed New Road Construction
- Proposed Road Obliteration

FACILITIES

- Hart Prairie Lodge
- Agassiz Lodge
- Agassiz Lift Mid-Station
- Existing Maintenance Facilities
- Proposed Building Expansion
- Proposed Parking Lot Reconfiguration
- Proposed Half Pipe and Surface Lift
- Proposed Pedestrian Underpass
- Proposed Snowplay Facilities
- Proposed Snowplay Parking
- Proposed Snowplay Area
- Proposed Snowmaking Control Building
- Proposed Pumphouse
- Proposed Snowmaking Water Impoundment
- Proposed Snowmaking Catchment Pond





ARIZONA SNOWBOWL  
Facilities Improvements  
Environmental Impact Statement

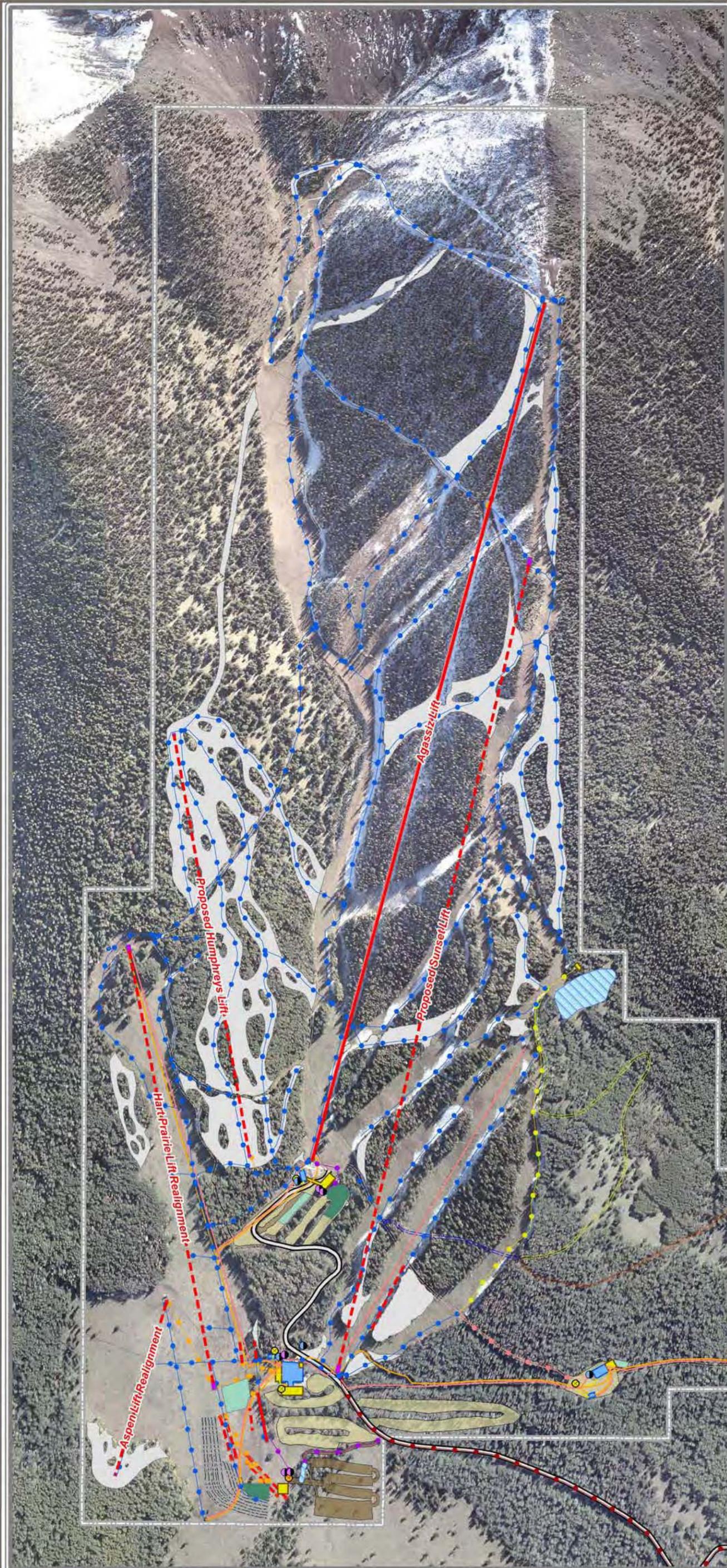
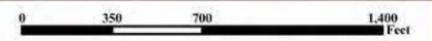
Figure 2-6  
Alternative 2 - Utility Map

**LEGEND**

- Existing Lift
- Proposed Lift
- Existing Facility
- Proposed Facility
- Special Use Permit Boundary
- Proposed Trail Clearing
- Proposed Road Reconstruction
- Proposed New Road Construction
- Proposed Road Obliteration

**Utilities**

- Existing Communication
- Existing Power
- Existing Propane
- Proposed Communication
- Proposed Power
- Proposed Snowmaking Water
- Proposed Snowmaking Water, Power, Air
- Proposed Snowmaking Water, Power, Air, Communication
- Proposed Snowmaking Water, Power, Communication
- Existing Water Tank
- Proposed Water Tank
- Existing Propane Tank
- Proposed Propane Tank
- Existing Leach Field
- Proposed Leach Field



## **ALTERNATIVE 3 – NO SNOWMAKING OR SNOWPLAY**

As with the Proposed Action, Alternative 3 would result in the creation of a MDP that includes all projects outlined in the Proposed Action description, with the major exception of snowmaking (including the transmission line from Flagstaff, pipelines, and the impoundment). Because construction and use of the proposed snowplay facility is dependant upon the ability of the Snowbowl to produce snow, this facility and associated parking would not be constructed under Alternative 3. Finally, Alternative 3 does not include realignment of the Aspen Chairlift or associated vegetation clearing in the northwestern portion of Hart Prairie, as in the Proposed Action.

Under Alternative 3 the Snowbowl's CCC would increase to the approved<sup>15</sup> level of 2,825 skiers-at-one-time. Peak day visitation would continue to reach in excess of 3,400 skiers-at-one-time. Developed skiing terrain would increase to approximately 202.6 acres. Peak day visitation would be expected to continue to exceed 3,400 skiers-at-one-time.

All costs associated with the planning, development, construction, operation, and maintenance of all proposed infrastructure would be fully the responsibility of the Arizona Snowbowl.

Alternative 3 is illustrated in figures 2-7 through 2-9.

By excluding all snowmaking infrastructure and the associated use of reclaimed water on the San Francisco Peaks, tribal and public concerns over effects to cultural and spiritual values as well as effects to water quality within the watershed would be addressed. Alternative 3 also responds to Heritage Issue #2 (scarring of the San Francisco Peaks) with reduced ground and vegetation disturbance. When compared to the Proposed Action, Alternative 3 reduces permanent and temporary ground disturbance (refer to Table 2-4). However, with the absence of snowmaking in Alternative 3, additional grading is proposed on new and existing terrain to minimize the depth of natural snow required for skiing (refer to Figure 2-8).

As detailed within the Social and Economic Resources, and Recreation sections of Chapter 3, operations under Alternative 3 would continue to be heavily dependant upon natural snowfall. Correspondingly, skier visitation levels, and therefore revenues, are not anticipated to stabilize. As such, it is probable that the owners of the Snowbowl would be unable or unwilling to continue to infuse the recurring capital necessary to maintain the quality and service level currently offered, or to implement all of the projects included in Alternative 3. Likely, a portion of the Alternative 3 improvements - those requiring smaller investments – would be developed. Dependant upon which facilities are ultimately implemented, the actual effects to the human, physical and biological environment would realistically be a blending of those effects described under the No Action Alternative and those detailed under Alternative 3.

For the purposes of comparison, this analysis primarily assesses anticipated effects of Alternative 3 assuming that *all* of the Alternative 3 improvements would be implemented.

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<sup>15</sup> Approved in the 1979 Arizona Snowbowl Ski Area Proposal Final Environmental Statement and subsequently incorporated by reference the CNF Forest Plan.



Facilities Improvements  
Environmental Impact Statement

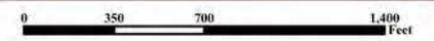
Figure 2-7  
Alternative 3

LEGEND

- Existing Lift
- Proposed Lift
- Existing Facility
- Proposed Facility
- Existing Parking
- Special Use Permit Boundary
- Proposed Trail Clearing
- Proposed Vegetation Clearing
- Proposed Hiking Trail

FACILITIES

- Hart Prairie Lodge
- Agassiz Lodge
- Agassiz Lift Mid-Station
- Existing Maintenance Facilities
- Proposed Building Expansion
- Proposed Parking Lot Reconfiguration
- Proposed Half Pipe and Surface Lift
- Proposed Pedestrian Underpass





Facilities Improvements  
Environmental Impact Statement

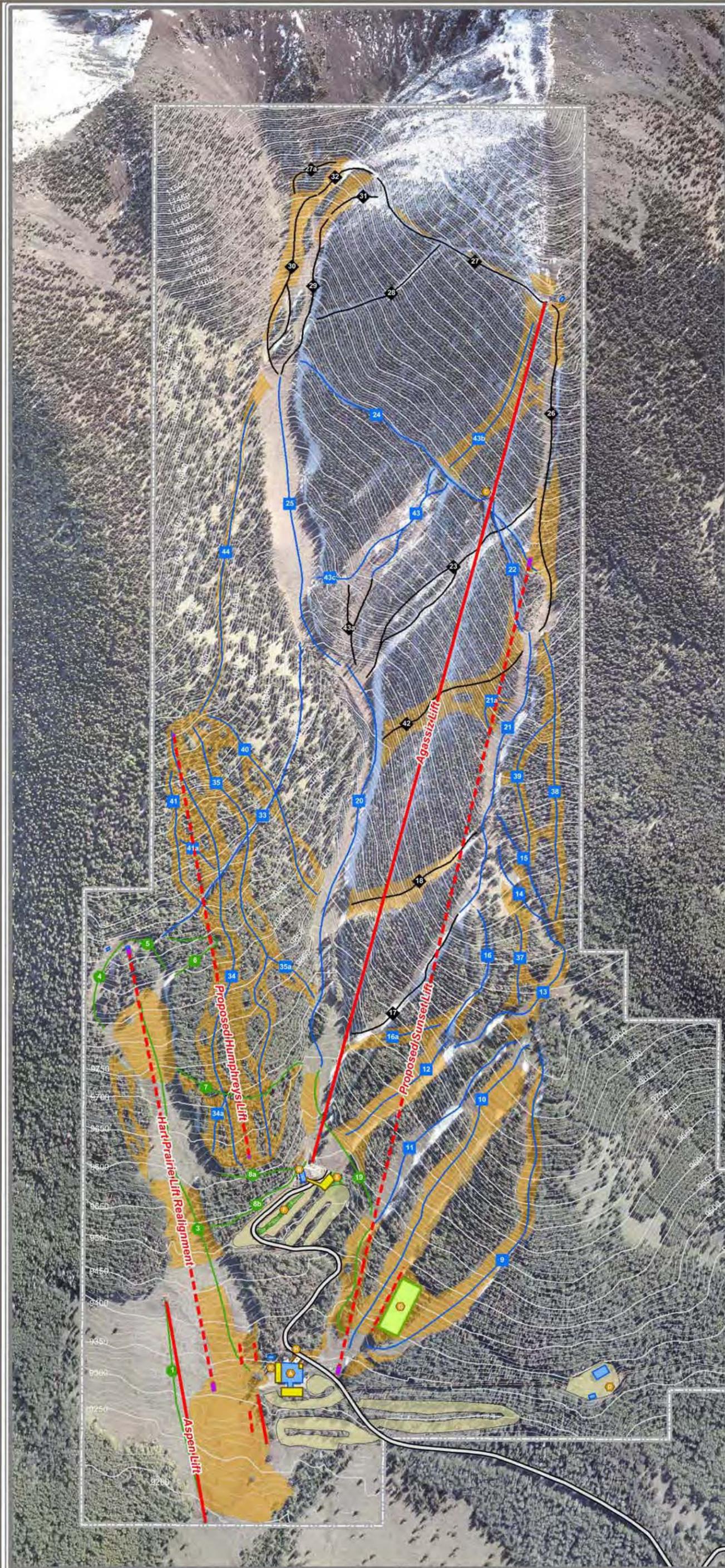
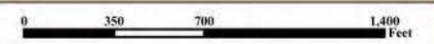
Figure 2-8  
Grading Plan  
Alternative 3

LEGEND

- Existing Lift
- Proposed Lift
- Existing Facility
- Proposed Facility
- Existing Parking
- Special Use Permit Boundary
- Proposed Trail Grading and Smoothing
- Proposed Grading

FACILITIES

- Hart Prairie Lodge
- Agassiz Lodge
- Agassiz Lift Mid-Station
- Existing Maintenance Facilities
- Proposed Building Expansion
- Proposed Parking Lot Reconfiguration
- Proposed Half Pipe and Surface Lift
- Proposed Pedestrian Underpass





Facilities Improvements  
Environmental Impact Statement

Figure 2-9  
Utility Map  
Alternative 3

**LEGEND**

- Existing Lift
- Proposed Lift
- Existing Facility
- Proposed Facility
- Special Use Permit Boundary
- Proposed Trail Clearing

**Utilities**

- Existing Communication
- Existing Power
- Existing Propane
- Proposed Power
- Existing Water Tank
- Proposed Water Tank
- Existing Propane Tank
- Existing Leach Field
- Proposed Leach Field



## MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

NEPA and CEQ regulations require that all relevant, reasonable mitigation measures that will reduce the impacts resulting from a project be identified, even if those measures are outside the jurisdiction of the Forest Service. Mitigation, as defined in the CEQ regulations, includes the following:

- Avoiding the impact altogether by not taking a certain action or parts of an action
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- Compensating for the impact by replacing or providing substitute resources or environments

An integral part of the analysis process is mitigation of the potential effects resulting from implementation of the action alternatives. Therefore, to minimize resource impacts, the mitigation measures detailed in Table 2-2 would be implemented for either of the action alternatives. The potential effects of each alternative (provided in Chapter 3) were analyzed with the specified mitigation measures applied. Appropriate mitigation measures and BMPs would occur previous to, or simultaneously with, approved ground disturbing activities.

Each mitigation measure or BMP includes rating of anticipated effectiveness and feasibility as well as an indicated objective. Responsibility for ensuring that these mitigation measures are implemented rests with the Snowbowl management and the Forest Service. In all cases, the ultimate enforcement mechanism for implementation of the specified mitigation measures would be the Record of Decision for this EIS, and would extend to the Forest Service Special Use Permit Administrator, the District Ranger, and the Forest Supervisor.

The effectiveness, feasibility, and objectives of the required mitigation measures and BMPs detailed in Table 2-2 were assessed based on the following rating system:

### EFFECTIVENESS

- |                 |  |
|-----------------|--|
| <b>High</b>     | Almost always reduces effects substantially. Commonly applied.           |
| <b>Moderate</b> | Usually results in a substantial reduction of effects. Commonly applied. |
| <b>Low</b>      | May not substantially reduce effects. <sup>16</sup>                      |

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<sup>16</sup> BMPs with effectiveness ratings of “Low” were avoided to provide more adequate protection of natural resources.

## FEASIBILITY

- F1** May be technically difficult.
- F2** Technically probable. Costs moderate in comparison to other options.
- F3** Technically easy. Cost high in comparison to other options.
- F4** Technically easy. Costs low in comparison to other options.

Categorical objectives have been developed for the Mitigation Measures and BMPs detailed in the following table and are referenced using the following codes:

## OBJECTIVE

- A** Promote revegetation of disturbed sites
- B** Reduce runoff, erosion, and sediment delivery
- C** Conserve productive soil resources
- D** Protect soil and water resources from contamination
- E** Minimize the effects of smoke, particulate matter and air emissions generated
- F** Reduce the visual prominence of proposed projects
- G** Reduce impacts to cultural resources
- H** Prevent overtopping of the snowmaking water impoundment embankment crest
- I** Prevent piping<sup>17</sup> development in the downstream toe of the snowmaking water impoundment embankment
- J** Prevent liquefaction<sup>18</sup> of the embankment foundation
- K** Ensure the protection of protected status flora and/or fauna
- L** Promote active vegetation management within the SUP area
- M** Define appropriate response scenarios, provide for specific notification plans, for all potential modes of snowmaking water impoundment failure
- N** Identify, minimize and correct any discovered safety deficiencies related to the snowmaking water impoundment.
- O** Monitor impacts to cultural resources
- P** Protect wildlife species, reduce the potential for human/wildlife encounters

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<sup>17</sup> Piping involves the transport of solid particles from within an embankment or foundation soil in response to high seepage pressures or seepage velocities.

<sup>18</sup> Liquefaction is a phenomenon that causes loss of shear strength during the strong ground motion accompanying an earthquake. Liquefaction requires two conditions: loose cohesionless soils and saturated conditions.

**Table 2-2  
Mitigation Measures and BMPs**

<b>Resource, BMP/Mitigation Measure</b>	<b>Objective</b>	<b>Effectiveness/Feasibility</b>
<b>VEGETATION</b>		
Understory vegetation will be preserved to the extent possible in all areas designated for flush cutting and/or overstory vegetation removal.	A, B, C, G	High/F4
Prior to construction, the disturbance limits of the site will be flagged. Pop fencing, flagging, or a staked rope line will be established to denote the limits of construction proximate to sensitive resource boundaries.	A, B, C, D, K	High/F4
Prior to removal of merchantable timber, decking areas and removal routes will be designated in the field and approved by the Forest Service. Timber removal shall minimize soil disturbance, re-use landings and skid trails that are weed-free and incorporate over-snow, skyline, or helicopter logging when and where feasible. Soil disturbance shall further be minimized by treatment of fuels in-place, use of low-impact equipment (big tires), use of equipment that carries rather than drags logs, use of hand fellers and hand piling, and by avoiding decking of logs in the woods.	C, D, K	Moderate/F4
The Snowbowl shall continue to restrict access to within the SUP during the summer months to prevent potential impacts to San Francisco Peaks groundsel and bearded gentian. Interpretive signage shall be developed and placed along the summer trail to be constructed between the Agassiz Chairlift top terminal and mid-station. As a portion of its ongoing interpretive program, Arizona Snowbowl shall provide general enforcement of access restrictions along the proposed summer trail. Arizona Snowbowl shall annually monitor the condition of alpine tundra areas to assess potential impacts and the adequacy of the restrictions. No equipment shall be operated at anytime outside the SUP.	K	High/F3
The Snowbowl shall coordinate with the CNF Silviculturalist to develop a vegetation management plan or specific treatment prescription for stands within the SUP. The CNF will approve the final prescription plan to address insect outbreaks (spruce beetle), fire risk, safety, and other management considerations that will maintain desired landscape characteristics.	L	Moderate/F3

**Table 2-2  
Mitigation Measures and BMPs**

<b>Resource, BMP/Mitigation Measure</b>	<b>Objective</b>	<b>Effectiveness/Feasibility</b>
Topsoil replacement, native seedbank promotion, seeding, and weed-seed free mulching (as necessary), will be used to stabilize disturbed soils in all areas where grading and soil disturbance will occur to promote native plant re-establishment. Weed-free topsoil shall be stockpiled and replaced in disturbed areas.	A, C, D, F, K,	Moderate/F2
Local seeding guidelines will be used to determine detailed procedures and appropriate mixes. Preference is given to local seed sources, cultivars, and species available commercially. To avoid weed contamination, all seed purchased shall be certified weed-seed free. Seed will be tested by the producer in a certified seed lab against the Coconino NF invasive weed list, the Arizona noxious weed list, and the federal noxious weed list.	A, C, D, F, K,	Moderate/F2
Before ground-disturbing activities begin, identify and locate all equipment staging areas in the SUP. Use weed-free staging areas if possible, otherwise treat existing noxious weeds in these areas prior to the staging of any equipment. Establish equipment wash stations (1) at the base of the ski area for construction activities and (2) at the base of Snowbowl Road for construction of the reclaimed water pipeline. Specific locations shall be approved by a forest officer prior to use. Each station shall have a filter system, for example at least 6 inches of large cinder or gravel spread over an area 10'x 30'. Filter cloth may be used for temporary stations. The area will be a perched drainage to allow excess moisture to drain after being filtered. Equipment wash stations shall be located at least 200 yards from any natural drainage to avoid contamination. All soiled equipment shall be washed before entering and before leaving the project area. This includes construction personnel vehicles in addition to trucks and other heavy equipment. A “contaminated” parking area shall be designated where vehicles and equipment can remain through the duration of construction activities to minimize the need for repeated cleaning. Equipment wash stations shall be monitored frequently and annually after completion of all construction activities. All weed materials shall be removed promptly.	A, C, D, F, K	Moderate/F3
For construction of the reclaimed water pipeline, the existing paved surface of the Snowbowl Road shall be used for all equipment staging and materials stockpiling. Any fill dirt obtained off-site shall be certified to be free of noxious weeds prior to its use in construction areas. Stockpiled materials shall be maintained in a weed-free condition.	A, D, F, K,	Moderate/F3

**Table 2-2  
Mitigation Measures and BMPs**

<b>Resource, BMP/Mitigation Measure</b>	<b>Objective</b>	<b>Effectiveness/Feasibility</b>
Monitor all construction areas and roadways within the SUP annually for at least five growing seasons and treat any noxious weeds found. Annually inspect all parking lots and areas surrounding guest service and maintenance facilities at the base of the ski area within the SUP and document and treat any new noxious weed infestations. Non-herbicidal treatments shall be given priority. If herbicides are necessary, their proposed use shall be publicly posted (including at trailheads) and alternative access routes shall be provided. Herbicide application, if used, shall incorporate dye markers to identify spray locations. Herbicide use shall strictly follow label directions and applicable legal requirements. If pesticides (herbicides) are used, specific plans will be developed to address application monitoring and evaluation, spill contingency, cleaning and disposal of containers, and control of pesticide drift, incorporating the measures described in Appendix B of FEIS for Integrated Treatment of Noxious and Invasive Weeds. Use of herbicides is prohibited in occupied “No Activity Centers” for Mexican Spotted Owls and in occupied nesting stands for Northern Goshawks. Only herbicides specified in Table 26 of the Required Protection Measures for Pesticide Application in Identified Species Habitat (RPMPA) of the fore-mentioned FEIS may be used within Mexican Spotted Owl Protected Activity Centers (PACs) and Northern Goshawk Post-Fledgling Family Areas (PFAs), including along road right-of-ways through such areas.	D, L	High/F4
Prior to ground disturbances affecting bearded gentian, the plants will be either transplanted to other suitable areas or collected for research purposes at the discretion of the Forest Botanist.	K	Low/F4
<b>SOIL AND WATER</b>		
A grading plan will be developed and submitted to the Forest Service for review and approval prior to implementation of proposed project elements.	A, B, C, D	High/F4
A site-specific erosion control plan for all approved project elements that entail ground disturbance will be developed and submitted to the Forest Service for review and approval prior to implementation.	A, B, C, D	High/F4

**Table 2-2  
Mitigation Measures and BMPs**

<b>Resource, BMP/Mitigation Measure</b>	<b>Objective</b>	<b>Effectiveness/Feasibility</b>
Soil-disturbing activities will not be initiated during periods of heavy rain or excessively wet soils.	B, C	High/F4
Immediately following completion of approved ground disturbing activities and seeding, all areas of ground disturbance will be mulched with weed-free straw, wood chips, bark, or jute mat.	A, B, C	Moderate/F3
In all areas where grading or soil disturbance will occur (excluding flush cut lift corridors), stockpile topsoil and re-spread topsoil following slope grading and prior to re-seeding. The stockpiled soil will be protected from wind and water erosion.	A, C, D	Moderate/F3
Check dams and sediment barriers (i.e., silt fence, weed-freed hay bales, wattles) will be placed in all temporary erosion channels with minimum sufficient spacing to control runoff velocity and encourage sediment deposition.	B, C	High/F4
Removal of logs and logging debris will be conducted with minimal dragging or pushing through the soil in order to minimize disturbances.	B, C	Moderate/F4
In areas where site conditions necessitate (i.e., excessively steep slopes and/or highly erosive soil types), temporary sediment detention basins will be created to detain runoff and trap sediment. Sediment basins will be created within the overall disturbance limits of the applicable project elements. Temporary sediment basins will be reclaimed following reestablishment of permanent vegetation and will likewise be revegetated.	B, C	High/F4

**Table 2-2  
Mitigation Measures and BMPs**

<b>Resource, BMP/Mitigation Measure</b>	<b>Objective</b>	<b>Effectiveness/Feasibility</b>
<p>On steeper slopes (&gt;30% slope gradient), areas exposed by grading will require implementation of jute-netting or other appropriate geo-textiles to further stabilize disturbed soils. Installation should include:</p> <ul style="list-style-type: none"> <li>• Seeding and mulching of the disturbed area</li> <li>• Burial of the top end of the netting in a trench of at least four inches depth and eight inches width. The trench shall be backfilled and tamped.</li> <li>• Netting should extend beyond the edge of the mulched and/or seeded area at least one foot on the sides and three feet on the top and bottom.</li> <li>• The netting should be rolled downslope and secured with staples or pins.</li> <li>• Netting should overlap at least four inches on the sides and secured with staples five feet apart along the overlap</li> <li>• The lower end of the uphill strip should overlap the downhill strip at least one foot and should be secured with staples one foot apart.</li> </ul>	A, B, C	High/F3
<p>Water bars (12 to 18 inches deep) and cross-drains will be constructed across all roads, trails, and other disturbed areas after seeding and fertilization at 50, 75, or 100-foot intervals as a function of slope angle, or as necessary, to disperse road surface runoff. The frequency will be sufficient to prevent rill erosion and sediment delivery channel formation. Alternatively, “parabolic slope water bars” may be constructed at the gradient beginning at the center of the road or trail surface and traversing outward to spill into undisturbed vegetation on both sides of the road or trail prism. Waterbars and outlets will be inspected seasonally, maintained, and cleared of sediment at regular intervals as necessary.</p>	A, B, C	High/F4
<p>Windrows will be installed where fill-slope erosion is possible, or where road-derived sediment may be delivered (i.e., outflow area of culverts and rolling dips).</p>	B, C, D	Moderate/F4
<p>All towers and concrete necessary for lift construction will be transported via helicopter, unless otherwise approved by the Forest Service in the field.</p>	C, K, F	High/F3
<p>Prior to construction, a construction access plan will be developed detailing access routes to pertinent project elements (i.e., lift towers, lift terminals, building sites, helicopter routes).</p>	C, K, F	High/F4
<p>Fuel delivery and storage will be located, designed, constructed and maintained to reduce the potential and severity of spills.</p>	D	High/F4

**Table 2-2  
Mitigation Measures and BMPs**

<b>Resource, BMP/Mitigation Measure</b>	<b>Objective</b>	<b>Effectiveness/Feasibility</b>
Fuel, oil and other hazardous materials will be stored in structures placed on impermeable surfaces with impermeable berms designed to fully contain the hazardous material plus accumulated precipitation for a period at least equal to that required to mitigate a spill.	C, D, K	High/F4
Helicopter refueling area(s) will be designated according to Forest Service refueling standards.	D, K	High/F4
An oil spill contingency plan will be developed and approved prior to initiation of construction activities.	D	High/F4
New and expanded parking lots and roads will be surfaced with aggregate materials.	B, D	High/F4
Concrete truck washout areas will be designated in the field and approved by the Forest Service prior to construction commencement.	D	High/F4
Where snowmaking and utility lines will be installed on slopes greater than 30 percent, temporary check dams will be placed within open sections of trench when those open sections exceed 100' in length.	B, C	High/F4
<b>DUST ABATEMENT</b>		
During construction under dry conditions, all exposed soil, including roadways, parking lots, buildings and lift terminal areas will be sufficiently watered to prevent excessive amounts of dust. In the absence of natural precipitation, watering of these areas will occur as necessary. This measure excludes trail grading or other project elements that do not have sufficient road access to facilitate water truck access.	E	High/F4
<b>AIR QUALITY</b>		
The primary contractor shall be responsible to ensure that all construction equipment is properly tuned and maintained.	E	Moderate/F4
Idling time and construction-related trips will be minimized, as appropriate	E	Moderate/F4
In order to minimize emissions and particulate matter, existing power sources and/or clean fuel generators will be used rather than temporary power generators	E	Moderate/F4

**Table 2-2  
Mitigation Measures and BMPs**

<b>Resource, BMP/Mitigation Measure</b>	<b>Objective</b>	<b>Effectiveness/Feasibility</b>
Lop and scatter slash and small woody debris generated across the width of new trails	B, C, E	Moderate/F4
Burning of slash/timber will be staged to reduce the volume of smoke being produced at any one time.	E	High/F4
Slash burning will be minimized by the removal of commercial grade timber and the practice of lopping and scattering where possible.	E	Moderate/F3
To the extent practicable, burning of slash piles during periods of time when the atmospheric conditions would transport smoke away from the Flagstaff area.	E	Moderate/F4
Non-agricultural material will not be included in slash burns.	E	High/F4
<b>AESTHETICS</b>		
Construct new structures with materials that blend with the landscape character.	F	Moderate/F3
Strategically locate and camouflage or screen all proposed fuel and water tanks.	F	High/F4
Straight edges in the forest canopy will be avoided by feathering the layouts of proposed trails and by selectively removing trees of different species and ages to the extent possible.	G, F	Moderate/F3
<b>CULTURAL RESOURCES</b>		
Pursuant to 36 CFR 800.6(b), the Forest Service has consulted with the 13 tribes for which the San Francisco Peaks have religious and cultural significance, and, pursuant to 36 CFR 800.6(c), has invited the Tribes and the Snowbowl to execute a Memorandum of Agreement (MOA) as concurring parties. The MOA is contained in Appendix D of the FEIS and indicates mitigation measures and stipulations that are designed to minimize the effects of any approved projects on historic properties.	G	Moderate/ <i>Required</i>
<b>WILDLIFE</b>		
Arizona Snowbowl will install bear-proof waste receptacles in public areas within the SUP as necessary to discourage scavenging by black bears and to reduce encounters by humans and bears.	P	High/F4

**Table 2-2  
Mitigation Measures and BMPs**

<b>Resource, BMP/Mitigation Measure</b>	<b>Objective</b>	<b>Effectiveness/Feasibility</b>
Tree removal within Restricted Areas or PACs is limited to eleven trees along the Snowbowl Road within the Snowbowl PAC. Prior to initiating construction of the reclaimed water pipeline, a subsequent survey will be conducted to identify any occupied nest sites within the PACs. If an active nest is located, any construction activities within ½-mile radius of the active nest site will be restricted to periods outside the breeding season, which extends from March 1 to August 31.	K	High/F4
Prior to initiating construction of the reclaimed water pipeline, a subsequent survey will be conducted to identify any occupied nest sites within the PFAs. If an active nest is located, any construction activities within ½-mile radius of the active nest site will be restricted to periods outside the breeding/fledging season, which extends from March 1 to September 30.	K	High/F4
The water impoundment will be surrounded by a fence to exclude big game wildlife. Specifications of the fence (material, height, and color) will be determined during final design of the impoundment.	P	High/F4
<b>STABILITY OF SNOWMAKING WATER IMPOUNDMENT</b>		
The uncontrolled emergency spillway should be checked routinely and frequently as part of normal operations for potential blockage by snow, ice, or debris and cleared if significant blockage is found.	H	High/F4
Install an automatic cutoff switch that would shut down pumps when the water surface in the impoundment reaches its maximum storage level.	H	High/F4
A composite liner system consisting of HDPE liner above a minimum six-inch thick bedding of compacted clay would restrict the flow volume sufficiently to prevent saturation of the foundation and embankment soils and create enough head loss to reduce high exit gradients in the toe area of the dam.	I	High/F4
Grout will be injected into any open fractures exposed during excavation prior to covering with the local sand bedding and the HDPE liner. The plugging of these fractures will either prevent the entry of water into the fractures or at least create enough head loss to reduce exit pressures at the embankment site.	I	Moderate/F4

**Table 2-2  
Mitigation Measures and BMPs**

<b>Resource, BMP/Mitigation Measure</b>	<b>Objective</b>	<b>Effectiveness/Feasibility</b>
<p>Check the relative density of entire soil profile and quantify the liquefaction potential of the deeper soils through a site-specific drilling program at the time of final design of the impoundment. If a liquefaction risk is identified at the time of final design, it can be easily mitigated by removing loose soil and replacing it with compacted, densified soil, or deep layers can be stabilized with grout.</p>	J	High/F3
<p>An Emergency Action Plan will be assembled to define appropriate response scenarios for all potential modes of failure and includes specific notification plans (updated at least every two years with current phone numbers), and evacuation plans. All responsible operating staff must be familiar with the Emergency Action Plan.</p>	M	Moderate/F4
<p>Snowmaking water impoundment will require an Operation &amp; Maintenance inspection by a qualified Forest Service engineer on an annual basis. Timing of said inspection shall be such to allow correction of discovered safety deficiencies prior to the immediately following season of operation. Inspection criteria shall be according to current safety criteria and engineering state-of-art judgment, and manual FSM 7500 direction. In addition, there shall be completed within three calendar days after any event of any unusual event; such as an earthquake of Richter magnitude 5.0 or greater within a twenty-mile radius of the event epicenter, in the event of an overtopping event, or at the discretion of the Forest Service. The Forest Service shall be notified by the facility owner/operator in the event of any unusual facility operational behavior or physical characteristic.</p>	N	High/F4

## **ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL**

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not analyzed in detail.<sup>19</sup> Public comments received during the scoping process and in response to the DEIS provided suggestions for alternative methods for achieving the established project purpose and need. Some of these alternatives may have been outside the scope of the proposal, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below. Some of the topics presented here may have constituted only portions of a complete alternative.

### **REMOVAL OF THE SKI AREA**

The existence of ski trails and infrastructure on the San Francisco Peaks led to some members of the public questioning why an alternative analyzing the dismantling of the Snowbowl was not considered. In 1979 the Forest Service issued a Final Environmental Statement that analyzed several alternatives including an alternative that would allow further development of the ski area and another alternative to dismantle the ski area facilities. In the Record of Decision that accompanied the Environmental Statement, the Forest Supervisor selected an alternative that allowed further development of the ski area. This decision was appealed and dealt with administratively by the Regional Forester and then the Chief of the Forest Service, who ultimately upheld the Forest Supervisor's decision. The Forest Service was subsequently sued by six plaintiffs seeking to halt further development and removal of the existing ski facilities. The Forest Service decision was reviewed and eventually upheld by the US District Court and then the US Court of Appeals. The US Supreme Court refused to hear the case, effectively upholding the decision of the US Court of Appeals. In 1987, the Coconino National Forest Land and Resource Management Plan was adopted. It included the continued operation of Snowbowl in accordance with the 1979 Environmental Statement as part of the management direction for Management Area 15. In 1993 a 40-year Ski Area Term special use permit was issued. Each of these choices has affirmed the existence of the ski area. Given this series of decisions it did not seem appropriate to consider the dismantling alternative in detail.

### **NIGHT LIGHTING**

In the fall of 2002, the Snowbowl developed and submitted a proposal to the Forest Service for improving the recreational opportunities at the ski area while addressing safety, customer service, and economic issues associated with the existing ski area operations. A large-scale, state-of-the-art night lighting system was included to enable the ski area to provide night skiing, snowplay and adequate lights in the ski area's parking lots to accommodate proposed nighttime activities. At that time, CNF Supervisor Jim

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<sup>19</sup> 40 CFR 1502.14

Golden accepted night lighting as a part of Snowbowl’s proposal and the NEPA process was initiated.

The public and tribal scoping process (detailed in Chapter 1) quickly revealed the controversial nature of the night lighting component of the Proposed Action. Concerns raised by the public and tribes pertaining to night lighting precipitated the identification of two issues. First, the general public was concerned with the “sky glow” that would inevitably be produced in the horizon due to lighting Snowbowl’s reflective, snow covered trails. The sky glow’s effects on Flagstaff’s designation as a Dark Sky Community, visibility of the lights from points across the Colorado Plateau, and effects to local observatories were a major concern. Second, tribal concerns focused on the cultural/spiritual effects of installing a large scale lighting system on the San Francisco Peaks, which are held sacred. To the tribes, night lighting would interfere with the natural processes of day and night and therefore the ability of the San Francisco Peaks to rest at night.

Public and tribal concerns regarding lighting, in addition to both the expense and technical difficulty of modeling the visual impacts of the lighting system (as well as mitigating the effects) led Snowbowl and the CNF to determine that it is not prudent to carry the night lighting component forward. Therefore, the night lighting system (associated with nighttime skiing and snowtubing, as well a parking lot lighting system to accommodate proposed nighttime activities) were eliminated from the proposal and are therefore not analyzed in this EIS.

However, prior to night lighting being dropped from the Proposed Action, three alternatives were developed by the ID Team that would have responded to issues surrounding the night lighting issue. Those alternatives, which have since been eliminated from further analysis, included the following:

### **No Snowmaking, Night Lighting or Snowplay**

This alternative included all components of the original Proposed Action, with the exception of snowmaking (and all associated infrastructure – including the transmission line from Flagstaff, pipelines and the reservoir), lighting, and the snowplay facility.

This alternative responded to issues raised during the public and internal scoping process. Two of these issues were subsequently eliminated by withdrawing the proposed night lighting system. With the elimination of lighting from the Proposed Action, this alternative was in essence identical to the Alternative 3, and therefore was not needed.

### **No Night Skiing (With Minimal Lighting for Snowplay)**

This alternative included all components of the original Proposed Action, with the exception of the lighting system necessary for night skiing. This alternative would have included installation of a minimal, low-level lighting system associated with evening operation of the snowplay facility and lighting in the snowplay parking lot.

By eliminating higher wattage lighting necessary for night skiing, potential for sky glow would have been minimized and this alternative would have responded to the two issues (that were subsequently eliminated) raised by the public and tribes. With the elimination off any nightlighting this alternative was not analyzed any further.

### **Proposed Action Without Night Lighting**

This alternative would have included all components of the original Proposed Action with the exception of the lighting system (for night skiing, snow tubing, and parking).

By eliminating all forms of night lighting, all issues associated with night lighting would have been responded to. This alternative would have been identical to the Proposed Action currently under analysis in this EIS.

### **ELIMINATION OF THE HUMPHREYS POD**

In response to the issue relating to permanently evident visible alterations (“scarring”) on the Peaks (detailed in Chapter 1 of this document) the Forest Service initially considered an alternative that would have carried forward all projects identified in the Proposed Action, with the exception of new lift and trail construction associated with the Humphreys Pod. This alternative would have partially addressed the “scarring” issue by eliminating both permanent and temporary ground disturbance; overstory vegetation removal, and lift construction in the Humphreys Pod.

However; this alternative was not carried forward because it only partially responded to the issue raised and would have failed to meet a key purpose and need of the Proposed Action - “To improve skiing and recreational opportunities, bringing terrain and infrastructure into balance with current use levels.” Specifically, the stated need to “Improve the quantity and distribution of beginner and intermediate terrain by developing additional ski trails and spaces within the existing SUP area” could not have been met. The proposed Humphreys Pod offers a unique, and needed, source of intermediate terrain within an undeveloped portion of Snowbowl’s SUP area.

Additionally, an alternative that excludes lift and trail development in Humphreys Pod would not relieve Snowbowl’s current uphill (i.e., lift) capacity shortfalls on peak days, in which lift line wait times can exceed 40 minutes. In contrast, under the Proposed Action the comfortable capacity of the ski area would increase to 2,825, whereas under an alternative without the Humphreys Pod, the CCC would only increase to 2,360. Given that frequent peak days will continue to exceed 3,400 skiers, the “No Humphreys Pod” alternative accomplishes far less in terms of fulfilling the need to service existing levels of visitation to the ski area and providing an adequate guest experience.

Additionally, the visual simulation which was completed to assess the anticipated visual changes resulting from the development of the Humphreys Pod indicates that the mosaic

of these trails would not be inordinately visible – and in fact is very much in keeping with the Scenic Integrity Levels required by the CNF Forest Plan.<sup>20</sup>

### **REDUCED SNOWMAKING COVERAGE**

In order to address potential effects associated with providing snowmaking coverage on the full extent of Snowbowl’s terrain (approximately 205.2 acres), the Forest Service initially considered an alternative to the Proposed Action that would have reduced the total amount of snowmaking coverage, and therefore the amount of reclaimed water used on the mountain. Focusing snowmaking infrastructure in the base area would not have provided for snowpack consistency throughout the extent of SUP area. Additionally, this alternative would have only slightly reduced anticipated concerns related to the use of reclaimed water, water quantity and quality, and reduced temporary soil disturbance within the SUP area. Therefore, a reduced snowmaking alternative would not reduce or mitigate heritage issues and impacts to the TCP. Given the extraordinary level of infrastructure necessary to introduce snowmaking at the Snowbowl, developing only a portion of the system (and therefore coverage areas) was determined to be impractical – particularly given the potential alternative’s inability to meaningfully respond to the specific issues. This potential alternative was therefore eliminated from further detailed analysis.

### **ALTERNATIVE ON-SITE AND NEARBY WATER SOURCES**

For several years prior to the current proposal, Snowbowl explored the possibility of using numerous different water sources to meet potential snowmaking needs. Some of those sources included the following:

- Drilling deep wells within the SUP area
- Developing nearby wells in lower Hart Prairie that were drilled in the 1970s as components of another development plan for the ski area
- Drilling wells on private property owned by the Snowbowl in Fort Valley and constructing a six-mile pipeline to transport water to the ski area
- Acquiring the rights to an existing well in Fort Valley that Snowbowl had used for potable water in the 1980’s
- Hauling water by tanker truck to the Snowbowl for storage in a reservoir
- Tapping into the pipeline/storage distribution system owned by the City of Flagstaff which currently transports water from the Inner Basin on the San Francisco Peaks to the City
- Using potable water from the City of Flagstaff with a pipeline identical to the one being proposed
- Collecting rain from summer monsoons

Snowbowl entertained the concept of using various potable water sources to potentially meet its snowmaking needs. After ample due diligence, (logistical and economic

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<sup>20</sup> Refer to the Section D - Aesthetic Resources of Chapter 3, specifically Figure 3D-2, for additional details and photo simulations of the lift and trail development in the Humphreys pod.

considerations and water availability research) it was determined that the use of potable water sources was not a prudent choice to meet the Snowbowl's snowmaking requirements. In addition, the Forest Service determined that the additional environmental and political issues that would inevitably accompany any potable water alternative would make such a concept imprudent. Finally, collecting rain water and hauling water to the site were both deemed economically and logistically infeasible given the large capacity of water that would be required to run the snowmaking system.

Therefore, in order to achieve the quantity of water necessary for Snowbowl's snowmaking needs, the current proposal to use reclaimed water from the City of Flagstaff represents the most reliable, practical, and ecologically responsible option.

### **ADDITIONAL / ALTERNATIVE SUMMER RECREATIONAL OPPORTUNITIES**

For many years local outdoor enthusiasts have voiced their opinions and desires for the Snowbowl to provide additional recreational activities, similar to those currently occurring at other ski areas. Mountain biking on the ski area with lift access and paragliding from near the top of the Agassiz lift are the most frequently requested activities (comments were received relating to both activities during the scoping process). Both mountain biking and paragliding are gaining in popularity in Flagstaff and across the western United States. Chairlift accessed mountain biking programs are common at ski areas operating on NFS lands, and several ski areas are nationally recognized for their paragliding programs. Construction of an Alpine slide for use during summer months was also briefly considered, but eliminated as it was not deemed appropriate for NFS lands.

The Snowbowl has the physical and operational attributes that would make all of these activities possible, as well as the consumer demand from within the local community and the state of Arizona. However, the Forest Service and the management of the Snowbowl jointly determined that the most immediately critical need for the ski area was to ensure a consistent and reliable winter operating season, thereby maintaining the economic viability of the Snowbowl (as referenced in the Purpose and Need). Therefore, mountain biking and paragliding were considered but eliminated at the early stages of planning for the Snowbowl's Proposed Action. These potential additional summer recreation activities were deemed not to be critical to the success of the ski area. They would not respond to the purpose and need for increased economic viability because summer activities, by nature, yield very low per capita profits.<sup>21</sup> The main reasons for not evaluating these two activities follow:

#### **Paragliding**

The primary launch site for paragliders could potentially impact critical botanical habitat in the Alpine areas. Additionally, flight paths would most certainly be over the Kachina Peaks Wilderness.

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<sup>21</sup> Hiking access between the base area and the top of the Agassiz Chairlift was retained in the proposal because it essentially an extension of existing opportunities offered at the Snowbowl and because it would service a dual purpose of providing motorized (ATV) maintenance access which is currently lacking.

## **Mountain Biking**

The Forest Service feels that there is currently ample mountain biking trails and opportunities in the greater Flagstaff area. Having lift-served mountain biking at the ski area is not critical to providing general mountain biking opportunities. In addition, the Forest Service believes that biking within the SUP could lead to the development of unsanctioned “social” trails exiting the SUP area and entering the surrounding Kachina Peaks Wilderness. Prohibiting mountain bike use within the adjacent Wilderness would be virtually impossible. Finally, Snowbowl has no existing mountain road system appropriate for bikes, especially the novice level cyclists which are typically attracted to lift-served programs. Single track trails and roads would need to be constructed (involving inherent ground disturbance); projects that the Forest Service did not believe were appropriate uses of the National Forest at this time.

## **ALTERNATIVE SNOWMAKING WATER PIPELINE ALIGNMENTS**

Several potential routes for the proposed snowmaking water pipeline between the City of Flagstaff and the Snowbowl were evaluated. After a thorough review, it was determined that several suitable locations for connecting to Flagstaff’s reclaimed water distribution system existed. Preliminary reclaimed water pipeline alternatives that were considered early in this proposal are described below and are depicted on Figure 2-10.

1. Forest Avenue and U.S. Highway 180 to Fort Valley
2. Buffalo Park north to Elden Lookout Road and Shultz Pass
3. Rio de Flag through Coconino Estates to Cheshire
4. Existing utility corridors for Arizona Public Service overhead power lines from Cheshire to Fort Valley
5. West Route 66 over A-1 Mountain in an existing utility corridor
6. Westridge Estates near Thorpe Park across State and Federal property
7. Cedar Hill to Elks Lodge to Shultz Pass Road to Transwestern Main Line
8. Highway 180 to FS Road 164b to Snowbowl Road
9. APS/Qwest overhead power line corridor from Hot Shot Ranch to Maintenance Shop

Each of the above mentioned routes were evaluated for financial feasibility, necessary entitlements, issues pertaining to co-locating with existing utilities, engineering constraints, overall distance, traffic mitigation, community inconvenience, private property impacts, and availability of electrical service.

The initial and most direct route would have connected the snowmaking water pipeline with Flagstaff’s reclaimed water distribution network at the intersection of Forest Street and U.S. Highway 180. A buried pipeline would have then followed U.S. Highway 180 to the Snowbowl Road intersection. This would have provided for possible future reclaimed water use at Sechrist Elementary School, Museum of Northern Arizona Property, Cheshire Park, and could easily accommodate the installation of fire hydrants near several rural subdivisions to aid in fire suppression.

The feasibility of the U.S. Highway 180 route was further evaluated as part of the City of Flagstaff's proposed urban trail along U.S. Highway to Cheshire. ADOT engineers were asked to determine the feasibility of locating a 12-inch diameter pipeline under the highway, adjacent to the highway or underneath the proposed urban trail. The engineering evaluation determined that such a pipeline could not be placed within the Highway easement or within the corridor established for the urban trail. It was determined that the highway easement, the trail corridor, and the highway itself are already at maximum capacity in terms of existing utilities which are already in place within the corridor. Therefore, the design specifications and code requirements pertaining to reclaimed water pipelines could not have been met with the U.S. Highway 180 route to Cheshire.

The currently proposed pipeline route was identified after discussions with Transwestern Pipeline Company, the Forest Service, Arizona State Land Department, and Lowell Observatory. Lowell Observatory is very interested in providing fire hydrants on observatory property west of their campus and also in replacing a private and antiquated potable water delivery system to the campus from Flagstaff. As a part of the Proposed Action, the Forest Service has agreed to consider the reclaimed water pipeline to be co-located within the Transwestern Lateral Natural Gas Pipeline easement from west of the observatory all the way to the intersection of U.S. Highway 180 and Snowbowl Road. The remainder of the proposed pipeline route is located on observatory private property or existing Forest Service roads or utility easements. The proposed route was also selected due to minimize impacts and inconveniences to traffic and private property during construction of the pipeline. Under the proposed pipeline route, Sechrist School and Cheshire Park would not have the ability to obtain reclaimed water from a new and nearby pipeline.



ARIZONA SNOWBOWL  
Facilities Improvements  
Environmental Impact Statement

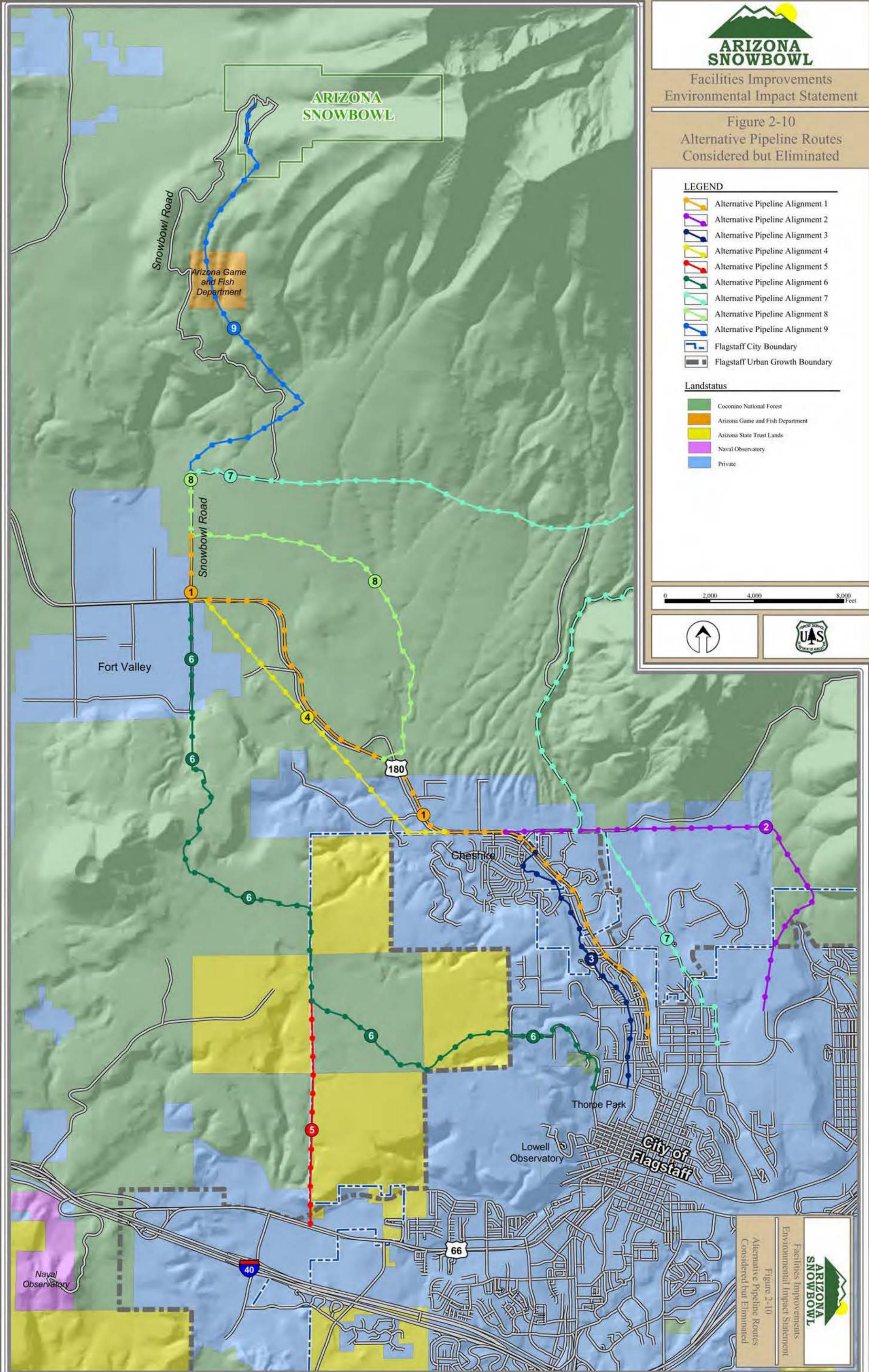
Figure 2-10  
Alternative Pipeline Routes  
Considered but Eliminated

LEGEND

- Alternative Pipeline Alignment 1
- Alternative Pipeline Alignment 2
- Alternative Pipeline Alignment 3
- Alternative Pipeline Alignment 4
- Alternative Pipeline Alignment 5
- Alternative Pipeline Alignment 6
- Alternative Pipeline Alignment 7
- Alternative Pipeline Alignment 8
- Alternative Pipeline Alignment 9
- Flagstaff City Boundary
- Flagstaff Urban Growth Boundary

Landstatus

- Coconino National Forest
- Arizona Game and Fish Department
- Arizona State Trust Lands
- Naval Observatory
- Private



## COMPARISON OF ALTERNATIVES

Table 2-3 compares each alternative as based on response to issues.

**Table 2-3  
Response to Issues**

<b>Issue</b>	<b>Alternative 1 No Action</b>	<b>Alternative 2 Proposed Action</b>	<b>Alternative 3 No Snowmaking</b>
<b>Heritage #1 - Snowmaking</b> (creating snow by artificial means, use of reclaimed water)	<b>Yes:</b> No snowmaking is proposed	<b>No:</b> Approximately 205 acres of snowmaking coverage are proposed	<b>Yes:</b> No snowmaking is proposed
<b>Heritage #2 – Scarring</b> (Ground disturbance associated with grading, vegetation clearing and snowmaking pipeline installation)	<b>Yes:</b> No additional ground disturbance is proposed	<b>No:</b> Includes ~245 acres of temporary/permanent ground disturbance and approximately 76 acres of overstory vegetation removal.	<b>Yes:</b> Reduces temporary/permanent ground disturbance and overstory vegetation removal compared to the Proposed Action.

Table 2-4 provides a comparison of project elements associated with each alternative.

**Table 2-4  
Alternatives Matrix**

	<b>Alternative 1 No Action</b>	<b>Alternative 2 Proposed Action</b>	<b>Alternative 3</b>
<b>GUEST CAPACITIES</b>			
<b>On-Mountain Comfortable Carrying Capacity (skiers)</b>	1,880	2,825	2,825
<b>Uphill Capacity (skiers)</b>	1,880	2,825	2,825
<b>Snowtubing Facility (tubers)</b>	N/A	600	N/A
<b>ON-SITE PARKING</b>			
<b>Existing Parking Area (acres)</b>	10.3	10.3	10.3
<b>Proposed Parking Area (acres)</b>			
Improved On-Mountain Parking	N/A	0.3	0.3
Snowtubing Parking	N/A	3.3	N/A
<b>Total Parking Area (acres)</b>	<i>10.3</i>	<i>13.9</i>	<i>10.6</i>
<b>Parking Capacities (Vehicles):</b>			
On-Mountain	1,200	1,235	1,235
Snowtubing	N/A	400	N/A
<b>Parking Capacities (Guests):</b>			
Guests – On-Mountain	3,000	3,087	3,087
Guests – Snowplay	N/A	600	N/A
<b>TERRAIN</b>			
<b>SUP Area</b>	777 acres	777 acres	777 acres
<b>Developed On-Mountain Terrain (acres):</b>			
Existing	138.6	138.6 <sup>a</sup>	138.6
Proposed	N/A	65.6	64.0

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
<i>Total</i>	138.6	204.2	202.6
<b>Improved Glades (acres)</b>	N/A	47.4	47.4
<b>Terrain Distribution (percent):</b>			
Beginner	1	3	3
Novice	44	35	35
Low Intermediate	25	22	22
Intermediate	22	23	23
Advanced Intermediate	6	13	13
Expert	2	4	4
<b>LIFT NETWORK</b>			
<b>Aerial Chairlifts:</b>			
Sunset Realignment	N/A	Yes	Yes
Agassiz	No Change	No Change	No Change
Hart Prairie Realignment	N/A	Yes	Yes
Aspen Realignment	N/A	Yes	N/A
Proposed Humphreys	N/A	Yes	Yes
<i>Total Aerial Chairlifts</i>	4	5	5
<b>Surface Lifts</b>			
Spruce	No Change	No Change	No Change
Hart Prairie Beginner Chairlifts	N/A	3	3
Halfpipe	N/A	1	1
Snowtubing	N/A	4	N/A
<i>Total Surface Lifts</i>	1	9	5
<b>Total Lifts in Network</b>	5	14	10
<b>SNOWMAKING</b>			
<b>Coverage Area (acres)</b>	N/A	205.2 <sup>b</sup>	N/A
<b>GUEST SERVICES</b>			
<b>Guest Service Space (square feet):</b>			
Agassiz Lodge	5,080	15,080	15,080
Hart Prairie Lodge	18,425	24,425	24,425
Snowtubing Facility	N/A	5,000	N/A
Native American Cultural & Education Center	N/A	2,500	2,500
<i>Total Guest Services Square Footage</i>	23,505	47,005	42,005
<b>GROUND DISTURBANCE</b>			
<b>Permanent (acres):</b>			
Buildings	N/A	0.8	0.5
Lift Terminals	N/A	0.2	0.2
Snowmaking Valve Houses	N/A	0.02	N/A
Snowmaking Water Impoundment	N/A	2.4	N/A
Snowmaking Catchment Pond	N/A	0.1	N/A
Hiking/Maintenance Access Trail	N/A	0.6	0.6
Parking Lots	N/A	3.6	0.3
Snowplay Access	N/A	0.3	N/A
Pedestrian Underpass	N/A	0.1	0.1
Road Reconstruction	N/A	1.7	N/A
New Road Construction	N/A	0.6	N/A
<i>Total Permanent Ground Disturbance</i>	N/A	10.4	1.7

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
<b>Temporary (acres):</b>			
Buildings	N/A	2.3	1.7
Lift Terminals	N/A	2.0	2.4
Grading			
Trails	N/A	87.3	111.6
Pedestrian Underpass	N/A	0.1	0.1
Snowmaking Water Impoundment	N/A	1.0	N/A
Parking	N/A	2.0	N/A
Grading Sub-Total	N/A	90.4	111.7
Vegetation Clearing	N/A	4.8	4.8
Utility and/or Snowmaking Pipelines	N/A	72.0	9.7
Snowmaking Pipeline Corridor	N/A	64.3	N/A
<i>Total Temporary Ground Disturbance</i>	<i>N/A</i>	<i>235.7</i>	<i>130.3</i>
<b>Total Temporary &amp; Permanent Ground Disturbance (acres)</b>	<b>N/A</b>	<b>245.4</b>	<b>131.4</b>
<b>OVERSTORY VEGETATION DISTURBANCE (ACRES)</b>			
Developed Trails	N/A	64.3	58.6
Buildings	N/A	1.1	0.7
Lift Terminals	N/A	1.2	1.2
Snowmaking Water Impoundment	N/A	1.8	N/A
Pedestrian Underpass	N/A	0.04	0.04
Snowplay Walkway	N/A	0.3	N/A
Lift Corridors	N/A	3.6	3.6
Road Reconstruction	N/A	0.8	N/A
New Road Construction	N/A	0.4	N/A
Parking Lot Construction/Improvements	N/A	2.1	0.3
Snowmaking Water Transmission Line	N/A	See footnote <sup>c</sup>	N/A
<i>Total Permanent Overstory Vegetation Removal</i>	<i>N/A</i>	<i>76.3</i>	<i>64.4</i>
<b>ROAD IMPROVEMENTS AND RECLAMATION</b>			
Road Construction	N/A	1,110 feet	N/A
Road Reconstruction	N/A	3,650 feet	N/A
Road Obliteration	N/A	3,050 feet	N/A

<sup>a</sup> In the Proposed Action, the snowtubing facility would occupy approximately 7.8 acres of existing skiable terrain in Hart Prairie.

<sup>b</sup> In the Proposed Action, snowmaking coverage differs from total developed on-mountain terrain for two reasons: 1) the snowtubing area is excluded from the developed terrain acreage but is dependent on snowmaking, and 2) one existing trail (#18) is excluded from snowmaking coverage.

<sup>c</sup> Incidental removal of overstory vegetation would occur along the extent of the 14.8-mile snowmaking water transmission line corridor, making an acreage estimate impractical. Therefore, a tree count was performed, indicating that 167 trees (pines and aspens of different sizes) would be removed for construction of the transmission line.

Table 2-5 provides a *brief* summary of the direct and indirect environmental consequences associated with implementation of each alternative, as further detailed in Chapter 3 – Affected Environment and Environmental Consequences. Table 2-5 is broken down according to resource area, issue statement and indicator. In some cases, the effects of different alternatives are combined in order to avoid redundancy.

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<b>HERITAGE AND CULTURAL RESOURCES</b>		
<i><b>Issue #1: The installation and operation of snowmaking infrastructure as described in the Proposed Action</b></i>		
<ul style="list-style-type: none"> <li>Indicator - Qualitative discussion of the cultural values of the San Francisco Peaks and the potential for incremental change as a result of implementation of the Proposed Action</li> </ul>		
N/A	Snowmaking would adversely impact the belief in the natural process of precipitation. From an ethnographic landscape perspective, the use of reclaimed water and resulting increased moisture associated with snowmaking within the SUP area may further impact the spiritual character of the entire Peaks beyond historic and existing ground disturbance. This could impact the tribes' ability to properly complete rituals.	N/A
<i><b>Issue #2: Proposed ground disturbances and vegetation removal may result in permanently evident alterations of the San Francisco Peaks landscape</b></i>		
<ul style="list-style-type: none"> <li>Indicator - Narrative description of existing and historic vegetation and ground disturbance within the SUP area</li> </ul>		
While numerous changes to lands within the boundary of the Snowbowl SUP have occurred, comments to Forest Service personnel over the years indicate that the Peaks retain an integrity related to the traditional religious, cultural, natural, and social values which make the Peaks important to the tribal people of the region.		
<ul style="list-style-type: none"> <li>Indicator - Quantification of existing and additional proposed temporarily and permanently evident vegetation and ground disturbances</li> </ul>		
Since approximately 1938, approximately 100 acres of overstory vegetation have been cleared throughout the Snowbowl SUP area, along with additional ground disturbance for terrain and related infrastructure.	<ul style="list-style-type: none"> <li>76.3 acres of overstory vegetation removal</li> <li>10.4 acres of permanent ground disturbance</li> <li>235.7 acres of temporary ground disturbance</li> </ul>	<ul style="list-style-type: none"> <li>64.4 acres of overstory vegetation removal</li> <li>1.7 acres of permanent ground disturbance</li> <li>130.3 acres of temporary ground disturbance</li> </ul>
<ul style="list-style-type: none"> <li>Indicator - Qualitative discussion of the cultural significance of proposed ground and vegetative disturbances within the SUP area</li> </ul>		
N/A	The Peaks are viewed as a living entity, where any additional ground disturbances would be harmful.	

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<ul style="list-style-type: none"> <li>▪ <i>Indicator - Narrative discussion why the Proposed Action is not dependent upon completion of the National Register nomination/designation processes</i></li> </ul>		
<p>The National Register Nomination process is underway and will be completed regardless of which alternative is approved.</p>		
<ul style="list-style-type: none"> <li>▪ <i>Indicator - Narrative discussion of the ability for the proposed projects to coexist with a National Register designation if nomination is approved</i></li> </ul>		
<p>The cultural values that pertain to the Peaks would be retained under any alternative.</p>		
<p><b><i>Some people feel the effects of the Proposed Action cannot be adequately described until the significant qualities of the San Francisco Peaks are identified as part of the National Register nomination process.</i></b></p>		
<ul style="list-style-type: none"> <li>▪ <i>Indicator - Narrative discussion why the Proposed Action is not dependent upon completion of the National Register nomination/designation processes</i></li> <li>▪ <i>Indicator - Narrative discussion of the ability for the proposed projects to coexist with a National Register designation if nomination is approved</i></li> </ul>		
<p>The San Francisco Peaks is a TCP as defined in National Register Bulletin 38: <i>Guidelines for Evaluating and Documenting Traditional Cultural Properties</i>. The Peaks have also been determined eligible for inclusion in the National Register of Historic Places as part of the White Vulcan Mine Settlement Agreement and Mine Closure in August 2000. Completion of a National Register nomination is underway by the Forest Service and will occur regardless of whether the Proposed Action is approved.</p>		
<p><b>NOISE</b></p>		
<p><b><i>The proposed snowmaking system would increase noise levels potentially disturbing resident, recreationists, and/or wildlife.</i></b></p>		
<ul style="list-style-type: none"> <li>▪ <i>Indicator - Modeled analysis of snowmaking-related noise emissions above ambient background levels (dBA)</i></li> </ul>		
<ul style="list-style-type: none"> <li>▪ Existing ambient levels 30-43 dBA</li> <li>▪ Existing short duration levels 43-85 dBA</li> </ul>	<ul style="list-style-type: none"> <li>▪ Heavy Equipment: 72-93 dBA at 50 feet</li> <li>▪ Rock Drills: 81-98 dBA at 50 feet</li> <li>▪ Fan Gun: 62 dBA at 200 feet</li> <li>▪ Tower Gun: 73 dBA at 200 feet</li> <li>▪ Booster Stations: Not audible beyond 100 feet</li> <li>▪ Snowmaking Control Building: Not audible &gt;100 feet</li> </ul>	<ul style="list-style-type: none"> <li>▪ Heavy Equipment: 72-93 dBA at 50 feet</li> <li>▪ Rock Drills: 81-98 dBA at 50 feet</li> </ul>
<ul style="list-style-type: none"> <li>▪ <i>Indicator – Modeled analysis of noise dispersion to define audible areas</i></li> </ul>		

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
N/A	<p>Hart Prairie/The Nature Conservancy could be disrupted by nighttime snowmaking and rock drills during construction period; snowmaking noise would not be audible from within homes of buildings.</p> <p>From the Fort Valley area operation of the snowmaking system would not be audible; temporary audible noise during construction of water transmission line from Flagstaff to the Snowbowl.</p>	Hart Prairie/The Nature Conservancy could temporarily be disrupted by construction-related activities.
<b>TRAFFIC AND RESORT ACCESS</b>		
<i>The Proposed Action could affect traffic volumes and/or congestion on U.S. Highway 180 and/or the Snowbowl Road.</i>		
<ul style="list-style-type: none"> <li>▪ <i>Indicator - Historic and projected traffic counts for U. S. Highway 180</i></li> <li>▪ <i>Indicator - Comparison of anticipated winter traffic volumes with existing winter traffic volumes and the design capacities of U.S. Highway 180 and the Snowbowl Road</i></li> <li>▪ <i>Indicator - Relative comparison of existing and anticipated winter traffic with current summer traffic volumes</i></li> </ul>		
<p>See Chapter 3, Section C for historic average annual daily traffic (AADT) on U.S. Highway 180.</p> <ul style="list-style-type: none"> <li>▪ Winter: average ~350 vehicles/day on U.S. Highway 180 attributable to Snowbowl’s operations between December and March</li> <li>▪ Summer: average ~95 vehicles/day on U.S. Highway 180 attributable to Snowbowl’s operations between Memorial and Labor day</li> <li>▪ No additions to capacities of Snowbowl Road or U.S. Highway 180 would be necessary</li> </ul>	<p>See Chapter 3, Section C for historic AADT on U.S. Highway 180.</p> <ul style="list-style-type: none"> <li>▪ Winter: average ~500 vehicles/day on U.S. Highway 180 attributable to Snowbowl’s operations between December and March</li> <li>▪ Summer: average ~95 vehicles/day on U.S. Highway 180 attributable to Snowbowl’s operations between Memorial Day and Labor Day</li> <li>▪ No additions to capacities of Snowbowl Road or U.S. Highway 180 would be necessary</li> </ul>	<p>See Chapter 3, Section C for historic AADT on U.S. Highway 180.</p> <ul style="list-style-type: none"> <li>▪ Winter: average ~365 vehicles/day on U.S. Highway 180 attributable to Snowbowl’s operations between December and March</li> <li>▪ Summer: average ~95 vehicles/day on U.S. Highway 180 attributable to Snowbowl’s operations between Memorial and Labor</li> <li>▪ No additions to capacities of Snowbowl Road or U.S. Highway 180 would be necessary</li> </ul>

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<b>AESTHETIC RESOURCES</b>		
<i>Proposed ground disturbance and vegetation removal within the SUP may incrementally affect the aesthetic quality of the west face of the San Francisco Peaks.</i>		
<ul style="list-style-type: none"> <li>Indicator - The incremental aesthetic effects of the proposed projects compared to historic landscape alterations within the SUP area</li> </ul>		
No changes to Snowbowl’s SUP area would occur under the No Action Alternative and its facilities would continue to comply with Forest Plan VQOs of Modification and Maximum Modification.	Some ground disturbing activities under the Proposed Action are considered temporary in nature, since these areas would be promptly revegetated. Direct, permanent aesthetic impacts are associated with components of the Proposed Action that, whether occurring in new or previously disturbed areas, would represent long-term visible elements of the ski area’s presence within the SUP area when perceived in either the foreground, middleground or background views. Proposed landscape alterations can be implemented while maintaining full consistency with the VQOs of Modification and Maximum Modification.	While Alternative 3 eliminates temporary ground disturbance associated with snowmaking line installation, it includes essentially all of the lift and trail additions contained in the Proposed Action. However, Alternative 3 increases temporary ground disturbance associated with trail grading – necessary to provide for increased skiability under reduced natural snow conditions. Overall, the aesthetic impacts are slightly reduced between alternatives 2 and 3. However, for the purposes of this analysis, they can be considered virtually identical, especially when perceived in the middleground and background distance zones.
<ul style="list-style-type: none"> <li>Indicator - Visual simulations from identified representative viewpoints of the proposed landscape alterations as compared to the existing condition.</li> </ul>		
Refer to Chapter 3, Section D which depicts a series of photo simulations.		
<b>SOCIAL AND ECONOMIC RESOURCES</b>		
<i>Implementation of the Proposed Action may have social and economic effects on Flagstaff and Coconino County.</i>		
<ul style="list-style-type: none"> <li>Indicator – Discussion of the potential for the Proposed Action to affect a change in key local economic indicators</li> </ul>		
Refer to Table 3E-13 within Chapter 3	Refer to Table 3E-13 within Chapter 3	Refer to Table 3E-13 within Chapter 3
<ul style="list-style-type: none"> <li>Indicator – Analysis of the correlation between Snowbowl annual skier visitation and annual retail and Bed, Board, and Booze (BBB) and tax revenues</li> </ul>		
Calculations indicate that Snowbowl visitors make a positive contribution to BBB tax collections. However, because this is an economy of significant size, BBB tax generated by Snowbowl visitors constitutes a small portion of total tax collections.		

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<ul style="list-style-type: none"> <li>Indicator – Narrative description of the recreational/social function which Snowbowl serves</li> </ul>		
<p>The continuation of the current operation as a for-profit business may not be sustainable; the ski area would likely decrease expenditures on maintenance and non-essential services leading to an overall reduction in the quality of the services offered under Alternative 1. In this event, much of the social and economic functions served by Snowbowl may be reduced or lost. The quality of the most significant Alpine recreation venue within the Flagstaff area would be diminished.</p>	<p>The recreational and social functions of the Snowbowl would be enhanced under Alternative 2, as described in chapters 2 and 3.</p>	<p>Same as for Alternative 1.</p>
<ul style="list-style-type: none"> <li>Indicator – The effects of dry roads/fair weather on tourism in Flagstaff and the BBB</li> </ul>		
<p>The relationship between annual snowfall and Flagstaff’s annual tourism volume is shown in Figure 3E-5 in Chapter 3. There is no obvious relationship between snowfall and Flagstaff tourism. The analysis suggests that, over the years, dry roads/fair weather bears little relationship to Flagstaff tourism volume and thus the BBB tax.</p>		
<ul style="list-style-type: none"> <li>Indicator – Presentation of historical data analyzing the relationship between winter tourism levels for the City of Flagstaff, with annual snowfall, and annual skier visitation</li> </ul>		
<p>The relationship between average monthly precipitation and average variation in Flagstaff’s monthly tourism volume is shown in Figure 3E-6 in Chapter 3. There is no obvious relationship between the two variables. While declining precipitation appears to relate to increasing tourism in May and June, tourism is at its highest level in the month with the highest average precipitation (July).</p>		
<ul style="list-style-type: none"> <li>Indicator – The percentage of the total economy represented by winter tourism</li> </ul>		
<p>Tourism in total is estimated to account for approximately 24.5 percent of the Flagstaff economy; winter tourism can be estimated to account for approximately 8.6 percent of the City’s economy.</p>		
<ul style="list-style-type: none"> <li>Indicator – Financial viability of the ski area under all alternatives</li> </ul>		
<p>Alternative 1 would result in no significant change in the Snowbowl’s viability as a for-profit business. While average annual skier visits are projected to increase by 12.7 percent over the current level, season-to-season totals would continue to fluctuate dramatically. As such, it is</p>	<p>While the investment required to achieve Alternative 2 is substantial and would result in a higher break-even point (more skier visits required to achieve profitable operations), year-to-year variations in business levels would be minimalized and would result in positive net</p>	<p>A prudent business operator would likely not make the majority of the investments in Alternative 3, as the break-even point for profitable operations would increase while skier visit totals would continue to fluctuate dramatically. The overall viability of the ski area would decline</p>

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
reasonable to project that under Alternative 1, the ski area would continue to experience negative net income in 30 to 40 percent of its operating seasons. Thus, the viability of the ski area would remain tenuous.	income in a higher percentage of seasons than under current operating conditions. The ski area would be in a significantly better financial position from which to maintain the physical facilities and maintain quality levels. The viability of the Arizona Snowbowl as a for-profit business would be enhanced under this alternative.	significantly if the Alternative were to be fully implemented.

**RECREATION**

*The effects of the Proposed Action on the quality, distribution, and opportunity for winter and summer recreational experiences within the SUP area.*

- *Indicator - Comparison of historic annual winter and summer recreational visitation versus those anticipated under various alternatives*

Annual winter visitation could be expected to fluctuate from roughly 98,000 (historic) to 110,000 between year 0 and year 11.	Annual winter visitation levels could be expected to increase from roughly 98,000 in year 0 to around 215,000 by year 11.	Under Alternative 3, winter attendance is anticipated to increase slightly above the No Action Alternative, but below that of the Proposed Action. Alternative 3 could be expected to produce annual skier visitation levels between 98,000 and 118,000 between year 0 and year 11.
The summer Ski Ride program would be expected to continue to draw approximately 30,000 visitors each year.	Overall summer visitation would not be expected to increase substantially, and would likely continue to be approximately 30,000 visitors annually.	Overall summer visitation would not be expected to increase substantially, and would likely continue to be approximately 30,000 visitors annually.

- *Indicator - Narrative description of the quality of winter and summer recreational opportunities under all alternatives.*

In lieu of updating guest service facilities at Snowbowl, selection of the No Action Alternative would translate to a continuation of crowded, and sometimes undesirable, guest experiences in many areas, such as in the lodges and on the chairlifts.	The only aerial lift at Snowbowl that would remain unchanged is Agassiz. Snowbowl’s developed terrain network would increase from approximately 139 acres to approximately 204 acres (a 47 percent increase). Snowmaking technology would provide consistent snowpack from season-to-season that would help redefine the Snowbowl as a reliable winter sports facility in Northern Arizona’s recreational setting. Terrain/infrastructural upgrades and increased CCC under	Alternative 3 does not include the primary elements associated with the Proposed Action which would most affect the overall recreational experience (snowmaking and snowtubing). Therefore, the overall recreation experience at Snowbowl would be less desirable than the Proposed Action, particularly on busy days, and would continue to deteriorate as skiers and snowboarders seek more favorable, out-of-state opportunities. The ski area’s reputation in Northern Arizona’s recreational environment
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**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
	<p>the Proposed Action would improve the Snowbowl’s ability to accommodate the existing levels of visitation. Skier densities would remain within the industry norm while lift line waiting periods would decrease. The proposed hiking trail from Agassiz Lodge to the top of the Agassiz Chairlift would add a new element to Snowbowl’s summertime recreational offerings.</p>	<p>would continue to be defined by climatic conditions with a continued dependency on natural precipitation. While difficult to measure, skier export to neighboring states would be expected to continue, as warranted by snowfall and climatic trends.</p>

*Implementation of the Proposed Action may affect the experience of wilderness users within the surrounding Kachina Peaks Wilderness.*

- *Indicator - Quantification of seasonal Wilderness use and visitation*
- *Indicator - Narrative discussion of the anticipated effects to Wilderness users*

<p>Annual use of the Wilderness would be expected to follow historic trends, as provided in Table 3F-6 in Chapter 3. Access, use and enjoyment of the Wilderness would not change.</p>	<p>Similar to the No Action Alternative, neither of the Action Alternatives would directly or indirectly impact summer or winter access, use or enjoyment of the adjacent Kachina Peaks Wilderness. All projects likely to occur under either of the Action Alternatives would be confined to the established Snowbowl SUP area, and no additional access to, or use of, the Wilderness area is anticipated.</p>
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**INFRASTRUCTURE AND UTILITIES**

*Effects of the Proposed Action on ski area infrastructure and supporting utilities within and beyond the SUP area.*

- *Indicator – Disclosure of current versus anticipated requirements for guest seating, power, domestic water supply and wastewater treatment, and parking capacity*

<p>CCC would remain at 1,880. Facilities and infrastructure would continue to be work well for this CCC, but would become overtaxed when exceeded.</p> <p>Snowbowl would continue to transport all of its domestic water from Flagstaff - there would be no additional storage capacity and demand would be anticipated to remain the same.</p>	<p>CCC would increase to 2,825. Guest service facilities and related infrastructure have been sized to accommodate 125 percent of CCC.</p> <p>The Snowbowl would continue to transport 100 percent of its potable water via truck from Flagstaff. However, with construction of the reclaimed water pipeline, it would no longer be necessary for the Snowbowl to use potable water for non-potable services.</p>	<p>CCC would increase to 2,825. As with the Proposed Action, Alternative 3 would size guest service facilities and related infrastructure to accommodate approximately 125 percent of CCC.</p> <p>Without the reclaimed water pipeline to supply non-potable water, Snowbowl would continue to use approximately 60 percent of the potable water it trucks to the ski area to accommodate its non-potable water needs.</p>
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**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<p>Because the existing electrical service is adequate to meet Snowbowl’s current needs, upgrades to power supply and distribution are not necessary.</p> <p>No additional communication lines would be installed.</p> <p>Guest seating and restrooms would continue to be inadequate on even moderately busy days.</p>	<p>With the addition of snowmaking infrastructure, new/upgraded lifts and other projects, Snowbowl’s existing power supply is inadequate and would need to be upgraded.</p> <p>The main telephone line servicing Snowbowl would need to be upgraded.</p> <p>Proposed improvements to the Hart Prairie and Agassiz day lodges would help achieve a better balance between guest services and attendance levels.</p>	<p>Because Alternative 3 excludes snowmaking, Snowbowl’s existing power supply is adequate to meet anticipated needs</p> <p>Alternative 3 would not necessitate any changes to the existing communications network at Snowbowl.</p> <p>Alternative 3 improvements to guest services would be identical to the Proposed Action.</p>

**WATERSHED RESOURCES**

*The application of Class A reclaimed water for snowmaking within the SUP area may affect water quality within the receiving subwatersheds.*

- *Indicator - Description of the certification process for allowing Class A water to be used for snowmaking*
- *Indicator - Discussion of the applicability of the Rio de Flag Water Reclamation Plant NPDES permit to the proposed snowmaking application*

ADEQ developed the Reclaimed Water Permit Program to define conditions and requirements for reuse of treated municipal wastewater. The program specifies reclaimed water standards and defines five classes of reclaimed water. Class A reclaimed water is the highest quality and is required for reuse applications where there is a relatively high risk of human exposure to treated effluent. The State of Arizona specifically allows Class A and A+ reclaimed water for direct reuse in snowmaking.

- *Indicator - Literature search on use of reclaimed water for various recreational and municipal purposes*

Reuse of municipal wastewater has become increasingly important during the past several decades due to the growth in urban population, constraints on the development of new water sources, and more stringent treatment requirements to protect the quality of the receiving water for aquatic life. Reuse is practiced extensively in the United States and around the world.

- *Indicator - Literature search and narrative description of the potential presence of pharmaceuticals, pathogens, and hormones in Class A reclaimed water*

Municipal wastewater contains a variety of PPCPs that are pharmaceutically active and known to act on the endocrine system at therapeutic doses. Although the occurrence of antibiotics and steroids has generated nearly all the controversy to date, many other classes of drugs, bioactive metabolites and transformation products, and personal care products have yet to be examined. Chemicals found in both non-prescription and prescription medications have been detected in municipal wastewaters and may act as endocrine disruptors. In addition to prescribed human drugs, other PPCPs of potential concern include veterinary and illicit drugs and such common substances as caffeine, cosmetics, food supplements,

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<p>sunscreens, solvents, insecticides, plasticizers, and detergent compounds. The analysis notes that humans are thought to be susceptible to endocrine disrupting compounds only at high exposure levels.</p>		
<p>▪ <i>Indicator - Documentation of compliance with State and Federal water quality standards regarding Class A wastewater and its uses</i></p>		
<p>The Rio de Flag Water Reclamation Plant (WRP) is authorized to discharge treated wastewater to the Rio de Flag under National Pollutant Discharge Elimination System (NPDES) Permit that was issued in November 1999. The permit requires that water quality of the reclaimed water meet State Surface Water Quality Standards for discharge to the Rio de Flag. ADEQ has assigned designated uses of partial-body contact (PBC) and aquatic and wildlife for effluent-dependent water to the receiving waters of the Rio de Flag WRP. EPA and ADEQ conduct annual inspections of the Rio de Flag WRP to assure the facility is operated and maintained in compliance with Federal and State regulations. NPDES inspection reports obtained for the past four years indicate that no deficiencies were found in the operation and maintenance of the Rio de Flag WRP.</p>		
<p>▪ <i>Indicator - Analysis of potential water quality effects of using reclaimed water in the snowmaking system to down gradient users</i></p>		
<p>N/A</p>	<p>Additional groundwater recharge associated with use of reclaimed water for snowmaking would increase the concentration of solutes in groundwater. Groundwater recharge that occurs in areas of proposed snowmaking would contain larger concentrations of TDS, TOC, total nitrogen, and other dissolved constituents from the reclaimed water than groundwater recharge from natural precipitation. However, the solute concentrations would be decreased substantially from concentrations in the reclaimed water by commingling and blending with natural precipitation.</p> <p><u>Snowbowl Sub-Area:</u> The net effect of changes in groundwater recharge from alternating dry, average, and wet climatic conditions would be to dilute and attenuate the flux of solute concentrations reaching the underlying perched aquifer system.</p> <p><u>Agassiz Sub-Watershed:</u> Although concentrations of TDS, TOC, and total nitrogen concentrations are larger than</p>	<p>N/A</p>

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
	<p>comparable concentrations assumed for water available for groundwater recharge from natural precipitation, the concentrations of TDS and TOC are decreased by more than an order of magnitude from concentrations in the reclaimed water.</p> <p><u>Hart Prairie Watershed</u>: Due to the distant location of the four small springs downgradient from the Agassiz sub-watershed and limited overall change in solute concentrations, the anticipated indirect effects to water quality at springs in Hart Prairie from Alternative 2 are considered to be negligible.</p>	

*Use of reclaimed water for snowmaking purposes between November and February of each year could affect aquifer recharge.*

- *Indicator - Quantification of anticipated snowmaking water use in average dry, median, and wet years*

N/A	<p><u>Agassiz Sub-Watershed</u></p> <ul style="list-style-type: none"> <li>▪ Dry Year: 40 AF/yr</li> <li>▪ Average Year: 30 AF/yr</li> <li>▪ Wet Year: 20 AF/yr</li> </ul> <p><u>Hart Prairie Watershed</u></p> <ul style="list-style-type: none"> <li>▪ Dry Year: 446 AF/yr</li> <li>▪ Average Year: 334 AF/yr</li> <li>▪ Wet Year: 223 AF/yr</li> </ul>	N/A
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- *Indicator - Description and quantification of the Rio de Flag WRP's historic seasonal discharges*

The Rio de Flag WRP was built to provide four millions gallons per day (MGD) of wastewater treatment capacity, with the potential for expansion to six MGD. The Rio de Flag WCP has treated wastewater at an average rate of 681 million gallons per year (1.87 MGD) during the past four years. The most recent data from 2002 indicate that approximately 25 percent of the wastewater treated at the WRP was beneficially reused in the Reclaimed Water System and 75 percent was discharged as Grade A+ treated effluent to the Rio de Flag channel.

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<ul style="list-style-type: none"> <li>Indicator - Description and quantification of current uses of reclaimed water within the City of Flagstaff by season</li> </ul>		
<p>The Rio de Flag WRP currently provides reclaimed water for turf irrigation to the Catholic Cemetery; Northern Arizona University; Pine Canyon Golf Course; Flagstaff Medical Center; the Flagstaff public school system; and the city’s public parks, facilities, and cemetery. Reclaimed water from the Wildcat Hill WWTP is used for irrigation at golf courses, public parks, the Christmas tree farm, and for dust control at various locations in east Flagstaff.</p>		
<ul style="list-style-type: none"> <li>Indicator - Discussion of existing water rights and the ability to implement the proposed snowmaking with or without procuring additional water rights</li> </ul>		
<p>The right to the use of reclaimed water in Arizona was established by the 1989 decision of the Arizona Supreme Court in the case of <i>Arizona Public Service v. Long</i>.</p>		
<ul style="list-style-type: none"> <li>Indicator - Narrative description of both the City of Flagstaff’s well field and reclaimed water uses and their hydrologic relationship to the regional aquifer</li> </ul>		
N/A	<p>As noted in Table 3H-4, proposed snowmaking would result in an estimated net average reduction in groundwater recharge to the regional aquifer of 178 AF per year. This calculated reduction represents slightly more than two percent of the City of Flagstaff’s total annual water production (as averaged over the 10 year period from 1992 to 2001). This amount is negligible compared to the annual groundwater recharge rate of approximately 290,000 AF to the regional aquifer estimated for the Lake Mary well field.</p>	N/A
<ul style="list-style-type: none"> <li>Indicator - Quantification of annual consumptive watershed losses resulting from snowmaking</li> </ul>		
N/A	<p><u>Snowbowl Sub-area</u></p> <ul style="list-style-type: none"> <li>Dry Year: 1,464 AF/yr</li> <li>Average Year: 1,692.9 AF/yr</li> <li>Wet Year: 1,681.7 AF/yr</li> </ul> <p><u>Agassiz Sub-Watershed</u></p> <ul style="list-style-type: none"> <li>Dry Year: 830.2 AF/yr</li> <li>Average Year: 1,276.7 AF/yr</li> <li>Wet Year: 1,350.9 AF/yr</li> </ul>	N/A

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
	<u>Hart Prairie Watershed</u> <ul style="list-style-type: none"> <li>▪ Dry Year: 4,532.1 AF/yr</li> <li>▪ Average Year: 6,442.6 AF/yr</li> <li>▪ Wet Year: 6,569.2 AF/yr</li> </ul>	
<b>SOILS AND GEOLOGY</b>		
<i>The Proposed Action has potential to change soil chemistry and moisture due to the application of machine produced snow.</i>		
<ul style="list-style-type: none"> <li>▪ <i>Indicator - Anticipated volume of machine-produced snow applied under various scenarios: dry year, average year, wet year (refer to Table 3I-10 for watershed breakdown)</i></li> </ul>		
N/A	<ul style="list-style-type: none"> <li>▪ Wet Year: 243 AF/yr</li> <li>▪ Dry Year: 486.0 AF/yr</li> <li>▪ Average Year: 364 AF/yr</li> </ul>	N/A
<ul style="list-style-type: none"> <li>▪ <i>Indicator - Modeled anticipated changes in the duration and intensity of annual snowmelt compared to historic natural variation</i></li> </ul>		
N/A	<p>The application of snowmaking alters the volume and timing of snowmelt; machine-produced snow typically begins to melt later in the season than natural snow. This can increase the average duration of seasonal melt. Trail clearing affects the water balance by decreasing the amount of water removed via evapotranspiration, thus increasing the quantity of water available for infiltration or runoff. Interception and evaporation losses from the forest canopy would be reduced. Vegetation removal would affect the infiltration characteristics of the watershed, generally resulting in quicker runoff generation. Changes in vegetative cover also can affect the solar energy balance of the watershed, permitting increased solar radiation and therefore earlier and faster snowmelt. Together these changes would alter water balance characteristics and snowmelt timing.</p>	N/A

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
	<p><u>Average Year</u>: Introduction of additional water equivalent in the form of machine-produced snow, coupled with changes in land use due to trail construction activities, would result in a six percent increase in watershed recharge in an average year.</p> <p><u>Dry Year</u>: Overall, an eight percent increase in annual recharge would be anticipated during dry-year conditions.</p> <p><u>Wet Year</u>: In a wet year, snowmaking represents a very small percentage of the overall water balance. For the Snowbowl watershed, receiving most of the snowmaking input, the change in recharge compared to existing conditions is two percent.</p>	
<p>▪ <i>Indicator - Modeled anticipated changes in erosion/sedimentation due to predicted changes in total snowpack</i></p>		
N/A	<p>While the sediment detachment quantities predicted by the WEPP model are measures of potential detachment, and not actual sediment yield or delivery, the anticipated increase in post-implementation detachment is approximately 483 tons. After re-vegetation, with de-commissioning of a portion of the existing mountain access road reducing detachment by approximately 14 tons per year, the total increase in detachment is anticipated to be almost 180 tons. This increase is driven primarily by 43.3 acres of the 131 acres of total disturbance that are proposed to occur on slopes of 30 percent slope gradient or higher.</p>	<p>The anticipated increase in detachment immediately following project implementation is approximately 466 tons, and is four percent lower than the Proposed Action. The detachment rates are driven primarily by 42 acres of the 119 acres of total grading that are proposed to occur on slopes of 30 percent slope gradient or higher.</p>

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<ul style="list-style-type: none"> <li>Indicator - Analysis of potential changes to soil chemistry due to anticipated increases in soil moisture and nutrient loading</li> </ul>		
N/A	Overall, percolating treated wastewater through the soil profile would be unlikely to have a negative impact on either the soils or treated water.	N/A
<b>VEGETATION</b>		
<i>Plant communities (including T, E and S plant species, and regionally important plants) within the SUP area may be altered as a result of the proposed projects</i>		
<ul style="list-style-type: none"> <li>Indicator - Acres of mixed conifer forest on the San Francisco Peaks, within the SUP, and potentially effected by the Proposed Action</li> </ul>		
There would be no overstory tree removal in the analysis area; therefore, the total acreage of mixed conifer and Spruce-fir forest on the San Francisco Peaks would not change.	76.3 acres of permanent overstory vegetation removal within Spruce-fir forest in the SUP area; and treatment of 47.4 acres of Spruce-fir forest within the Agassiz and Sunset pods, consisting of 20% tree removal, are proposed.	64.4 acres of permanent overstory vegetation removal within Spruce-fir forest in the SUP area; and treatment of 47.4 acres of Spruce-fir forest within the Agassiz and Sunset pods, are proposed.
<ul style="list-style-type: none"> <li>Indicator - Potential impacts to montane grasslands within the SUP as a proportion of total grasslands on the San Francisco Peaks</li> </ul>		
There would be no change in acreage of montane grassland either within the SUP area or on the San Francisco Peaks.	2.7 acres of permanent loss, and 18.2 acres of temporary disturbance, to montane grassland in the SUP area are proposed.	0.1 acre of permanent loss, and 17.7 acres of temporary disturbance, to montane grassland in the SUP area are proposed.
<ul style="list-style-type: none"> <li>Indicator - Disclosure of effects to potentially occurring T, E, and/or S plant species or potential habitat</li> </ul>		
There would be no effect on the endangered San Francisco Peaks groundsel or its habitat, including designated critical habitat in the upper portion of the SUP.	This alternative would result in disturbance within mapped critical habitat for the threatened San Francisco Peaks groundsel, but would not affect actual habitat or plants.	This alternative would result in disturbance within mapped critical habitat for the threatened San Francisco Peaks groundsel, but would not affect actual habitat or plants.
<i>The Proposed Action has potential to change vegetation composition within the SUP area due to the application of machine-produced snow.</i>		
<ul style="list-style-type: none"> <li>Indicator - Description of likely snowmaking scenarios for dry, wet and average snow years</li> </ul>		
N/A	See issue Soils and Geology, above.	N/A

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<ul style="list-style-type: none"> <li>Indicator - Analysis of potential changes to botanical composition due to anticipated increases in soil moisture consistency and/or delayed snowpack desiccation</li> </ul>		
<p>Vegetation communities in the analysis area would receive only natural precipitation.</p>	<p>Additional water and nitrogen from snowmaking would increase plant growth and may change plant species composition on existing and newly developed ski trails.</p>	<p>Vegetation communities in the analysis area would receive only natural precipitation.</p>
<ul style="list-style-type: none"> <li>Indicator - Description of the certification process for allowing Class A water to be used for snowmaking</li> </ul>		
<p>The State of Arizona allows Class A and A+ reclaimed water for direct reuse in snowmaking. ADEQ developed the Reclaimed Water Permit Program to define conditions and requirements for reuse of treated municipal wastewater. The program specifies reclaimed water standards and defines five classes of reclaimed water. Class A reclaimed water is the highest quality and is required for reuse applications where there is a relatively high risk of human exposure to treated effluent.</p>		
<ul style="list-style-type: none"> <li>Indicator - Literature search on use of reclaimed water for various recreational and municipal purposes uses</li> </ul>		
<p>Reuse of municipal wastewater has become increasingly important during the past several decades due to the growth in urban population, constraints on the development of new water sources, and more stringent treatment requirements to protect the quality of the receiving water for aquatic life. Reuse is practiced extensively in the United States and around the world.</p>		
<ul style="list-style-type: none"> <li>Indicator - Documentation of compliance with State and Federal water quality standards regarding Class A wastewater and its uses</li> </ul>		
<p>The Rio de Flag WRP is authorized to discharge treated wastewater to the Rio de Flag under NPDES Permit (currently referred to as an AZPDES Permit since the program has been delegated to State authority) that was issued in November 1999. The AZPDES Permit requires that water quality of the reclaimed water meet State Surface Water Quality Standards (SWQS) for discharge to the Rio de Flag. The Arizona Department of Environmental Quality (ADEQ) has assigned designated uses of partial-body contact (PBC) and aquatic and wildlife for effluent-dependent water (A&amp;Wedw) to the receiving waters of the Rio de Flag WRP.</p>		
<ul style="list-style-type: none"> <li>Indicator - Description of nitrogen constituents of Class A wastewater</li> </ul>		
<p>Effects of supplemental nitrogen on plant communities on ski trails would be dependent on local conditions, nitrogen concentrations in the reclaimed water, and deposition rates. The rate of nitrogen saturation of the soil would be dependent on a number of factors, including soil physical and chemical characteristics, existing soil nutrient content, plant species diversity and density, and climate. Net nitrogen deposition as a result of snowmaking in the SUP would be from about two-fold to over 60-fold lower than that in the studies cited. Therefore, nitrogen saturation would likely occur over a longer time period.</p>		

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<b>WILDLIFE</b>		
<i>The Proposed Action may result in the alteration and/or removal of habitat for terrestrial wildlife species within the SUP</i>		
<ul style="list-style-type: none"> <li>Indicator - Identification of any T, E, and S; MIS; and other wildlife species and habitats present within the SUP area and along the pipeline corridor</li> </ul>		
<p>One federally-listed threatened wildlife species occurs regularly within general the analysis area: Mexican spotted owl (<i>Strix occidentalis lucida</i>). The threatened bald eagle (<i>Haliaeetus leucocephalus</i>) may occur in the analysis area in winter. The endangered black-footed ferret (<i>Mustela nigripes</i>) is not known or expected to occur in the analysis area. On the San Francisco Peaks, the Navajo Mountain Mexican vole has been found in open grassy areas amid limber pine, spruce, fir, and aspen. There are two PFAs within the analysis area, both of which are located along the Snowbowl Road and the reclaimed water pipeline alignment. The Veit Spring PFA largely overlaps the Snowbowl Mexican spotted owl PAC. There are no MIS identified for Developed Recreation Areas (i.e., the Arizona Snowbowl SUP). Alpine habitat occupies about 20 acres above timberline in the SUP area and covers an estimated 1,600 acres on the San Francisco Peaks, generally above 11,500 feet. Only the water pipit is known to breed in this habitat type. The analysis area is located within Game Management Unit (GMU) 7. Large game species managed by the Arizona Game and Fish Department are the pronghorn antelope, black bear, elk, mule deer, and wild turkey. Mountain lions are also known to occur in the analysis area. A number of smaller game animals and fur bearers also occur, including Abert and red squirrel, gray-collared chipmunk, mantled ground squirrel, Gunnison’s prairie dog, coyote, and bobcat. Several species of bats have been documented in the Fort Valley area, west of the Snowbowl Road.</p>		
<ul style="list-style-type: none"> <li>Indicator - Disclosure/quantification of anticipated effects to those species and habitats present within the SUP area and along the pipeline corridor</li> </ul>		
<p>This alternative would have No Effect on any threatened, endangered, or sensitive species, management indicator species, migratory birds, or game and non-game wildlife</p>	<p><u>Threatened, Endangered, or Sensitive species:</u> Alternative 2 would not adversely affect threatened or endangered species within the analysis area. Regarding sensitive species, this alternative may impact individuals of the Navajo Mexican vole and habitat for the northern goshawk but is not likely to result in a trend toward Federal listing or loss of viability.</p> <p><u>Management Indicator Species:</u> Tree removal would not substantially affect habitat for the Abert squirrel, pygmy nuthatch, wild turkey, elk, hairy woodpecker, red squirrel, red-naped sapsucker, or pronghorn antelope.</p> <p><u>Migratory Birds:</u> Proposed activities may affect migratory bird species within the SUP directly through habitat removal or modification or indirectly through changes in</p>	<p><u>Threatened, Endangered, or Sensitive species:</u> Alternative 3 would not adversely affect threatened or endangered species within the analysis area. Regarding sensitive species, this alternative may impact individuals of the Navajo Mexican vole and habitat for the northern goshawk but is not likely to result in a trend toward Federal listing or loss of viability.</p> <p><u>Management Indicator Species:</u> No effect on management indicator species.</p> <p><u>Migratory Birds:</u> Proposed activities may affect migratory bird species within the SUP directly through habitat removal or modification or indirectly through changes in</p>

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
	<p>prey populations.</p> <p><u>Game and Non-game Wildlife</u>: Effects would result from increased moisture and nutrients due to snowmaking, construction activities, forest fragmentation, and summer recreation.</p>	<p>prey populations.</p> <p><u>Game and Non-game Wildlife</u>: Effects would result from noise due to construction activity, forest fragmentation, and an increase in summer recreation.</p>
<p><i>Proposed snowmaking activities may result in a longer-duration snowpack and additional water storage for wildlife in the SUP area.</i></p>		
<p>▪ <i>Indicator - Acreage of proposed snowmaking coverage</i></p>		
N/A	205.2 acres	N/A
<p>▪ <i>Indicator - Comparison of natural snowpack duration with the extended snowpack due to snowmaking</i></p>		
N/A	<p>Snowmaking would generally extend the duration of snowpack in the SUP area. Snow grain (crystal) size of machine-produced snow is typically smaller than that of natural snow. This would result in denser snow that typically takes longer to melt than natural snow.</p>	N/A
<p>▪ <i>Indicator - Effects of both longer-duration snowpack and water storage (impoundment) on wildlife in the analysis area</i></p>		
N/A	<p>Greater moisture availability from snowmaking and an extended snowpack would generally enhance the growth of grasses and forbs on cleared ski trails within the SUP area. This would locally increase forage conditions for deer and elk and result in higher densities of these game species in the SUP area. The snowmaking water impoundment would have no effect on most game and non-game wildlife because access would be precluded by fencing.</p>	N/A

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<b>GEOTECHNICAL</b>		
<i>Geotechnical feasibility and associated hazards associated with construction of the proposed snowmaking impoundment on the ridge above the Sunset Chairlift must be analyzed</i>		
▪ <i>Indicator - Hazard classification</i>		
N/A	The structure would classify as a low hazard dam using the State of Arizona criteria, and a moderate hazard dam using the Forest Service criteria. Therefore, it is recommended that the final structure be designed using design criteria associated with a moderate hazard dam.	N/A
▪ <i>Indicator - Failure Risk</i>		
N/A	Low risks of failure are associated with: <ul style="list-style-type: none"> <li>▪ overtopping</li> <li>▪ piping (with appropriate mitigation)</li> <li>▪ static instability</li> <li>▪ excessive displacement during an earthquake is low</li> <li>▪ liquefaction (believed to be low, but needs to be verified by site-specific investigation at the time of final design)</li> <li>▪ excessive settlement</li> </ul>	N/A

**Table 2-5  
Summary of Direct and Indirect Environmental Consequences**

ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – THE PROPOSED ACTION	ALTERNATIVE 3
<ul style="list-style-type: none"> <li>Indicator - Dam breach and downstream inundation analysis</li> </ul>		
N/A	<p>The model indicates that the flood wave attenuates substantially on its way down the mountain and dissipates almost entirely in the broad floodplain of Fort Valley. Downstream from Fort Valley, it is anticipated that existing hydraulic structures (bridges and culverts) on the Rio De Flag would accommodate the passing breach flood without impact through the Flagstaff area.</p>	N/A
<p><b>AIR QUALITY</b></p>		
<p><i>Snowplay activities at Snowbowl could increase vehicular traffic and may negatively impact air quality in the region.</i></p>		
<ul style="list-style-type: none"> <li>Indicator - Compliance with local, state and federal regulations regarding air quality</li> </ul>		
<p>There is no projected increase in visitation under Alternative 1. The area would remain in attainment for all six criteria pollutants and the visibility of the Kachina Peaks Wilderness would remain unimpaired. Snowbowl would maintain compliance with all local, state, and Federal air quality regulations.</p>	<p>While the Proposed Action would be accompanied by an increase in total annual vehicular traffic and short-term, construction related affects to air quality, Snowbowl would remain in attainment for all six criteria pollutants. It would also maintain the integrity of the visibility in the nearby Kachina Peaks Wilderness. Snowbowl would maintain compliance with all local, state, and Federal air quality regulations.</p>	<p>As a result of implementation of Alternative 3, Snowbowl would remain in attainment for all six criteria pollutants with a net reduction of direct and indirect effects as compared to those disclosed under the Proposed Action. It would also maintain the integrity of the visibility in the nearby Kachina Peaks Wilderness. Snowbowl would maintain compliance with all local, state, and Federal air quality regulations.</p>

## **DATA INTEGRITY**

Prior to undertaking this NEPA analysis, a thorough review of the existing mapping and data for Arizona Snowbowl was conducted. For the scope and detail of this analysis, the existing mapping and data was determined to be insufficient to model and analyze the Proposed Action in the detail required. For this analysis, high resolution, ortho-rectified, aerial photography and digital contour data was acquired for a 6,800 acre area including and surrounding the ski area. Digital contour data was created at a ten foot contour interval and the ortho-photography was captured at a one-foot pixel resolution. Additionally, this mapping was augmented using supplementary detailed data from a local surveyor and via GPS technology.

All of the data used in this analysis has been either created from, or corrected by, the digital aerial mapping. These datasets include but are not limited to the base mapping of the ski area such as lifts, trails, and infrastructure. DEM (Digital Elevation Model) and TIN (Triangulated Irregular Network) files have been compiled based on the elevation data from aerial and ground surveys. Additional datasets from sources such as the Forest-wide GIS database and sub-contractors have been corrected and rectified to coincide with the data generated from the aerial photography. This state-of-the-art GIS database was used to create, calculate, and analyze all of the anticipated impacts displayed within this analysis.

# CHAPTER 3

## AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

A. Heritage and Cultural Resources .....	3-3
B. Noise .....	3-31
C. Traffic and Ski Area Access .....	3-40
D. Aesthetic Resources .....	3-52
E. Social and Economic Resources .....	3-73
F. Recreation .....	3-129
G. Infrastructure and Utilities .....	3-150
H. Watershed Resources .....	3-160
I. Soils and Geology .....	3-225
J. Vegetation .....	3-280
K. Wildlife .....	3-300
L. Geotechnical .....	3-335
M. Air Quality .....	3-351
N. Environmental Justice .....	3-362



**Coconino National Forest  
Peaks Ranger District**

# **3. THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

## **INTRODUCTION**

CEQ regulations direct agencies to succinctly describe the environment that may be affected by the alternatives under consideration.<sup>1</sup> As such, Chapter 3 describes the existing physical, biological, social, and economic components of the project area which have potential to be affected by implementing any of the alternatives (i.e., the Existing Conditions). Each Existing Condition description is followed by an Environmental Consequences discussion that provides an analysis of the potential effects of implementation of each of the alternatives.

Chapter 3 is organized by resource area, and follows the organization of issues and resources requiring further analysis (and indicators) as presented in Chapter 1. Each resource section in Chapter 3 is organized in the following order:

## **SCOPE OF ANALYSIS**

The scope of analysis briefly describes the geographic area(s) potentially affected by the alternatives for each issue and its indicator(s). The scope of analysis varies according to resource area and may be different for direct, indirect, and cumulative effects.

## **EXISTING CONDITIONS**

The Existing Conditions section provides a description of the environment potentially affected, as based upon current uses and management activities/decisions.

## **DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES**

This section provides an analysis of direct and indirect environmental effects of implementing each of the alternatives, according to the issues or resources requiring additional analysis and indicators identified in Chapter 1. Cumulative effects are discussed separately.

Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (i.e., likely to occur within the duration of the project).

## **CUMULATIVE EFFECTS**

Cumulative effects are the result of the incremental direct and indirect effects of any action when added to other past, present, and reasonably foreseeable future actions, and can result from individually minor but collectively major actions taking place over a period of time.

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<sup>1</sup> 40 CFR 1502.15

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

An irreversible commitment is a permanent or essentially permanent use or loss of resources; it cannot be reversed, except in the extreme long term. Examples include minerals that have been extracted or soil productivity that has been lost. An irretreivable commitment is a loss of production or use of resources for a period of time. One example is the use of timber land for a logging road. Timber growth on the land is irretreivably lost while the land is a road, but the timber resource is not irreversibly lost because the land could grow trees in the near future. The Forest Service recognizes the fact that certain management activities will produce irreversible or irretreivable commitments of resources.

## **FOREST PLAN CONSISTENCY**

In conjunction with each resource analysis presented in this chapter, a thorough review of the Forest Plan was conducted in order to determine consistency with standards and guidelines at the Forest and management area levels on the CNF. The Forest Plan consistency analysis is contained in the official Project Record. Aside from a specific reference to the 1979 EIS, the Forest Plan Consistency Analysis identified no inconsistencies in the Proposed Action. Therefore, as indicated in the Proposed Action description in Chapter 2, a minor, non-significant Forest Plan amendment is associated with all alternatives. The amendment language can be found in Appendix B of this EIS.

# 3A. HERITAGE AND CULTURAL RESOURCES

## SCOPE OF THE ANALYSIS

The scope of the cultural and heritage resources analysis within this document focuses on the cultural and spiritual values of the San Francisco Peaks, and the San Francisco Peaks Traditional Cultural Property (TCP), an area of approximately 74,381 acres that is defined in the Existing Conditions discussion. The analysis area for the project encompasses the entirety of the San Francisco Peaks with the understanding that the actual affected environment is far smaller, consisting only of lands within the SUP area (i.e., existing and proposed areas of disturbance). It should be noted that it is difficult to be precise in the analysis of the impact of the proposed undertaking on the cultural and religious systems on the Peaks, as much of the information stems from oral histories and a deep, underlying belief system of the indigenous peoples involved. Pilles,<sup>2</sup> in his draft National Register nomination, has noted that we “can only attempt to describe the major characteristics to which values are assigned that lead to an understanding of the deep, cultural meaning of the Peaks to the traditional people of the First Nations of the Southwest.”

## EXISTING CONDITIONS

NFS lands within Snowbowl’s 777-acre SUP area have been used for winter sports and recreational use since 1938, when the ski area’s original base area was established in Hart Prairie. Since that time, developed recreation at the Snowbowl has evolved with the creation of additional trail systems, buildings, lifts and infrastructure. Snowbowl’s existing developed terrain network is comprised of 32 trails creating approximately 139 acres of skiable areas.

Vegetation breaks within the SUP area were cut throughout the development of Snowbowl; for the most part, vegetation breaks within the SUP area have been “feathered” and undulated in an attempt to mimic natural breaks in the vegetation across the San Francisco Peaks. With the exception of the Hart Prairie area (approximately 40 acres), which is a natural alpine meadow, approximately 100 acres of overstory vegetation have been cleared throughout Snowbowl’s development history.

## FOREST SERVICE TRUST RESPONSIBILITIES

The United States government has a trust responsibility brought about by treaties and laws related to American Indians. This responsibility is unambiguous in that the welfare of American Indians and their land and its resources are entrusted to the United States. While trust responsibilities are clear as they relate to the Bureau of Indian Affairs (BIA) because its mission centers around caring for the welfare, land and interests of American Indians, trust responsibilities are less clear for the Forest Service, who’s mission is providing goods and services related to NFS lands for the benefit of *all* people. For the Forest Service, trust

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<sup>2</sup> Pilles 2003, section 10:1

responsibilities are defined by executive orders, laws, and treaties that are directly related to NFS lands. While there are no treaties tied to the San Francisco Peaks, the Forest Service responds to trust responsibilities by following the laws that protect tribal rights and by making a strong concerted effort to manage NFS lands in a way that accommodates the needs and concerns of Native American groups, while still maintaining a responsibility to all citizens of the United States. Managing and protecting forest resources is a part of the Forest Service multiple-use management direction.

## **LEGAL MANDATES**

In addition to the National Environmental Policy Act, the Forest Service has followed pertinent laws, regulations, and policies in conducting the cultural analysis presented in this FEIS. These include:

### **National Historic Preservation Act**<sup>3</sup>

The National Historic Preservation Act requires agencies to inventory lands under their jurisdiction for historic properties and determine if those properties meet the criteria of eligibility for nomination to the National Register of Historic Places.

Section 106 (*Advisory Council on Historic Preservation*) of the National Historic Preservation Act provides specific directions on how federal agencies are to take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. It specifies how agencies are to conduct and document consultations with the public, Indian tribes, State Historic Preservation Officers, Tribal Historic Preservation Officers, and the Advisory Council on Historic Preservation.

Section 101(d)(6)(B) (*National Register of Historic Places*) of the National Historic Preservation Act requires that, in carrying out its responsibilities under section 106, a Federal agency shall consult with any Indian tribe that attaches religious and cultural significance to properties

Section 110 (*Federal Agencies' Responsibility to Preserve and Use Historic Properties*) of the National Historic Preservation Act, provides direction to federal agencies to establish programs and activities to identify and nominate historic properties to the National Register and to consult with tribes.

### **Executive Order 13007**

Executive Order 13007 "*Indian Sacred Sites*" requires federal agencies to accommodate access to and ceremonial use of sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such places. It also requires agencies to notify tribes of proposed actions or policies that may restrict access or adversely affect sacred sites.

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<sup>3</sup> 16 U.S.C. 470 et seq.

### **Executive Order 12898**

Executive Order 12898 “*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*” provides that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

### **Executive Order 13175**

Executive Order 13175 “*Consultation and Coordination with Indian Tribal Governments*” requires federal agencies to “establish regular or meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationship with Indian Tribes...” The “policies that have tribal implications refer to regulations, legislative comments or proposed legislation, and other policy statements...” The remainder of the EO refers to potential legislation or regulations based on legislation and recognition of the need to communicate with Tribal governments. In light of the content of this executive order, it does not appear to apply to the proposed projects at the Snowbowl, in that this is a site-specific project that does not result in legislation or regulation changes.

### **Forest Service Manual 1500**

Section 1563, “*American Indian and Alaska Native Relations*” in Forest Service Manual 1500, Chapter 1560 - State, Tribal, County, and Local Agencies; Public and Private Organizations, provides policy and guidance on how the Forest Service relates to Native Americans, emphasizing government to government relationships.

### **American Indian Religious Freedom Act of 1978**

The American Indian Religious Freedom Act directs federal agencies to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

### **National Register Bulletin 38**

National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties*<sup>4</sup> provides guidance in addressing the National Register eligibility of traditional cultural properties such as the San Francisco Peaks (defined below).

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<sup>4</sup> <http://www.cr.nps.gov/nr/publications/bulletins/nrb38/>

## The San Francisco Peaks and The National Register of Historic Places

The National Register of Historic Places (National Register) is the Nation's official list of properties recognized for their significance in American history, architecture, archaeology, engineering, and culture. National Register properties include districts, sites, buildings, structures, and objects. They can be to a local community, a state, an Indian tribe, or the Nation as a whole.

A Traditional Cultural Property (TCP) is a place that is associated with the cultural practices or beliefs of a living community. Those practices or beliefs must be rooted in the history of the community and be important in maintaining the continuing cultural identity of the community. While not all TCPs are eligible for the National Register, a TCP is eligible if the property plays a role in a community's historically rooted beliefs, customs, and practices and meets at least one of four National Register Criteria for Significance: A) associated with significant events; B) associated with a significant person; C) is an outstanding example of a type; or D) is associated with information contained in an archaeological site.

The Forest Service has identified the San Francisco Peaks as a TCP as defined in National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties*. The Peaks have also been determined eligible for inclusion in the National Register of Historic Places as part of the White Vulcan Mine Settlement Agreement and Mine Closure in August 2000.<sup>5</sup> The San Francisco Peaks are associated with culture and beliefs of living Native American communities that are rooted in their history and are important in maintaining the continuing cultural identity of their community. A number of places considered Traditional Cultural Properties and used for religious purposes, have been nominated to the National Register of Historic Places.

Simply being on the National Register does not afford a property any additional protection. It merely gives the property formal recognition of its importance. Once a property has been formally determined eligible, it has just as much protection as if it were listed. As a result of the determination of eligibility, the Forest Service is required to protect the Peaks as if they were already on the National Register and consult with Tribes and interested parties regarding the impacts of proposed actions upon the Peaks as they relate to affecting the values that makes the Peaks eligible for the Register.<sup>6</sup> At the time of publication of this EIS, the Forest Service is in the process of completing a National Register nomination form for the Peaks.

The San Francisco Peaks TCP is bounded by Forest Road 418 on the north; U.S. Highway 89 on the east; and the boundary between CNF, State, City of Flagstaff, and private lands on the southern and eastern boundary of the Fort Valley Experimental Forest. There are private lands within the TCP boundary, but the designation applies only to federal lands. The TCP boundary goes south to approximately the El Paso Natural Gas Pipeline, then west to U.S. Highway 180. It then generally follows U.S. Highway 180 to its junction with Forest Road 418. It includes the

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<sup>5</sup> USDA Forest Service 2000a

<sup>6</sup> Pursuant to 36 CFR Part 800 Protection of Historic Properties.

San Francisco Peaks, all peaks and ridges that form the skyline view of the Peak, the Inner Basin, all springs in the Inner Basin, most other springs on the Peaks (except those on state, city, or private lands), Lockett Meadow, Weatherford Canyon, Mt. Elden, Little Mt. Elden, Schultz Pass, the Dry Lake Hills, Friedlein Prairie, Hart Prairie, and the Hochderffer Hills.<sup>7</sup> The Snowbowl SUP area is included in the National Register boundary.

In addition, two sites listed on the National Register of Historic Places are contained within the boundaries of the San Francisco Peaks TCP area. The C. Hart Merriam Base Camp is located three miles north/northwest of the SUP area and Fern Mountain Ranch is located 1.5 miles northwest of the SUP area. As part of the 1980 lawsuit, it was determined that the significant qualities of these two sites would not be effected by upgrading the Arizona Snowbowl facilities.

## **ETHNOGRAPHIC LANDSCAPE**

An additional issue that is often considered with National Register-eligible properties is that the Peaks may be considered an ethnographic landscape. Ethnographic landscapes, as defined by the National Park Service, are those landscapes containing a variety of natural and cultural resources that people define as heritage resources (e.g., small plant communities, animals, shrines, and ceremonial grounds). As such, ground disturbance to the landscape can impact its integrity, even if the disturbance does not occur in the specific area of ethnographic usage. For example, historic ground and vegetation disturbances within the Snowbowl SUP area have impacted the Peaks. These indirect impacts may have compromised the entire mountain's spiritual character and the effectiveness of rituals related to the Peaks.

## **TRIBAL CONTACTS**

The San Francisco Peaks are of traditional cultural and spiritual significance to people from many tribes, including the Hopi, Navajo, Acoma, Zuni, Hualapai, Havasupai, Yavapai, Apache, and Southern Paiute. In an effort to provide tribes with an early opportunity to comment on the Proposed Action, consultation between the Forest Service and 13 tribal leaders was initiated in June 2002, with a formal letter from the Forest Supervisor. The reader is referred to Chapter 1 "Public Involvement" for more information on Tribal contacts and consultation that occurred throughout the NEPA process.

## **CULTURAL BACKGROUND**

The San Francisco Peaks are sacred to at least 13 formally recognized tribes that are still actively using the Peaks in cultural, historic, and religious contexts. A central underlying concept to all tribes for whom the Peaks are especially important is the recognition that the San Francisco Peaks are a source of water in the form of rain, springs, and snow. It is believed that the Peaks were put there for the people and it is therefore the peoples' duty to protect it for the benefit of the world.<sup>8</sup> "We believe the snow that comes down the Peaks is like a human being or a spiritual

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<sup>7</sup> Pilles, 2003

<sup>8</sup> Id.

deity that brings us water. Water runs throughout the body and nourishes us.”<sup>9</sup> Pilles<sup>10</sup> identifies nine significant qualities that characterize the Peaks for the tribes. These qualities include:

- They are the abode of deities and other spirit beings.
- They are the focus of prayers and songs whereby humans communicate with the supernatural.
- They contain shrines and other places where ceremonies and prayers are performed.
- They are the source of water.
- They are the source of soil, plant, and animal resources that are used for ceremonial and traditional purposes.
- They mark the boundaries of traditional or ancestral lands.
- They form a calendar that is used to delineate and recognize the ceremonial season.
- They contain places that relate to legends and stories concerning the origins, clans, traditions, and ceremonies of various Southwestern tribes.
- They contain sites and places that are significant in the history and culture of various tribes.

Pilles also notes that most tribes acknowledge they have shrines on the Peaks, or specific places where ceremonial things are done, but they are reluctant to identify them for fear they will be disturbed or desecrated, as well as the fact that such places should not be visited by people unless they have the sufficient religious training and have made the appropriate preparations to go there. “They wanted indications of sacred sites on this mountain, and we can’t say X and X are sacred sites on the east side, or the top is a sacred site. The Mountain was put there for the people, not just part of it, so it’s our duty to protect this place for the benefit of the world, for our people, and everyone else.”<sup>11</sup> The Forest Service facilitates tribal access to the Peaks for the purposes of collecting plants, visitation to shrines, and other religious activities. The tribes have not identified any specific shrines, trails, or sacred resources located directly within the Snowbowl SUP area.

The qualities listed above are manifested by the undisturbed appearance of the Peaks as a landmark upon the horizon, as viewed from the traditional or ancestral lands of the Hopi, Zuni, Acoma, Navajo, Apache, Yavapai, Hualapai, Havasupai, and Paiute.

Sacred sites play an integral role in Native American religions and cannot be disturbed or the spirits may leave. Native American religions often emphasize the natural world in its entirety; every part of nature contains sacred knowledge, and the relationship of man to every creature and place is one of kinship. The entire earth is sacred; it is seen as the source of life. Some parts of

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<sup>9</sup> Reid, 2001

<sup>10</sup> Pilles, 2003; *Dine’* Medicineman’s Association 1999; Western Navajo Agency, 1999; Hopi Tribe, 1975; Hopi Cultural Resources Advisory Task Team, 2002; Watson, 1964:22

<sup>11</sup> Kiefer, 1998

the natural world, such as the San Francisco Peaks, are accorded special reverence. These special places may be where spiritual beings or forces originated or where they reside or where individuals or spiritual leaders communicate with them. Thus, the relationship between native people and the land is central and indispensable to their religion, culture, and way of life.

The concept of landscape should be considered when discussing Native American relationships to the land.<sup>12</sup> Large areas such as mountains may be considered sacred preserves, with various activities occurring that relate to the culture and religion. While preserving places important to a group is important in helping perpetuate the culture, a more effective approach is to widen the focus by considering the culturally landscape within which each group functions and from which they derive their cultural values. In this regard, many groups consider the landscape to be part of a living cultural system, which encompasses both the people and the land together. The most sacred and places for Native Americans are those where there is a symbiotic relationship among land, religion and people - and the place is important in the creation/origin stories of the people. It is these places where there are shrines or offering places and where ceremonies and rituals are conducted.

Developing a cultural understanding about the sacredness of a TCP is difficult within the parameters of a NEPA analysis. Pilles<sup>13</sup> notes that we can only attempt to describe the major characteristics to which values are assigned that lead to an understanding of the deep, cultural meaning of the Peaks to the tribes for which they are sacred.

Two examples of the cultural significance of the San Francisco Peaks are the Hopi and Navajo peoples' religious and spiritual connections to the Peaks, as discussed below.

### **Hopi**

Hopi clans migrated through the San Francisco Peaks (called *Nuvatukyaovi*, “High Place of Snow”), made settlements nearby, and placed shrines on the Peaks. All of the religious ceremonies focus on *Nuvatukyaovi* and demonstrate the sacred relationship of the Peaks to the Hopi people. The history of clan migrations through the area continue to be related, discussed, and passed on from generation to generation. The Peaks contain clan and society shrines, and gathering areas for medicinal and religious use. Hopi religious leaders visit the Peaks annually. The San Francisco Peaks are the spiritual essence of what Hopis consider the most sacred landscapes in Hopi religion. They are the spiritual home of the *Katsinam*,<sup>14</sup> significant religious beings that all Hopis believe in, and are therefore, sacred. The ceremonies associated with the Peaks, the plants and herbs gathered on the Peaks, and the shrines and ancestral dwellings located in the vicinity of the Peaks are of central importance to the religious beliefs and traditions that are the core of Hopi culture.<sup>15</sup>

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<sup>12</sup> Kelley and Francis, 1994

<sup>13</sup> Pilles, 2003

<sup>14</sup> Note: “*Katsina*” and “*Katsinam*” are the linguistically correct ways of spelling the more-commonly used terms “*Kachina*” and “*Kachinas*”.

<sup>15</sup> Titiev, 1944; Loftin, 1991

*Katsinam* represent the multi-layered spirit powers who personify nature: clouds, sky, storms, trees, etc. They function as protective supernatural beings who can help humans if they are asked properly and respectfully. They also represent the spirits of Hopi ancestors who, in the form of clouds, bring much-needed rain. They serve as entertainers and discipliners of children, look after the interests of humans, serve as intermediaries to the gods, and can bestow good fortune, such as fertility, power, and long life.<sup>16</sup>

The Hopis recognize hundreds of specific *Katsinam* who personify the forces of nature and the spiritual essence of plants, animals, other tribes, specific people and supernatural forces. *Katsinam* return to live in Hopi villages every year, beginning in February after descending from their home on top of the San Francisco Peaks. The top of the Peaks is considered to be a cloud house, since the *Katsinam* are manifested as clouds.<sup>17</sup> There is a kiva for the *Katsinam* on the very top of the Peaks<sup>18</sup> and the *Ka'nas Katsina*, for example, lives in an ice cave on top of the Peaks.<sup>19</sup> The *Katsinam* remain in the villages until *Niman*, the Going Home Ceremony, in late July, at which time they return to the San Francisco Peaks. Boughs are collected from the Peaks for use during *Niman*; water from springs is collected as well, usually from high up on the Peaks.<sup>20</sup>

The Peaks are one of the major landmarks that define the traditional and spiritual boundaries of *Hopitutsqwa*, “Hopi land” and the territory for which they act as stewards of the land through their pact with *Ma'saw*, the guardian of this world.<sup>21</sup> The Peaks are mentioned, or figure prominently, in numerous folk tales and oral traditions of the Hopi.<sup>22</sup> These traditions mention the Peaks as a reference point<sup>23</sup> or as the location where the stories took place.

Pilles<sup>24</sup> notes that trails lead from the Hopi Mesas to the San Francisco Peaks and are traditionally used as part of annual pilgrimages and collecting expeditions. During the winter solstice when the *Soyalung* ceremony is done, the Hopi re-enact their emergence tradition. Pilgrimages are made to the Peaks to collect Douglas-fir, evergreen plants, and ice for the ceremony. “Prayers are said for prosperity, for good health, for our own families, our grandchildren, ourselves, and for the world over.”<sup>25</sup> Former Tribal Chairman Ferrell Secakuku describes the Peaks as a spiritual center of the Hopi. “We go there to make prayers to our ancestors and deities to protect us and to support our prayers when we do our ceremonies, so we

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<sup>16</sup> Loftin, 1991

<sup>17</sup> Malotki, 1987:10

<sup>18</sup> Malotki, 1987:32,169

<sup>19</sup> Malotki, 1987:30

<sup>20</sup> Pilles, 2003

<sup>21</sup> Id.

<sup>22</sup> Nequatewa, 1936; Parsons, 1967

<sup>23</sup> Mullett, 1979:76, 80; Nequatewa, 1936:86-93

<sup>24</sup> Pilles, 2003

<sup>25</sup> Reid, 2001

could come in touch with the cloud people, who bring rain. Rain is a symbol of life. Rain represents nourishment.”<sup>26</sup>

## **Navajo**

The Navajo people believe that the Creator placed them on land between four sacred mountains: Blanca Peak in Colorado, Mount Taylor in New Mexico, the San Francisco Peaks in Arizona, and Hesperus Peak in Colorado. According to their own history, the Navajos have always lived between these mountains. Each of the four mountains is associated with a cardinal direction, symbolizing the boundaries of the Navajo homeland. For the Navajo, the Peaks are the sacred mountain of the west, *Doko’oo’sliid*, “Shining on Top,” a key boundary marker and a place where medicine men collect soil for their medicine bundles and herbs for healing ceremonies. Navajo traditions tell that San Francisco Peak was adorned with *Diichilí*, Abalone Shell, Black Clouds, Male Rain, and all animals, besides being the home of *Haashch’éelt’i’i* (Talking God), *Naada’algaii* ‘Ashkii (White Corn Boy), and *Naadá’Altsoii* ‘At’ééd (Yellow Corn Girl). The sacred name of the Peaks is *Diichilí Dzil* – (Abalone Shell Mountain). The Navajo people have been instructed by the Creator never to leave their sacred homeland.<sup>27</sup> *Dook’o’osliid* and the other three sacred mountains are the source of curing powers. They are perceived as a single unit, such as the wall of a hogan, or as a particular time of a single day. *Dook’o’osliid* is seen as a wall made of abalone shell and stone, with mixed yellow and white bands.<sup>28</sup>

The Peaks are recognized as a source of water. As one Navajo said, “I go to the Inner Basin to place *nlt’iz* and prayers for rain.” The Peaks contain numerous sacred places, such as springs, trails, cairns, offering places, plant gathering areas, and mineral gathering areas. In addition, rocks, plants, trees, coal, clay, water, and soil are specifically collected from the Peaks.<sup>29</sup> Each of these is important for specific ceremonies as well as for food and other every-day purposes.<sup>30</sup> For example, pinyon nuts and firewood collecting are the main reasons Navajo go to the forests, other than to collect medicinal plants.<sup>31</sup> Ear ache medicine was prepared from the pulp of a tree (*tsidisi*) found on the San Francisco Peaks.<sup>32</sup> Animals living on the Peaks are also sacred, such as owls and other birds. Owls have a sacred and significant place in Navajo history and are responsible for specific ceremonial actions such as the *Tl’ee’ii* (the Nightway, or *Yeii-bi-cheii*).

Pilles<sup>33</sup> notes that some indication of the importance of the San Francisco Peaks to Navajo in their daily lives can be seen from Vannette and Fearey’s study of Navajo uses of the National Forests of northern Arizona. In a specific study of these uses, 37 percent of their informants indicated that they gather medicine from sacred places, 23 percent said they pray to them, and 20

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<sup>26</sup> Id.

<sup>27</sup> [http://www.lapahie.com/San\\_Francisco\\_Peak.cfm](http://www.lapahie.com/San_Francisco_Peak.cfm); [http://www.cpluhna.nau.edu/Places/san\\_francisco\\_peaks.htm](http://www.cpluhna.nau.edu/Places/san_francisco_peaks.htm)

<sup>28</sup> Reid, 2001

<sup>29</sup> Vannette and Fearey, 1981:47

<sup>30</sup> Cameron Chapter, 1992; Jensen *et al*, 1998

<sup>31</sup> Vannette and Fearey, 1981:44

<sup>32</sup> Franciscan Fathers, 1910:112, 202

<sup>33</sup> Pilles, 2003

percent said they make offerings at these sacred places.<sup>34</sup> In other words, sacred places, pre-eminently the San Francisco Peaks, play an important role in the lives of at least 37 percent of the Navajo people living in northern Arizona.

Today, ceremonies are conducted on the Peaks by both the Hopi and Navajo people. For example, plants and herbs are gathered and shrines and ancestral dwellings visited. There are numerous medicinal herbs and other plants at several levels of the Peaks that are used in traditional ceremonies and to treat the ailments of Native American people. The tribes have not identified any plants or other natural resource materials gathered within the Snowbowl SUP area. Both tribes (and others as needed) have access to their sacred sites, conduct ceremonies, and gather plants of traditional importance and herbs when needed. These activities are of central importance to the cultural and religious values of both tribes.

### **Other Tribes**

The Hopi and Navajo are most directly associated with the Peaks, and their religious and spiritual connections to the Peaks have been relatively well documented. Therefore, only brief mention of a sample of the other tribes with spiritual connections to the Peaks is offered here.

### **Apache**

The Peaks are a very important and powerful place to many traditional Apache people in San Carlos and elsewhere.<sup>35</sup> Mountains are prayed to because clouds hang on them and Lightning People are on them. As with other tribes in their concepts of the relationship of mountains to water,

*“When we go up the Mountain we pray as we go. We take every step with prayer. When our prayers are answered we see the water come. There are life-giving waters on the Mountain. The rain that comes sprinkles everyone even in the valley and it blesses everyone. Our prayers go through the Mountain, to and through the top of the Mountain.”<sup>36</sup>*

They are prayed to for crops, life, and hunting.<sup>37</sup> Mountains are also considered to be the home of the *ga'an* (mountain spirits) and the San Francisco Peaks have been identified as one of the places of the *ga'an*.<sup>38</sup> Because of this, people did not go far up the San Francisco Peaks, as supernatural beings lived on the top.<sup>39</sup> Their association with mountains is also reflected by their

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<sup>34</sup> Vannette and Fearey, 1981:31

<sup>35</sup> Cassa, 1999.

<sup>36</sup> Stanley, 1992: in Spoerl, 2001

<sup>37</sup> Goodwin, 1929-1939:89

<sup>38</sup> Goodwin, 1929-1939:85

<sup>39</sup> Goodwin, 1969:44

dress. They usually have spruce boughs tied to them as well as eagle and turkey feathers - birds that are often associated with the mountains.<sup>40</sup>

### Acoma

The San Francisco Peaks are the western boundary marker for the Acoma, and are considered to be their Guardian of the West. The Acomas' protection shrine is on top of the Peaks. They perform ceremonies on the Peaks and collect soil, water, and plants from it for ceremonial and medicinal purposes.

### Yavapai

The San Francisco Peaks are recognized as the northeastern boundary of Yavapai territory<sup>41</sup> and contain "a lot of sacred things."<sup>42</sup> The area around the Peaks was used to collect pinyon nuts and grass seeds as well as for hunting, collecting wild plants for food, and other plants for medicines.<sup>43</sup> Songs are sung about the Peaks and relate to various specific places and areas.

### Hualapai and Havasupai

The Hualapai and Havasupai perceive the world as flat, marked in the center by the San Francisco Peaks, which were visible from all parts of the Havasupai territory except inside the Grand Canyon. The commanding presence of the Peaks probably accounts for the Peaks being central to the Havasupai beliefs and traditions, even though the Peaks themselves are on the edge of their territory.<sup>44</sup>

### Zuni

The San Francisco Peaks are an ancestral site in the Zuni migration narrative. Willow, aspen, and medicinal herbs are collected from the Peaks, as well as soil.

## **SUMMARY OF CULTURAL RESOURCE INVESTIGATIONS WITHIN THE SUP AREA**

CNF Archaeology records indicate that at least 14 cultural resources surveys have been conducted within the Snowbowl SUP area since 1980.<sup>45</sup> These surveys provided cultural resource clearance recommendations for the development of the Snowbowl to its current state

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<sup>40</sup> Goodwin, 1929-1939:88

<sup>41</sup> Khera and Mariella, 1983:39

<sup>42</sup> Marquez, 1998

<sup>43</sup> Schroeder, 1959

<sup>44</sup> Id.

<sup>45</sup> Bremer 1987, 1989; Bremer and Holden, 1986; Clements 1981; Dosh, 1997, 1999, 2002; Farnsworth, 1986, 1993; Geib, 1983; Harper, 1995a, 1995b; Kelley, 1980; Pilles, 1988; Stein and Pilles, 1981

under the auspices of the Record of Decision (ROD) that approved the 1979 Final Environmental Statement for the Arizona Snowbowl Ski Area Proposal.<sup>46</sup>

Prior to 1979, Snowbowl had operated the Agassiz Chairlift with two primary trails. Following the 1979 ROD, Snowbowl made plans for the Hart Prairie Chairlift. A cultural resources survey of that lift was conducted by the Northern Arizona University (NAU) Department of Anthropology,<sup>47</sup> recording one cultural property outside the proposed alignment - the site of the original Snowbowl Lodge, which was constructed in 1941 and subsequently burned to the ground in 1952. The Hart Prairie Chairlift alignment was later modified so that the new alignment – as well as the site of a proposed Hart Prairie Lodge, the Sunset and Aspen chairlifts and their associated ski trails, and new trails serviced by the Agassiz Chairlift – was included in the areas surveyed by NAU.<sup>48</sup> At the same time, CNF archaeologists conducted a survey of the existing ski trails.<sup>49</sup> No additional cultural resources were identified. In a letter from Ann A. Pritzlaff, Arizona State Historic Preservation Officer, to Neil R. Paulson, CNF Forest Supervisor, dated September 11, 1981, the site of the original Snowbowl Lodge<sup>50</sup> was determined ineligible for listing on the NRHP and clearance for the first stage of development was granted by the CNF. In 1983, NAU surveyed a small block area between the Snowbowl Road and the Snowbowl maintenance shop road, a power line extending to the south from the maintenance shop, and a right-hand turning lane off of U.S. Highway 180 at the other end of Snowbowl Road.<sup>51</sup> No cultural resources were identified.

From 1986 to 1995, CNF archaeologists conducted all surveys within the Snowbowl SUP area. Farnsworth surveyed for replacement of the Agassiz Chairlift, the construction of the Aspen Chairlift<sup>52</sup>, minor trail improvements within *Lower Bowl* (trail #29), *Logjam* (trail #25), and along *Ridge Run* (trail #26), and the road shoulders between Hart Prairie Lodge and Agassiz Lodge.<sup>53</sup> That same year, Bremer reported on a survey of *Pomal*,<sup>54</sup> and the following year, on a survey of proposed telephone and power corridors between Hart Prairie Lodge and the maintenance shop (another survey previously covered by Clements<sup>55</sup> and Geib<sup>56</sup>). In 1988, Pilles provided the documentation, assessment, and recommendations for converting an existing restroom into a locker room.<sup>57</sup> The existing structure was determined ineligible for listing onto the NRHP because it was less than 50 years old. The following year, clearance documentation

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<sup>46</sup> USDA Forest Service, 1979

<sup>47</sup> Kelley, 1980

<sup>48</sup> Clements, 1981

<sup>49</sup> Stein and Pilles, 1981

<sup>50</sup> AR-03-04-03-199

<sup>51</sup> Geib, 1983

<sup>52</sup> Clements, 1981

<sup>53</sup> Farnsworth, 1986

<sup>54</sup> Bremer, 1986

<sup>55</sup> Bremer 1987, 1989; Bremer and Holden, 1986; Clements 1981; Dosh, 1997, 1999, 2002; Farnsworth, 1986, 1993; Geib, 1983; Harper, 1995a, 1995b; Kelley, 1980; Pilles, 1988; Stein and Pilles, 1981

<sup>56</sup> Geib, 1983

<sup>57</sup> Pilles, 1988

was provided for additional parking areas (another previously covered survey by Clements)<sup>39</sup> and minor trail improvements at the top of the Sunset Chairlift, along the Agassiz Chairlift, and within *Lower Bowl* (trail #29) and through *Logjam* (trail #25). In 1993, Farnsworth reported on a survey of trail widening from *Lower Bowl* (trail #29) through *Logjam* (trail #25) and *Wild Turkey* (trail # 20), and smaller improvements between *Ridgeway* (trail #22) and *Blackjack* (trail #17).<sup>58</sup> More recently, the two-track road from the maintenance shop to the top of the Sunset Chairlift, the top of the Hart Prairie Chairlift, and an area around Agassiz Lodge was surveyed;<sup>59</sup> soon thereafter followed by a survey of an existing parking area west of the Hart Prairie Lodge (another survey previously covered by Clements),<sup>60</sup> the newly proposed ski trail between *Casino* (trail # 23) and *Logjam* (trail #25), and large block areas between the Hart Prairie Chairlift and *Ridge Run* (trail #26).<sup>61</sup> Harper recorded one historic "dendroglyph" (carved bark of an aspen tree) northeast of Agassiz Lodge, which was inscribed "DANIAL GALAR - Julio 29 1928." It was recorded as an "Isolated Find" and determined ineligible for the NRHP.

In 1997 and 1998, additional survey work was assigned to Northland Research. The first of these surveys included a cellular tower location within the maintenance area, where no cultural resources were recorded. The remaining surveys filled gaps between areas covered by prior surveys, totaling approximately 120 acres and including approximately 15 acres of previously surveyed coverage. In addition, another 95 acres were surveyed within the lower end of the SUP area to complete the survey of the entire SUP area, except for approximately 70 acres of steep, high-altitude areas within the permit area where cultural resources are unlikely to occur. The plan to exclude those 70 acres was accepted by CNF, and the final clearance report for the entire SUP area was completed in 1999.<sup>62</sup> Through all of these surveys, no significant or eligible cultural resources were recorded within the Snowbowl SUP area.

## **SURVEY OF PROPOSED RECLAIMED WATER PIPELINE ROUTE**

An intensive cultural resource survey was conducted within the proposed reclaimed water pipeline route between the City of Flagstaff and the Snowbowl that included all land that had not been previously included in prior surveys. The proposed route traverses both public and private lands, including the CNF, Arizona State Trust land, City of Flagstaff land, and land owned by Lowell Observatory (refer to Figure 2-4). Much of the route lies within the existing rights-of-way of Snowbowl Road and the Transwestern Pipeline Company, Flagstaff Lateral Pipeline. The total length of the proposed pipeline route is 78,012 linear feet. A total of 65,920 feet had been previously surveyed, leaving just 12,092 feet the subject of the new survey. A 50-foot width was surveyed for the proposed reclaimed water pipeline right-of-way.

With the exception of the route through Lowell Observatory, a short segment through Arizona State Trust land located in the adjacent Section 18, Township 21 North, Range 7 East, and a

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<sup>58</sup> Farnsworth, 1993

<sup>59</sup> Harper, 1995a

<sup>60</sup> Clements, 1981

<sup>61</sup> Harper, 1995b

<sup>62</sup> Dosh, 1999

paved section along West Birch Avenue in Flagstaff, all of the proposed pipeline route had been included in three prior cultural resources inventory surveys.<sup>63</sup> Previously unsurveyed portions of the route, totaling 2.3 miles of the right-of-way, were surveyed for this analysis resulting in a complete survey of the entire proposed pipeline route. The results of the survey are discussed under “Environmental Consequences.”

## **ENVIRONMENTAL CONSEQUENCES**

### **DIRECT AND INDIRECT EFFECTS**

In some cases, indicators were combined throughout the Direct and Indirect Effects section in order to avoid redundancy.

#### **Snowmaking**

##### *Issue:*

*The installation and operation of snowmaking infrastructure as described in the Proposed Action, and the use of reclaimed wastewater as a water source, will impact cultural and spiritual values associated with San Francisco Peaks.*

##### Indicator:

Qualitative Discussion of the Cultural Values of the San Francisco Peaks and the Potential for Incremental Change As a Result of Implementation of the Proposed Action

#### **Alternative 1 – No Action**

Under the No Action Alternative no new construction or modification, including snowmaking infrastructure, would occur within the SUP area. The impacts of selecting Alternative 1 on the sacred values of the Peaks are discussed under the next issue heading. Current conditions that allow for the gathering of plants and other forest products, as well as visitation to shrines and other areas, would continue. The spiritual values of the Peaks that are delineated in the cultural background section would continue as they are today. The presence of the ski area on the Peaks would continue in its existing configuration.

#### **Alternative 2 – The Proposed Action**

The Hopi believe that the Peaks generate their own weather conditions, forming cumulus clouds that provide the life-giving rain to sustain crops, animals, and human life. The rain also recharges groundwater supplies that result in a number of springs across the Peaks<sup>64</sup> and beyond,

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<sup>63</sup> Dongoske, 2003; Purcell, 1992; Stein and Pilles, 1981

<sup>64</sup> Pilles, 2003, section 9:1

to the Hopi Mesas. The Hopi believe that the addition of snowmaking would adversely impact the natural process of precipitation.

The 1975 Hopi Tribal Resolution<sup>65</sup> noted that there are numerous medicinal herbs and other plants at several levels of the Peaks that are used to treat the ailments of the Hopi people. The Forest Service is unaware of any plants or other natural resource material used by the Hopi within the Snowbowl SUP area; however, the addition of new trails, increased parking, and the potential for additional annual visitation within the SUP area and the San Francisco Peaks themselves causes concern among the Hopi and other tribes that their areas of traditional use would be impacted. Specifically, the Hopi make pilgrimages to shrines and use the Peaks for religious reasons such as gathering evergreens and herbs and delivering prayer feathers.

Although the reclaimed water proposed for use in snowmaking fully meets both the EPA and ADEQ water quality standards, it is believed that trace levels of unregulated residual constituents within reclaimed water (e.g., pathogens, pharmaceuticals, hormones, etc.) could negatively impact the spiritual and medicinal purity of resident flora on the Peaks. Several specific concerns have been raised about the impact of snowmaking on the spiritual values of the Peaks.

The Hopi have expressed concern that plants that are used in ceremonies would be affected spiritually in two ways: 1) the increased water would impact the natural growth of plants, and 2) runoff from the Peaks to areas where they collect plants would not be pure, natural rainwater - thus affecting their spiritual content. The Hopis' traditional/medicinal uses of plants and water would therefore be directly affected. An additional concern is that some of the reclaimed water once passed through hospitals or mortuaries could carry the spirits of the dead with it. Those spirits, as part of the water draining from the Peaks, would then infiltrate plants, thus affecting their ritual purity.

From both a Hopi and Navajo perspective, any plants that would come into contact with reclaimed water would be contaminated for medicinal purposes, as well as for use in ceremonies needed to perpetuate their cultural values. The Navajo believe that the plants, rocks, life, and spirit of the Peaks need to be respected, and that the application of reclaimed water – which is believed to be unclean – on the land would desecrate the spirituality of the Peaks. Both groups strongly believe that wastewater cannot be purified in any way, and that the use of reclaimed water would adversely affect the spiritual beings and forces that reside on the Peaks. These concerns are focused on spiritual and cultural issues, not the actual biological purity of the water itself (i.e., to the tribes, it is irrelevant that reclaimed water meets EPA and ADEQ standards).

The Hopi believe that the *Katsinam* are responsible for moisture and that the installation of snowmaking technology within the SUP area would alter the natural processes of the San Francisco Peaks and the responsibilities of the *Katsinam*. As stated at an August 21, 2002 meeting with the Hopi, “if Snowbowl makes their own snow, the *Katsinam* will say: ‘they can make their own moisture, they don’t need us’ and they will leave. Snowmaking would desecrate

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<sup>65</sup> The 1975 Hopi Tribal Resolution is explained in more detail below.

our beliefs. Let the *Katsinam* make the moisture.” In addition, spruce and Douglas-fir both have important ceremonial associations with moisture and the Peaks. Douglas-fir, is perceived to be a house of the *Katsinam* and a strong attractor of rain. The increased artificial snowpack that would result from snow-making would cause plants to be kept moist at times when the Peaks would normally be dry. This additional “false” moisture would interfere with the natural cycle of these trees, and their role in producing rain

Finally, the Hopi and Navajo need to have access to sacred areas. With an increased snowpack due to snowmaking within the SUP area, a concern was expressed that access to shrines and sacred places would be more difficult. Currently, the Snowbowl provides summer access to Tribal members allowing them to ride the Agassiz Chairlift to the ridgeline making it easier for them to access the high elevation areas, beyond the Snowbowl SUP area, for religious purposes. Other than using the Agassiz Chairlift, it is not known if Tribal members access the Peaks by way of the SUP area or along the Humphreys Trail into the Wilderness. If access for religious purposes does occur through the SUP area, it is likely during the late spring or summer months when snowpack is not an issue. If access were desired over-the-snow, the snowpack on the lower reaches of the ski area if augmented with snowmaking would have a negligible persistence as compared with a natural snowpack.

Thus, the additional ground disturbance and use of reclaimed water that would result from Alternative 2 would further contaminate the spiritual purity of the entire Peaks beyond the historic and existing levels. The Hopi, Navajo, and other tribes have existed in the region of the San Francisco Peaks for thousands of years and have developed their cultures and religious institutions around the natural and cultural landscape of the San Francisco Peaks. Traditions, responsibilities, and beliefs that delineate who they are as a people, and as a culture, are based on conducting ritual ceremonies they are obligated to perform as keepers of the land. These obligatory activities focus on the Peaks, which are a physical and spiritual microcosm of their cultures, beliefs, and values. Snowmaking and expansion of facilities, especially the use of reclaimed water, would contaminate the natural resources needed to perform the required ceremonies that have been, and continue to be, the basis for the cultural identity for many of these tribes.

Under the Proposed Action the Forest Service would work with the Tribes to ensure continued and adequate access to special areas and accessibility for the collection of plants and other materials needed for ceremonies and medicinal purposes. Monitoring of areas important to the Tribes would be conducted to protect them from other impacts such as public visitation or construction. Efforts would be made to provide the Tribes the opportunity to conduct their religious activities in an uninterrupted manner.

### **Alternative 3**

Under Alternative 3 no snowmaking would occur within the SUP area. Without snowmaking, Alternative 3 addresses the concerns expressed by the Tribes about the integrity of the

natural/sacred landscape and plants as a result of the addition of reclaimed water and machine-produced snow.

### **Scarring of the Sacred Mountain**

#### *Issue:*

*Proposed ground disturbances and vegetation removal may result in permanently evident, visible alterations (i.e., “scarring”) of the San Francisco Peak’s landscape.*

#### Indicators:

Narrative Description of Existing and Historic Vegetation and Ground Disturbance Within the SUP Area

Quantification of Existing and Additional Proposed Temporarily and Permanently Evident Vegetation Disturbances/Removals

Quantification of Existing and Additional Proposed Temporary and Permanently Evident Ground Disturbances

Qualitative Discussion of the Cultural Significance of Proposed Ground and Vegetative Disturbances and Removal Within the SUP Area

### **Alternative 1 – No Action**

Since approximately 1938, development of the Snowbowl has evolved with chairlifts, lodges, paved roads, parking lots, and ski and hiking trails. Since that time, approximately 100 acres of overstory vegetation have been cleared throughout the Snowbowl’s SUP area, along with additional ground disturbance, for terrain and related infrastructure.

While numerous changes to lands within the boundary of the Snowbowl SUP area have occurred, comments made to Forest Service personnel over the years indicate that the Peaks in fact retain an integrity of condition related to the traditional religious, cultural, natural, and social values that make the Peaks significant to the Tribal people of the region.<sup>66</sup> However, from an ethnographic landscape perspective (as defined by the National Park Service – see Existing Conditions) historic ground and vegetation disturbance within the SUP area may have visually impacted the entirety of the Peaks, even if the disturbance did not occur in specific areas of ethnographic usage. Therefore, selection of Alternative 1 may represent a continued impact on the Peaks’ spiritual character and the ability of rituals to perform their intended function.

It should be noted that the tribes have always objected to the Snowbowl’s presence, due to their belief that any disturbance of the Peaks is sacrilegious. Therefore, the continued use of the Peaks for a developed ski area continues to have negative impacts on its sacred values and related

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<sup>66</sup> Pilles, 2003

cultural values. Comments made at a Hopi public meeting indicate a belief that recent years of drought have been caused by the “misuse” of the Peaks by the Snowbowl’s existence and continued operations; however, there is also an enduring belief that the Peaks still retain their spiritual values.

In 1975, through a Tribal Resolution, the Hopi Tribal Council objected to the development of the Snowbowl. Their objection<sup>67</sup> was based on a basic precept of Hopi religious and cultural values that the land is sacred, and the San Francisco Peaks are a most sacred part of the land. Their sacred nature is evidenced by the existence of shrines within and around the Peaks, Hopi ceremonies are regulated by astronomical relationships with the Peaks, traditional religious practitioners gather medicinal herbs and other plants at several levels on the Peaks, and, most importantly, the Peaks are the home of the *Katsinam*. In 1984, The Hopi Tribal Council passed another resolution<sup>68</sup>, which noted concerns about the development of trails by the CNF on parts of the San Francisco Peaks within the federally designated Wilderness area; their objection was based on the same issues as in the 1974 resolution - that the Peaks are sacred. Both Hopi and Navajo oral testimonies emphasize the importance of the Peaks to their cultural integrity and religion. Disruption of the natural presence of the Peaks disturbs the spiritual beings and forces that exist there. As the natural qualities of the Peaks are modified and disturbed, so will the quality of life in general be adversely affected.<sup>69</sup>

While the No Action Alternative would not change the current configuration of the Snowbowl and would cause no additional ground or vegetation disturbance to the area, the Hopi and other tribes remain in opposition to the Snowbowl’s continued presence on the sacred San Francisco Peaks landscape because of the negative impact on the religious beliefs and related cultural values of their people.

### Alternative 2 – The Proposed Action

Ground disturbance associated with the Proposed Action is provided in Table 3A-1.

**Table 3A-1  
Proposed Action Ground and Vegetation Disturbance**

Type of Disturbance	Amount of Disturbance (acres)
Overstory Vegetation Removal	76.3
Permanent Ground Disturbance	10.4
Temporary Ground Disturbance	235.7 <sup>a</sup>

<sup>a</sup> Approximately 64 acres of temporary ground disturbance are associated with construction of the water pipeline between Flagstaff and the Snowbowl.

Alternative 2 includes snowmaking infrastructure, construction of a 10 million gallon water impoundment, a reclaimed water pipeline extending from the City of Flagstaff to the ski area, a snowplay facility, additions to the lift and trail networks, additional parking lots and other

<sup>67</sup> Hopi Tribal Resolution H-31-75.

<sup>68</sup> Hopi Tribal Resolution H-125-84.

<sup>69</sup> Carothers and House, 1985

infrastructural additions. The permanent nature of these projects would be significant to the cultural landscape of the Peaks.

The reader is specifically referred to the Aesthetic Resources section (Section D), within this chapter, for a detailed description and quantification of the anticipated temporarily and permanently evident ground disturbances and vegetation removal associated with the Proposed Action.

The Peaks are perceived by some traditional religious practitioners as a sacred, living entity that would be physically harmed by any ground disturbances or vegetation removal. Not only would the Peaks be scarred, but also there would be additional noise and activity, that would impact the Peaks' ability to rest and recuperate for the forthcoming year's religious ceremonies. An example of the Hopi perspective on additional development within the SUP area can be gained from the December, 2002 public meeting, in which Mr. Raleigh Pooyouma noted that these are the only sacred peaks the Hopis have. He noted that every month they go there for prayers. In January and July they go to collect greens and herbs for the Bean Dance and Home Dance (*Powamuy* and *Niman* ceremonies). He stated, "Development is like cutting the heart and blood vessels of a living being."

The sacred qualities are manifested by the undisturbed appearance of the Peaks as a landmark upon the horizon as viewed from the traditional or ancestral lands of the Hopi, Zuni, Acoma, Navajo, Apache, Yavapai, Walapai, Havasupai, and Paiute<sup>70</sup>.

From a landscape perspective, additional ground and vegetation disturbance within the SUP area associated with the Proposed Action could further impact the visual quality, as well as spiritual integrity, of the Peaks beyond the existing conditions (Alternative 1). This could impact the effectiveness of rituals conducted by traditional religious practitioners.

Although no traditional religious practitioners have indicated that plants of traditional importance are collected within the Snowbowl SUP area, the removal of 76 acres of vegetation would affect the integrity of the Peaks and therefore impact its sacred values. Ground disturbance within the SUP area, especially the 10 acres of permanent ground disturbance, would impact the sacred values of the Peaks and their spiritual nature.

The Hopi are farmers, for whom agriculture is a cornerstone of their culture that is integrally related to the *Katsinam* and the San Francisco Peaks. The *Katsinam* are believed to depart the San Francisco Peaks after the conclusion of the winter solstice to reside with the Hopi until they return to the Peaks after the summer solstice. During their time at Hopi the *Katsinam* are involved in ritual dances in which they chant and pray for the needs of the people, especially for rain, fertility, good crops, and abundance for all. The *Katsinam* and associated ceremonies are an integral part of Hopi agricultural concerns and needs. The disturbance of their home could

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<sup>70</sup> Pilles, 2003, section 8:1

have a direct impact on the *Katsinam*, and, as a result, successful harvests for the Hopi and their importance for perpetuation of Hopi culture.

There is no way to quantify the amount and types of plants that are gathered by the Hopi and others for their ceremonies and medicinal use. This information is private and only available to Hopi religious practitioners. It is known, however, that pilgrimages do occur at specific times of the year for the purpose of visiting shrines and gathering certain plant materials such as Douglas-fir and evergreen plants. At this time, as far as the Forest Service knows, plants are gathered outside the Snowbowl SUP area. The tribes have not identified any plants or other materials that are gathered or used from within the SUP area.

Should the Proposed Action be selected, the Forest Service would work with those tribes actively using the area to identify any culturally significant plants within the Snowbowl SUP area that may potentially be disturbed by facilities construction and use. If present, these plants could be relocated to new areas on the Peaks. The Forest Service could also require the reintroduction of any plants that would be impacted. The Forest Service would continue to work with the Tribes to promote and protect plants used for religious and tradition purposes outside of the permit area. Such a “habitat exchange” is one way to mitigate physical impacts to the Peaks. In addition, feathering the forest canopy to minimize the visual impact of any new trails would help mitigate tribal concerns. Neither of these methods would completely mitigate the spiritual impact to the Peaks, but could help alleviate direct impacts to vegetation.

### Survey of Proposed Reclaimed Water Pipeline Route

All sections of the proposed reclaimed waterline route corridor, except those portions through Lowell Observatory, the State land in Section 18, and West Birch Avenue were previously surveyed and no archaeological resources were found during those surveys. For planning purposes, a survey of the remaining locations of the proposed water pipeline corridor was conducted in 2003 to ascertain whether or not there are any archaeological resources present and to provide information for the Snowbowl EIS and the development of alternatives. There are no archaeological resources present within the water pipeline route outside the Peaks TCP that cannot be avoided or mitigated. Further, the proposed waterline right-of-way would not affect any significant contributing elements within the *Lowell Observatory National Historic Landmark* or *Flagstaff Townsite Historic Residential District*.<sup>71</sup>

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<sup>71</sup> A Memorandum of Agreement (MOA) has been prepared that stipulates survey, consultation, and mitigating actions for the entire Snowbowl project, including the waterline and any modifications to the project as presently described. The MOA is contained in Appendix D of this FEIS.

### Alternative 3

**Table 3A-2**  
**Alternative 3 Ground and Vegetation Disturbance**

Type of Disturbance	Amount of Disturbance
Overstory Vegetation Removal	64.4 acres
Permanent Ground Disturbance	1.7 acres
Temporary Ground Disturbance	130.3 acres

Alternative 3 also reduces ground and associated vegetation disturbance with elimination of the snowplay facility and parking lot. As compared to the Proposed Action, Alternative 3 reduces ground disturbance by approximately 114 acres<sup>72</sup> and vegetation removal by approximately 12 acres.

While Alternative 3 includes a reduced amount of ground and vegetation disturbance than the Proposed Action, the overall impact to the sacred nature of the Peaks is estimated to remain the same. The issue of disturbance to the Peaks is essentially not one of how much land is disturbed, but that any land is disturbed at all. From the perspective of the Tribes, any additional disturbance to the landscape is adverse and would harm the spiritual nature of the Peaks, the effectiveness of the Tribes' prayers to the Peaks and the spiritual beings that reside there, and the relationship between those beings and human-kind. As with the Proposed Action, from an ethnographic landscape perspective, ground and vegetation disturbances within the SUP area could further impact the visual quality of the Peaks. In addition to the Snowbowl's existing facilities and trails, Alternative 3 may further impact the spiritual character of the Peaks and the ability for rituals to be effective.

The Navajo consider the Peaks to be a living entity, the home of "the Mountain People," that is, the wildlife, the plant people, people of the rocks, people of the underbrush, people of the water, and people of the sky, as well as being the source of rain.<sup>73</sup> To alter the landscape then would harm this living being. The amount of harm is not an issue; any harm to the Peaks will affect all the living things that reside there.

The major issue with Alternative 3 concerns the effects related to vegetation removal and their visual impacts. While the tribes have not identified any plants or other materials of traditional importance that are gathered from the Snowbowl SUP area, because they relate to the Peaks as a whole, as an ethnographic landscape, they are still concerned about plant and ground disturbance within the SUP area. Should Alternative 3 be selected, the Forest Service would work with the Tribes to help mitigate their concerns by minimizing the visual impact of approved projects through feathering and prompt revegetation. While these actions would not completely mitigate the spiritual impacts to the Peaks, they could help alleviate direct impacts to vegetation.

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<sup>72</sup> Approximately 64 acres of this reduction in ground disturbance are associated with off-site construction of the reclaimed water pipeline between the Snowbowl and Flagstaff.

<sup>73</sup> Pilles, 2003, section 8:1

## **National Register Nomination**

*Some people feel the effects of the Proposed Action cannot be adequately described until the significant qualities of the San Francisco Peaks are identified as part of the National Register nomination process.*

Indicators:

Narrative Discussion Why the Proposed Action is Not Dependent Upon Completion of the National Register Nomination/Designation Processes

Narrative Discussion of the Ability for the Proposed Projects to Coexist With a National Register Designation If Nomination Is Approved

### **Alternative 1 – No Action**

The San Francisco Peaks is a TCP as defined in National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties*. The Peaks have also been determined eligible for inclusion in the National Register of Historic Places as part of the White Vulcan Mine Settlement Agreement and Mine Closure in August 2000. As a result of its determination of eligibility, the Forest Service is required to consult with Tribes and interested parties regarding the effect of the Proposed Action upon the Peaks, regardless of whether the Proposed Action occurs.<sup>74</sup> The Forest Service is in the process of completing a National Register nomination for the Peaks as a TCP. The area to be designated as a TCP would be inclusive of the Arizona Snowbowl SUP and would encompass 74,380.5 acres of NFS lands.

### **Alternative 2 – The Proposed Action**

The Proposed Action would have no impact on the National Register status of the San Francisco Peaks as a TCP. Completion of a National Register nomination is underway by the Forest Service and will occur regardless of whether the Proposed Action is approved. The Arizona State Historic Preservation Office, San Carlos Apache, Yavapai-Apache, Hualapai, and Yavapai-Prescott Tribes have reviewed drafts of the nomination. The Hopi are in the process of reviewing and commenting on the draft nomination. The Snowbowl SUP area accounts for one percent of the area being nominated to the National Register,<sup>75</sup> and it is assumed that the cultural values of the Peaks would be retained, even if the religious values were adversely effected as a result of the Proposed Action.

### **Alternative 3**

The impacts of selection of Alternative 3 on the National Register eligibility of the San Francisco Peaks as a TCP are assumed to be identical to those of the Proposed Action - the cultural values that pertain to the Peaks would be retained, even if the religious values were adversely affected.

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<sup>74</sup> 36 CFR Part 800, Protection of Historic Properties.

<sup>75</sup> Calculation based on the 74,381-acre area included in the TCP nomination and the existing 777-acre SUP area.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Spatial Bounds**

In considering the cumulative actions that have affected cultural resources in the past, and could potentially effect them in the future, the entirety of the San Francisco Peaks within the TCP boundary were evaluated. As a result, past, present, and reasonably foreseeable future actions both within and beyond the Snowbowl SUP Area were considered in this cumulative effects analysis.

#### **Temporal Bounds**

The Peaks have maintained a cultural and religious role in the lives of indigenous peoples in the Four Corners area for centuries – well before the establishment of the Snowbowl in 1938. Therefore, for the purposes of this cumulative effects analysis, it is assumed that effects to cultural resources on the Peaks began well before 1938, with impacts such as logging, mining, and fires, dating back to the latter half of the 19<sup>th</sup> Century.

### **Past, Present and Reasonably Foreseeable Future Actions**

A review of past, present, and reasonably foreseeable future actions is important when considering effects to the religious and cultural values of the Peaks. Past actions include a number of activities which have occurred on, and in the vicinity of, the San Francisco Peaks, both within and beyond the Snowbowl SUP area. Appendix C includes the full list of past, present and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

#### **Within SUP Area**

1. Development of ski area infrastructure over the past six decades, including: aerial and surface lifts, approximately 139 acres of developed trails, two guest lodges, paved and dirt roads, and parking facilities
2. Year-round visitation and activities including skiing, the summer Sky Ride program, weddings, and occasional concerts.
3. Snowbowl Wireless Communications Site (approved but yet to be constructed)

#### **Outside of SUP Area**

1. Development of the Inner Basin Well Field
2. Ongoing improvements and maintenance to the Inner Basin Water Pipeline
3. Adjacent private land development
4. Kachina Peaks Wilderness designation
5. Snowbowl Road parking restrictions
6. San Francisco Mountain Mineral Withdrawal

7. White Vulcan Mine Settlement and Reclamation
8. Peaks Segment of the Arizona Trail
9. Miscellaneous/ongoing recreational uses
10. Bebbs Willow Restoration Project
11. Peaks Nomination to National Register
12. Fort Valley Restoration Project

Considered individually, none of these projects has been regarded as posing, adverse effects on the spiritual or cultural values of the Peaks. However, when considered cumulatively, these individual projects may have already affected these values to an unknown degree.

### **Alternative 1 – No Action**

From an ethnographic landscape perspective, over time, the previously-noted historic ground and vegetation disturbances have individually and cumulatively effected, or “scarred,” the Peaks. Visual impacts on shrines and trails used for traditional religious and cultural purposes may affect the integrity and effectiveness of tribal ceremonies and prayers directed to the Peaks. As indicated, when considered individually, none of these projects has been determined to have caused, adverse indirect effects to the Peaks. However, when considered cumulatively, they may have affected the Peaks’ spiritual character and its centrality to traditional religious and cultural perspectives.

While the tribes have indicated concern and dissatisfaction with the existing conditions of the Peaks due to historic projects and activities, they have not indicated that past actions and the continued existence of permitted activities within the Snowbowl SUP area would have any additional effects on their abilities to continue conducting their religious ceremonies. Some statements, including one made on December 9, 2002 by Bucky Preston at the Kykotsmovi public meeting, indicate concern with the existing conditions: *“that the drought may be a result of the developments and activities that have occurred on the Peaks. This is the way the spirits tell the people that something is wrong; by not providing much needed moisture.”* In 1981, former Hopi Tribal Chairman Abbott Sekaquaptewa stated,

*“...Hopis believe that continued or expanded commercial use of the home of the Katsinam (the Peaks) for a ski area or any other similar commercial or recreational purpose, would constitute a direct affront to the Katsinam and to the Creator, thereby resulting in severe adverse consequences to the Hopis and all mankind...”*

While these statements indicate concern over the effects of commercial use of the Peaks upon Hopi culture and quality of life for humanity, under the No Action Alternative, on-going religious practices would continue.

Past, present, and reasonably foreseeable projects that could have a negative effect on the spiritual integrity of the Peaks due to scarring and increased human/infrastructural presence include: construction of the Inner Basin Well and Pipeline; increased recreational use of the

mountain; the construction and operation of the White Vulcan Mine; past and present mining operations on patented mining claims; construction of various utility corridors; adjacent private land development; and special uses such as weddings and family reunions in the area.

However; positive effects have been identified as well. Closing of the Snowbowl Road to winter parking and thereby dispersed Snowplay activities has had a positive effect on the San Francisco Peaks and traditional uses as Native Americans have safer and improved access to areas along the road and are now able to conduct traditional practices in a more uninterrupted/private manner. Forest restoration projects have also had a positive effect on the Peaks. Aspen exclosures, wildlife closure areas, road closures, Hart Hill restoration, the Kachina Peaks Wilderness designation, Fort Valley Ecosystem restoration, White Vulcan Mine Settlement and Restoration, and trails that concentrate previously dispersed use have all had positive effects on the Peaks because they are helping to restore the area to a more natural state through ecosystem restoration and limiting dispersed, public use. Determining the Peaks eligible for the National Register of Historic Places has provided the Peaks additional protection in that any undertaking on the Peaks now requires specific tribal consultation.

### **Alternative 2 – The Proposed Action**

In a cumulative context, all alternatives would result in adverse, long-term effects to the cultural and spiritual values of the Peaks. While the Proposed Action would ultimately have a greater cumulative effect, due to the introduction of snowmaking and reclaimed water, under either action alternative the development of additional facilities would further affect the current physical and spiritual condition of the Peaks when assessed with other past, present and reasonable foreseeable future projects.

According to Daniel Peaches, member of the *Dine*' Medicine Man's Association,

*“Once the tranquility and serenity of the Mountain is disturbed, the harmony that allows for life to exist is disrupted. The weather will misbehave, the ground will shift and tremble, the land will no longer be hospitable to life. The natural pattern of life will become erratic and the behaviors of animals and people will become unpredictable. Violence will become the norm and agitation will rule so peace and peacefulness will no longer be possible. The plants will not produce berries and droughts will be so severe as to threaten all existence.”<sup>76</sup>*

Native American inhabitants of the area believe not that they own the land, but that they are only custodians responsible for passing the resource on to the next generation – unimpaired. Both Hopi and Navajo traditions emphasize the importance of the Peaks to the cultural integrity of their people. All tribes consulted indicate that disruption of the natural presence of the Peaks is a disturbance to the guiding spiritual forces that reside there, and as the natural quality of the Peaks

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<sup>76</sup> Peaches, 1998

succumbs to the manipulations of humans, it is believed that the cultures of the tribes also will perish, and that all life will be adversely affected.<sup>77</sup>

Many tribal members believe the ground and vegetation disturbance that would occur as a result of implementing the Proposed Action, in addition to past ground-disturbing activities, could lead to the following cumulative impacts to the San Francisco Peaks:

- Further destroys the reciprocal relationship between humans and spiritual forces needed to maintain the traditional cultures of the tribes.
- Further impact the visual quality of the San Francisco Peaks.
- Additional scarring of the Peaks further disturbs the spiritual forces and beings who reside in the Peaks and, as a result of this disturbance, impairs the effectiveness of ceremonies needed to maintain the harmony of life and existence of all living things.
- With better facilities, the ski area would receive increased annual visitation. As a result, there may be more opportunity for conflicts with traditional use of the mountain and an overall disturbance of the Peaks' tranquility and serenity.

Therefore, beyond the previously-identified direct/indirect impacts of machine-produced snow and reclaimed water use on the spiritual integrity of the Peaks, from a Tribal perspective, additional vegetation and soil disturbance related to construction of additional developed trails, roads, parking lots, buildings and snowmaking infrastructure would further affect the cultural landscape of the San Francisco Peaks, potentially causing additional physical harm through scarring. In addition, implementation of Alternative 2 would increase total annual visitation to the Peaks, thereby disturbing its tranquility and serenity. As noted, from an ethnographic landscape perspective, additional ground and vegetation disturbance, use of reclaimed water and the increased moisture that would result from machine-produced snow within the SUP area combined with other past, present, and reasonably foreseeable future projects could further cumulatively impact the visual quality and spiritual integrity of the entirety of the Peaks.

The positive effects would be the same as they are for the No Action Alternative. Additionally, more opportunity for monitoring special places may result. The development of a Cultural Center within the SUP area could offer tribes the opportunity to educate the general public about the sacred nature of the Peaks. Increased public awareness, when considered cumulatively with other previously-identified positive impacts may then help minimize future impacts on the religious and cultural values of the Peaks.

### **Alternative 3**

Ground and vegetation disturbance that would occur as a result of implementation of Alternative 3 are essentially the same as under the Proposed Action, minus that associated with the snowmaking system and snowplay area.

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<sup>77</sup> Pilles, 2003

As with the Proposed Action, when considered with other past, present and reasonably foreseeable future actions, implementation of Alternative 3 would result in adverse, long-term cumulative effects to the cultural and spiritual values of the Peaks, as described in the previous pages.

The positive cumulative impacts would be the same as they are for the No Action Alternative and Alternative 2.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

There are three potential impacts that would have long-term and lasting effects on the Peaks from a cultural perspective: 1) the addition of snowmaking technology (adding moisture to the Peaks at times when it is otherwise dry); 2) the use of reclaimed water rather than relying on natural precipitation to create snow; and 3) the removal of vegetation and ground disturbance for the construction of trails and other infrastructure. Under all alternatives, the spiritual and cultural values of the Peaks as they relate to the tribes would continue to be impacted and are perceived by many tribal members as irretrievable for as long as the current and proposed facilities exist within the Snowbowl SUP area.

### **Alternative 1 – No Action**

While the historic and present impacts to the cultural and spiritual qualities of the Peaks are believed to be irretrievable in nature, with time, the SUP area could technically be reclaimed by removing the buildings, equipment, and other infrastructure at the Arizona Snowbowl and rehabilitating the area to return it to a near-natural appearance. Therefore, historic and present cultural and spiritual impacts are not considered irreversible under the No Action Alternative

### **Alternative 2 – The Proposed Action**

With implementation of the Proposed Action, it is assumed that there would be much greater disruption to the spiritual and cultural values of the tribes than currently exists and the impacts would be longer lasting.

It is difficult to assess whether the impacts are irretrievable or irreversible in the case of snowmaking, as tribal members believe it is the spiritual beings and forces who create precipitation. Many Hopi believe that with the addition of snowmaking technology on the Peaks, there is the possibility that the *katsinam* would leave or stop making snow because they would no longer be needed (i.e., “if people can make their own moisture, they do not need the *katsinam...*”). Many Hopi believe that even if snowmaking is suspended or removed for a period of time, it is impossible to determine for certain whether or not the *katsinam* would return or renew the production of moisture. While there is no means to assess how religious values would be permanently impacted with the use of snowmaking technology, based on the belief systems of many of the tribes, at least a portion of these impacts must be considered as a potentially irreversible impact to these tribes’ religious and cultural foundations. In addition, the use of reclaimed water is believed by the tribes to be impure and would have an irretrievable

impact on the use of the soil, plants, and animals for medicinal and ceremonial purposes throughout the entire Peaks, as the whole mountain is regarded as a single, living entity.

Additional vegetation and ground disturbance due to the construction of new parking lots, trails, lifts and infrastructure under the Proposed Action would impact the Peaks, as indicated in the analysis of direct and indirect effects. When viewed from the tribal perspective the impacts of vegetation removal to the spiritual and cultural qualities of the Peaks can be regarded as irretrievable in nature, since they effect values based upon faith and cultural beliefs. However; a literal interpretation of the terminology implies that historic and proposed ground/vegetation disturbance could be considered *reversible* because ecological, visual, and aesthetic functions of the landscape of the Peaks (within and outside of the SUP area) could be restored in the long term if facilities were removed and disturbed areas allowed to recover. Regardless, the Forest Service acknowledges the tribal perspective of the effects of “scarring” on the sacred landscape and that the associated spiritual and cultural impacts may in fact be considered *irreversible* in nature.

### **Alternative 3**

Ground and vegetation disturbance on the Peaks would be reduced in Alternative 3 as compared to those of the Proposed Action. Overstory vegetation removal is reduced by 11.9 acres, permanent ground disturbance is reduced by 8.7 acres, and temporary ground disturbance is reduced by 105.4 acres.

Under Alternative 3, from some tribal perspectives, additional ground and vegetation disturbance may represent an irretrievable impact to the spiritual integrity of the Peaks and to the use of soils, plants, and animals for medicinal and ceremonial purposes. However, with time the SUP area could, theoretically, be reclaimed and infrastructure dismantled. Therefore, these impacts are not considered irreversible.

## 3B. NOISE

### SCOPE OF THE ANALYSIS

This noise analysis was conducted within, and adjacent to, Snowbowl's SUP area. This analysis was conducted in four phases:

1. **Ambient<sup>78</sup> noise level monitoring:** Sound level measurements were performed to help determine the existing ambient noise levels for this area.
2. **Noise Level Prediction:** Based on sound level data, and locations for the various equipment proposed to be used, noise levels were calculated and predicted for closest/worst-case receiving locations.
3. **Determined/Developed Acceptable Noise Level Limits:** Applicable studies, codes, and standards were researched in order to determine the acceptability of the potential noise levels from the proposed operations.
4. **Conclusions:** Noise level predictions were compared with existing ambient noise levels and acceptable noise level limits.

### EXISTING CONDITIONS

#### AMBIENT NOISE LEVELS

Based on professional judgment, ambient noise level measurements in the vicinity of the Snowbowl were collected at three locations: 1) the northwest section of the Snowbowl's base area – near the bottom terminal of the Hart Prairie Chairlift; 2) just off of Snowbowl Road, approximately ¼ mile southwest of the base area; and 3) in the Hart Prairie/The Nature Conservancy area, along Forest Road 151 (and east of the road at the Kachina Peaks Wilderness boundary). Measurements were taken at the Snowbowl in order to obtain a baseline ambient noise level at the “source” location. The other measurement sites were selected to determine the ambient noise level at the “receiving” locations of concern (i.e., the nearest Wilderness and residential areas). Measurements were performed on Sunday night the 24<sup>th</sup> of August, 2003. Sunday night was selected because it was assumed that it would give the most conservative (i.e., the quietest) ambient levels. Weather during the measurement period was calm and clear with no wind.

The ambient noise levels are highly dependant on the amount of wind on a given night. Based on the noise level measurements, the ambient noise level at each of the three sampling locations

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<sup>78</sup> *Ambient* - (As used in this report) Typical background noise associated with a given environment excluding the specific noise under investigation and the transient noise from isolated identifiable sources.

could be 30 (dBA)<sup>79</sup>, or lower, on a calm, clear night. However, with 10 mile per hour winds, the ambient could exceed 43 dBA.

The existing noise sources in the area include snowmobiles, passenger vehicles, and wind. The existing noise impacts from these sources to the receiving locations could range from 43-85 dBA. This is based on the following typical sound levels:

**Table 3B-1  
Typical Sound Levels from Various Sources**

	<b>50 Feet</b>	<b>250 Feet</b>	<b>1,000 Feet</b>
Snowmaking Tower Gun	85 dBA	71 dBA	59 dBA
Snowmobile (1)	85 dBA	71 dBA	59 dBA
Passenger vehicle (1)	67-71dBA	53-57dBA	41-45dBA
Wind	43+ dBA	43+ dBA	43+ dBA

Source: Acoustical Consulting Services, 2003.

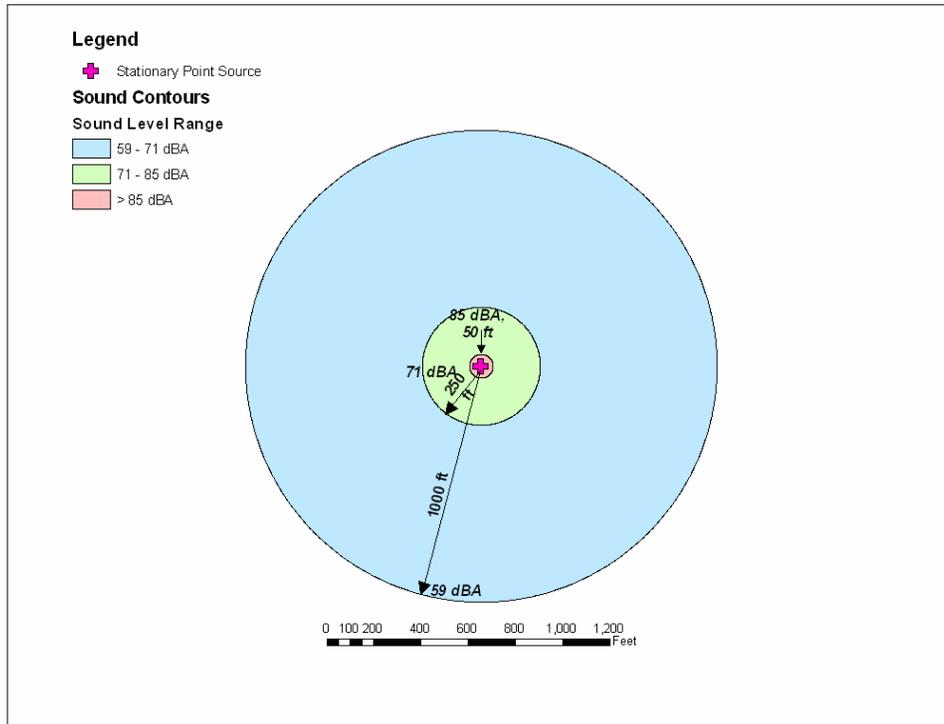
A contour plot portraying the behavior of sound level versus distance for the stronger sources outlined in Table 3B-1 (the snowmaking tower gun and the snowmobile) is shown in Figure 3B-1.

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<sup>79</sup> *dBA* - Sound pressure level expressed in decibels, filtered or weighted at the various frequencies to approximate the response of the human ear.

*Decibel* - A unit for measuring the intensity of sound. The human hearing range is from 0 dB (the theoretical threshold of audibility) to 130 dB (the average pain threshold). The sound pressure level in decibels is equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 microPascals.

**Figure 3B-1  
Sound Level versus Distance**



**EXTERIOR NOISE STANDARDS**

There are no Coconino County or State of Arizona noise codes. Because the Snowbowl is outside of the city limits of Flagstaff, the ski area is not subject to Flagstaff’s noise nuisance codes.

Typical municipal ordinances set not-to-exceed limits and consider instantaneous noise levels below 50 to 55 dBA at night and 60 to 65 dBA during the day to be acceptable. Some suburban and rural municipalities have set nighttime limits as low as 45 dBA.<sup>80</sup>

The only applicable national noise code is established in the US Housing and Urban Development Department (HUD) regulations. The potential noise from Snowbowl is not subject to HUD but is still in compliance. HUD sets forth the following exterior noise standards:

<sup>80</sup> Cowan, J.P., 1994

**Table 3B-2  
HUD Regulations for Exterior Noise**

<b>Rating</b>	<b>Threshold</b>
<b>Acceptable</b>	65 L <sub>dn</sub> <sup>a</sup> or less
<b>Normally Unacceptable</b>	Exceeding 65 L <sub>dn</sub> but not exceeding 75 L <sub>dn</sub>
<b>Unacceptable</b>	Exceeding 75 L <sub>dn</sub>

<sup>a</sup> L<sub>dn</sub> - Day Night average sound level (DNL) is the 24-hour average sound level, in decibels, obtained after the addition of 10 decibels to the sound levels occurring between 10:00 p.m. and 7:00 a.m.

<sup>b</sup> To achieve an acceptable status, appropriate sound attenuation measures must be provided

## INTERIOR NOISE STANDARDS

HUD's regulations do not contain standards for interior noise levels. Rather a goal of 45 dBA is set forth and the attenuation requirements are designed to achieve that goal. It is assumed that with standard construction, any building will provide sufficient attenuation so that if the exterior level is 65 L<sub>dn</sub> or less, the interior level will be 45 L<sub>dn</sub> or less. According to the Environmental Protection Agency (EPA), the approximate national average Sound Level Reduction for homes is 25 dB.

## TYPICAL AUDIBILITY OF COMMON NOISE SOURCES

The following table provides a reference for audibility and the typical sound pressure levels associated with common noise sources:

**Table 3B-3  
Noise Levels (dBA) for Common Noise Sources**

<b>Common Noise Source</b>	<b>Sound Pressure Level (dBA)</b>	<b>Subjective Evaluation</b>
Human breathing at three feet	8-10	Just Audible
Quiet rural area or a bedroom at nighttime	25-30	Very Quiet
Wind in trees at 10 mi/hr or soft stereo music in a residence	40-45	Quiet
Birds at 10 feet or normal conversation at three feet	55-60	Moderate
Electric shaver at 1.5 feet	+/- 68	
Vacuum cleaner at 10 feet or a large dog barking at 50	70-75	Loud
Alarm clock ringing at five feet	+/- 80	
Lawn mower at five feet, food blender or garbage disposal at three feet	85-90	Very Loud
Train pulling hard at 100 feet	+/- 94	
Train siren at 50, motorcycle at 25 feet, car horn at 10 or a chain saw at two feet	100-110	Extremely Loud
Thunder nearby	+/- 115	
Hard rock band at 16 feet or a jet aircraft at 300 feet during takeoff	120-130	Painful
Jet aircraft at 75 feet or a long range gun at 0 feet	140	Deafening

## ENVIRONMENTAL CONSEQUENCES

### DIRECT AND INDIRECT EFFECTS

*The proposed snowmaking system would increase noise levels potentially disturbing residents, recreationists, and/or wildlife.*

Indicators:

Modeled Analysis of Snowmaking-Related Noise Emissions Above Ambient Background Levels (Dba)

Modeled Analysis of Noise Dispersion to Define Audible Areas

#### **Alternative 1 – No Action**

The No Action Alternative would not result in any additional noise levels within, or in the vicinity of, the Snowbowl's SUP area. The existing noise sources in the area include snowmobiles, passenger vehicles, and wind. The existing noise impact from these sources to the northwest of the Snowbowl base area, south of the Snowbowl near Snowbowl Road; and in the Hart Prairie/The Nature Conservancy currently ranges from 43-85 dBA. Noise levels would not be expected to increase above existing levels.

#### **Alternative 2 – The Proposed Action**

With the Proposed Action, existing noise sources would remain, and would be compounded by the following potential noise sources:

- temporary construction vehicles and equipment
- snowmaking fan and tower guns
- water transmission pump stations
- snowmaking control building noise emissions

#### Temporary Construction Noise

Construction of the proposed projects, including: installing the reclaimed water pipeline between Flagstaff and the Snowbowl base area, snowmaking infrastructure, lift terminals and towers, buildings, and terrain modifications could include temporary noise sources such as heavy equipment (72-93 dBA at 50 feet), rock drills (81-98 dBA at 50 feet), and helicopters (65 dBA at 1,300 feet).

#### Fan Guns & Tower Guns (Snowmaking Equipment)

With implementation of the Proposed Action, there could be as many as 25 fan guns and 25 tower guns in operation at any one time. The proposed snowmaking system would likely be operating at 100 percent during the early season (late November through December), or as soon as ambient temperatures drop to suitable levels for making snow. Because of Snowbowl's irregular climate (as compared to other ski areas with snowmaking technology), all or part of the snowmaking system could be brought on-line at any time throughout the season to compensate for a lack of natural precipitation. During the pre- and early season, snowmaking would likely

occur at night, when temperatures drop. However; as daytime temperatures decrease throughout the season, the length of time over a 24-hour period in which snow could be made would increase.

Each tower gun produces an average noise level of 73 dBA at 200 feet and each fan gun produces an average noise level of 62 dBA at 200 feet.

### *Booster Stations*

There is no specific noise data available for the booster station equipment. However, each of the pump stations would be enclosed in a concrete vault which would decrease exterior audibility of the pump substantially. According to the pump manufacturer the noise emissions from booster stations should not be audible beyond 100 feet.

### *Snowmaking Control Building*

The proposed snowmaking control building would house additional pumps and air compressors. All equipment would be electrically powered and contained within the building. Due to the low noise emissions of the equipment and their containment within the building, the control building equipment is not expected to be audible beyond 100 feet from the building.

### *Potentially Disturbed Areas*

With the addition of potential noise emission sources, the following areas were investigated for potential to be affected: Hart Prairie residences, Fort Valley, and surrounding northern goshawk/Mexican spotted owl habitat.

#### *Hart Prairie/The Nature Conservancy*

The Hart Prairie area is located approximately 1.5 miles west (downhill) of the Snowbowl base area. Based on very conservative noise propagation modeling, this area could be affected by nighttime snowmaking noise levels as high as 38 dBA under certain atmospheric conditions.<sup>81</sup> At these distances, atmospheric conditions such as temperature and humidity can influence sound propagation. The projected 38 dBA is based on worst-case noise levels for various combinations of temperature and humidity.

During the construction period, Hart Prairie/The Nature Conservancy area could be temporarily impacted by rock drills (37-54 dBA) and backhoes (28-49 dBA) and helicopters (65 dBA at 1,300 feet).

Although this potential temporary and permanent noise levels could exceed the existing minimum ambient noise level of  $\leq 30$  dBA (see Existing Conditions) in the Hart Prairie/The Nature Conservancy area, it would be well below the on-going noise sources in the area, such as snowmobiles, passenger vehicles, and wind. As previously described, existing ambient noise levels currently range from 43-85 dBA.

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<sup>81</sup> Outdoor sound propagation models accounted for variables including distance, air absorption, ground attenuation, and vegetation. The projected noise impact assumes all 50 snowmaking guns would be operating simultaneously.

Although the potential noise impacts to the Hart Prairie/The Nature Conservancy area may be audible outdoors, the levels should not exceed typical noise standards. The projected maximum potential *outdoor* noise impact of 38 dBA detectable in Hart Prairie/The Nature Conservancy area from snowmaking would be in compliance with the HUD standards provided in the Existing Conditions section.

Based on the HUD and EPA assumptions provided in the Existing Conditions section, the potential maximum *interior* noise level should not exceed 13-18 dBA at the Hart Prairie/The Nature Conservancy area. The projected *indoor* maximum potential noise impact of 18 dBA would also be in compliance with HUD and all known interior noise standards.

As compared to the common noise sources presented in Table 3B-3, the subjective audibility of the operation of the snowmaking system would be “very quiet” to “quiet” with the temporary audibility of construction activities being subjectively characterized as “quiet” to “moderate.”

### *Fort Valley Area*

The Fort Valley residential area is located approximately four miles to the south of the Snowbowl SUP area. Given this distance and the attenuation of noise emissions, it is easily determined that operation of the proposed snowmaking system will not be audible within the Fort Valley area. The area may be temporarily affected by audible noise during the construction of the water transmission line from Flagstaff to the Snowbowl.

### *Northern Goshawk/Mexican Spotted Owl Habitat*

An assessment of the effects of noise to both northern goshawk and Mexican spotted owl and their habitat areas was conducted as a portion of this analysis. Details of this analysis and a determination of effects are presented in the Wildlife Section of this document.

### **Alternative 3**

The potential noise sources described within the Proposed Action are all dependant on the addition of snowmaking. With the elimination of snowmaking from the Proposed Action, (with the possible exception of temporary construction activities for the installation of lifts and building construction) noise levels would not increase above existing levels, as described for Alternative 1.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

Proposed snowmaking infrastructure would increase the amount of noise generated throughout the Snowbowl winter operating season both during the day and at night for an indefinite amount of time (i.e., for as long as Snowbowl is in operation). Snowmaking operations would typically take place at night when ambient temperatures are lower than during the day. However, snowmaking would occur whenever ambient temperatures permit, especially during the pre- and early season.

## Spatial Bounds

The affected environment relevant to a discussion of cumulative affects on “natural quiet” includes the area where noise generated by both construction activities (short-term) and normal operations (long-term) is heard by people. Similar to the aesthetics analysis, the ridge system that encloses the Snowbowl facilities also encloses sounds generated by ongoing activities at the ski area. Louder noises generated by ongoing Snowbowl activities, such as outdoor concerts, can be heard as far away as Humphreys saddle at the upper end of the Humphreys Trail. Such noises diminish rapidly as topographic screening intervenes between the noise source and the listening receptor; though specific climatic conditions can cause such noises to travel well beyond the prominent topographic screening features. As noted in the discussion of direct/indirect effects, noise projected to the west of the Snowbowl SUP area, which is not bounded by topographic features, rapidly diminishes and approaches ambient noise levels by the time it reaches FR 151. Based on modeling conducted for this analysis, sound levels from normal snow gun operations (assuming 25 tower guns and 25 fan guns) are in operation simultaneously) should be well below ambient natural sound by the time it reaches U.S. Highway 180, just over three miles from the sound source. Noise from construction would be louder than general operational noise and would carry farther, but would be short-term and intermittent and would only be heard during specific construction activities. Likewise noise from pipeline construction would be generated from outside the Snowbowl operational area but would only occur during construction of the project.

## **Past, Present, and Reasonably Foreseeable Future Actions**

Past, present, and reasonably foreseeable projects that could cumulatively affect natural quiet include:

1. Bebb's Willow Restoration project in Hart Prairie
2. Residential and summer home development in Hart Prairie
3. Assorted and ongoing utility line clearing and maintenance
4. Snowbowl cellular tower (approved but not yet built)
5. Hart Hill restoration
6. Transwestern lateral pipeline construction
7. Arizona Trail – Peaks segment

Appendix C includes the full list of past, present, and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

With the exception of minor residential and summer home development and use in lower Hart Prairie, noise generated from all of these sources is anticipated to be intermittent and/or short-term (related to construction activities) in nature. None of the past, present, or reasonably foreseeable activities identified above are anticipated to cumulatively combine with activities included under any of the alternatives analyzed within this document to result in measurably cumulative noise levels.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

With the exception of temporary, construction related disturbance to wildlife (which would be considered irretrievable), no other irreversible or irretrievable commitments of resources have been identified in this noise analysis.

## 3C. TRAFFIC AND SKI AREA ACCESS

### SCOPE OF THE ANALYSIS

The scope of this traffic analysis is limited to U.S. Highway 180 (between the Snowbowl and Flagstaff) and the Snowbowl Road.<sup>82</sup>

### EXISTING CONDITIONS

#### SKI AREA ACCESS

Snowbowl Road is a seven-mile long Forest System road that is maintained by the Forest Service and the ski area. While the entire length of the 28 foot-wide Snowbowl Road is paved, curves and steep grades make for a necessarily slow approach to, and exit from, the ski area.<sup>83</sup> The present Snowbowl Road was designed in the mid-1980s following a snowy winter with high ski area attendance. While the Road was not constructed to a documented design capacity, it has been reviewed and is considered adequate to accommodate existing and peak day attendance at the ski area.<sup>84</sup>

Once guests reach the main base area, they have two options for parking. The Hart Prairie base area offers five parking lots. Approximately ¼-mile further up the road, four more lots are located adjacent to the Agassiz base area. Just past the Hart Prairie parking lots, vehicles often encounter skiers walking across the road to and from the Hart Prairie Lodge from the base of the Sunset Chairlift. The nature of multiple parking lots offered between two base areas, combined with a mix of pedestrian and vehicular traffic, provides for a less-than-ideal situation in terms of safety and general circulation.

#### PARKING

Guest parking is provided in nine lots (totaling approximately 10.3 acres) which collectively accommodate approximately 1,200 cars (116.5 cars/acre, allowing for snow storage). The parking areas are allocated with approximately 436 spaces in the upper lots adjacent to the Agassiz base area and 764 spaces in the lower lots proximate to the Hart Prairie base area. Applying an average occupancy rate of 2.5 passengers per vehicle, Snowbowl's parking areas currently have a capacity of approximately 3,000 guests. This parking capacity is more than adequate to accommodate Snowbowl's existing CCC of 1,880 guests but becomes the constraint to total visitation on peak days.

On peak days, attendance far exceeds the ski area's CCC. An analysis of the ten highest attendance days for each year between the 1992/93 and 2002/03 seasons indicates that the Snowbowl averaged 3,434 guests on peak days. Thus, peak days have historically averaged over

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<sup>82</sup> In conjunction with this analysis of traffic and ski area access, the Forest Service completed a Roads Analysis (RAP) to assist in making decisions concerning the lands contained within the Arizona Snowbowl permit area. The Roads Analysis is contained in the project file.

<sup>83</sup> The posted speed limit is 30 mph for dry conditions.

<sup>84</sup> Standing, Paul, 2003

180 percent of Snowbowl's current CCC,<sup>85</sup> which tax the ski area's available parking capacity. Buses transporting guests from the Phoenix area park at the overflow lots, as well. In assessing Snowbowl's current infrastructure, parking is currently the constraint limiting overall attendance.

## **TRAFFIC**

The Snowbowl is accessed via Snowbowl Road (Forest Service Road #516), seven miles north of Flagstaff off of U.S. Highway 180. Traffic on U.S. Highway 180 related to Snowbowl's seasonal operations primarily occurs between Flagstaff and the Snowbowl Road, as there are essentially no population centers north of the Snowbowl Road that significantly contribute to attendance at the ski area.

The Data Section of the Arizona Department of Transportation's (ADOT) Transportation Planning Division is responsible for road and highway use data throughout the State. With some exceptions, Arizona's State Highway System consists of all roadways identified by wayside route number signing with an Interstate, U.S., or State shield. Traffic counting locations are marked along these roads by a small blue or white "TCS" (Traffic Counting Station) sign. Portable electronic vehicle counting and classifying equipment at these TCS stations is used to collect raw traffic volumes.

While ADOT has made many changes to Highway 180 over the past decade to improve safety and visibility, traffic typically spikes during the morning and evening rush (i.e., ingress and egress) between Snowbowl and Flagstaff. This is especially true on busy weekends and good snow days, and results in traffic being backed up on portions of Highway 180. This particularly affects residents from Coconino Estates, Cheshire, and Fort Valley.

### **Average Annual Daily Traffic**

Raw data is processed and converted to average annual daily traffic (AADT) volumes. AADT is defined as the total volume of traffic on a road segment for one year, divided by 365 days. Both directions of traffic volumes are reported. AADT can be adjusted to compensate for monthly and daily fluctuations in traffic; the basic intent being to provide traffic volumes which best approximate the use of a given highway section for a typical day of the year.

Seasonal adjustment factors are developed from a network of automatic traffic recorders (ATRs). Currently, ADOT's Data Section operates 69 ATR stations statewide, which monitor vehicular traffic twenty-four hours per day each day of the year. These ATR stations are polled daily via telemetry and computer software to report the previous day's traffic activity. Traffic data polled from ATRs are stored and processed in both monthly and annual cycles, which are subsequently applied to raw counts taken on all highway segments that are assigned to a particular set of ATR stations.

While historic traffic volume data for U.S. Highway 180 between Flagstaff and the Snowbowl is somewhat limited, it has been collected at two locations: 1) between Schultz Pass Road and Snowbowl Road (approximately 3.5 miles south), and 2) between Snowbowl Road and Curley

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<sup>85</sup> As indicated in Chapter 1, ski areas typically design facilities to accommodate up to 125 percent of CCC.

Seep Spring (approximately 13.5 miles north). AADT data for these two locations is presented for 1998 through 2002 in Table 3C-1.

**Table 3C-1  
AADT for U.S. Highway 180 in the Vicinity of Snowbowl  
1998 - 2002**

<b>Location</b>	<b>AADT 1998</b>	<b>AADT 1999</b>	<b>AADT 2000</b>	<b>AADT 2001</b>	<b>AADT 2002</b>
Schultz Pass Road to Snowbowl Road (TCS MP <sup>a</sup> #222.80)	3,396	3,721	3,858	3,944	2,237
Snowbowl Road to Curley Seep Spring (TCS MP #223.00)	2,934	3,644	3,778	3,863	2,100

<sup>a</sup> Traffic Count Section Milepost Number  
Source: Arizona Department of Transportation, 2004

Skier visitation at Snowbowl between 1998/99 and 2002/03 is provided in Table 3C-2.

**Table 3C-2  
Snowbowl Skier Visits  
1998/99 – 2002/03**

<b>Season</b>	<b>Visits</b>
1998/99	35,205
1999/00	66,152
2000/01	162,175
2001/02	2,857
2002/03	88,000

Table 3C-2 provides a typical range of annual visitation at the Snowbowl which, incidentally, is directly related to annual snowfall (i.e., higher annual snowfall equates to higher annual visitation – refer to the Recreation Section of this chapter for more information). While a direct correlation between annual visitation at the Snowbowl and AADT for U.S. Highway 180 is difficult to make based on this limited data, it is logical to assume that fluctuating annual attendance at the Snowbowl has little direct impact on AADT for U.S. Highway 180. Correspondence with ADOT engineers confirmed that Snowbowl’s wintertime operations, irrelevant of high or low attendance levels, have little impact on AADT for U.S. Highway 180.<sup>86</sup>

**Average Daily Traffic**

Average Daily Traffic (ADT) counts are typically useful in analyzing seasonal traffic patterns. ADT counts for U.S. Highway 180 at its intersection(s) with Peak View, Aspen, and Navajo are periodically collected by the City of Flagstaff, and are provided in Table 3C-3. In Snowbowl’s case (due to the limited amount of data collected), this data is only marginally useful because the 2002 season was one of the worst on Snowbowl’s records (48 inches of snow and just 2,850 total visits). Therefore, due to less snow and intuitively better driving conditions, ADT during

<sup>86</sup> Gillick, July 2003; Flaherty, June 2003

February of 2002 (the only winter month collected) is assumed to reflect much lower than average Snowbowl traffic and likely higher than average Grand Canyon traffic.

**Table 3C-3  
ADT on U.S. Highway 180**

<b>Intersection with Peak View Road</b>		
<b>ADT</b>	<b>Month</b>	<b>Year</b>
5,497	June	2001
3,283	February	2002
4,295	July	2002
4,464	October	2002
4,952	October	2003
4,580	August	2003
<b>(Humphrey's Street) Intersection With Aspen Street</b>		
<b>ADT</b>	<b>Month</b>	<b>Year</b>
8,700	June	2001
10,728	July	2002
<b>Intersection with Navajo</b>		
<b>ADT</b>	<b>Month</b>	<b>Year</b>
18,765	August	2001
14,155	November	2002
15,967	July	2002
14,570	March	2002
15,197	March	2003
16,454	April	2003
12,998	August	2003
13,765	October	2003

Source: City of Flagstaff, 2004.

In addition to U.S. Highway 180, ADT counts have been collected for Snowbowl Road. This data is provided in Table 3C-4.

**Table 3C-4  
ADT for Snowbowl Road**

<b>ADT</b>	<b>Month</b>	<b>Year</b>
158	August	2000
572	June	2001
231	February	2002
146	August	2002
710	October	2002
703	October	2003
117	August	2003

Source: City of Flagstaff, 2004.

Data provided by the Flagstaff Metropolitan Planning Organization indicates that ADT for U.S. Highway 180 typically peaks during the summer months, and tapers off considerably during the

wintertime.<sup>87</sup> This is due to use of U.S. Highway 180 by summertime travelers as the primary access route to the Grand Canyon.

By applying the average occupancy rate of 2.5 Snowbowl guests per vehicle discussed above, a generalization as to the Snowbowl's contribution to wintertime traffic volumes on U.S. Highway 180 can be made. Based on an exceptional season, such as 2000/01, in which annual visitation approached 163,000, approximately 65,000 vehicles on U.S. Highway 180 could be attributed to the Snowbowl's operations. On the opposite end of the spectrum, during a poor year such as the 1998/99 season, in which annual visitation only reached 35,000 guests, approximately 14,000 vehicles on U.S. Highway 180 and Snowbowl Road could be attributed to the Snowbowl's operations. A conservative estimate, in which these raw vehicular counts are converted to ADT between the months of December and March (four months) would equate to approximately 540 vehicles per day on the high end and approximately 115 vehicles per day on the low end. However, on peak days, which have historically occurred on a handful of days (approximately 10) each year as attributable to good snow conditions, holidays, and long weekends, attendance at the Snowbowl has been shown to average 3,400 guests; the Snowbowl's contribution to ADT on U.S. Highway 180 could approach 1,360 vehicles per day.

## **SNOWPLAY TRAFFIC**

While in the past, snow on the San Francisco Peaks brought large crowds to NFS lands to snowplay (defined as sledding, tubing, saucering, or building snowmen), this activity is not permitted within the Snowbowl SUP area. Prior to the 2002/03 winter season, the general public was attracted to the areas along the Snowbowl Road for dispersed snowplay activities. These activities created ongoing public safety issues including: snow sliding on non-directional equipment (sleds, saucers and trash bags) in wooded or steep areas, pedestrian/vehicular encounters, sanitation, and refuse concerns, and difficulties for emergency vehicles passing through congested areas. During periods of abundant snow as many as 300 vehicles per day may have been parked along the Snowbowl Road belonging to visitors engaged in dispersed snowplay activities. Beginning with the 2002/03 winter season, the Forest Service has prohibited parking along the Snowbowl Road and initiated an active enforcement program. Although signs have been posted at the bottom of the Snowbowl Road informing visitors that snowplay is not allowed, scores of cars continue to drive up the road in search of snowplay opportunities. The majority of these visitors reach the Snowbowl base area only to be turned back by the ski area parking staff. On a peak day with good snow conditions, the Snowbowl parking staff may turn away as many as 500 cars full of visitors seeking an opportunity to play in the snow.<sup>88</sup> Unable to consistently discern skiing guests from snowplay visitors, the Snowbowl staff frequently is required to ask visitors found snowplaying in and adjacent to the parking areas and on the ski trails to leave. This creates an unfortunate and contentious situation for all involved.

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<sup>87</sup> City of Flagstaff, 2000-2002

<sup>88</sup> Personal Communication with Snowbowl Management, 2003

## ENVIRONMENTAL CONSEQUENCES

### DIRECT AND INDIRECT EFFECTS

*The Proposed Action could affect traffic volumes and/or congestion on U.S. Highway 180 and/or the Snowbowl Road.*

#### Indicators:

Historic and Projected Traffic Counts for U.S. Highway 180

Comparison of Anticipated Winter Traffic Volumes With Existing Winter Traffic Volumes and the Design Capacities Of U.S. Highway 180 and the Snowbowl Road

Relative Comparison of Existing And Anticipated Winter Traffic With Current Summer Traffic Volumes

### **Alternative 1 – No Action**

#### Traffic

Generally speaking, future annual visitation levels under the No Action Alternative would be expected to resemble historic visitation, with possible slight increases attributable to regional population growth (refer to the Socio-Economic section for more details). Selection of the No Action Alternative, therefore, would not be expected to have any major impact on current or future traffic volumes for either U.S. Highway 180 or Snowbowl Road. Seasonal traffic attributable to Snowbowl's operations under the No Action Alternative would continue to be dictated primarily by weather conditions (i.e., better natural snow conditions would be expected to increase visitation and associated Snowbowl-related traffic). Conversely, poor natural snow conditions (and therefore better driving conditions) on U.S. Highway 180 would likely lead to increased vehicular traffic between Flagstaff and the Grand Canyon.

As indicated in the Recreation and Socio-Economics sections of this chapter, if the No Action Alternative were implemented, during the first eleven seasons the average annual wintertime attendance at the Snowbowl would be expected to hover around the historic average (as based on the past 22 seasons), which is approximately 105,000 visits. Applying 2.5 guests per vehicle, this equates to approximately 350 vehicles per day on U.S. Highway 180 between December and March (120 days) of each year that could be attributable to the Snowbowl's wintertime operations. Peak days, which have historically averaged approximately 3,400 guests, would be expected to occur on a handful of days each year under the No Action Alternative and could contribute as many as 1,360 vehicles per day on U.S. Highway 180.

As indicated, ADT on U.S. Highway 180 during the summer months is presumed to be much higher than during the winter. Under the No Action Alternative, Snowbowl's summertime operations would be expected to draw an insignificant amount of traffic, as no changes are proposed to the Sky Ride program. The summer Sky Ride program would be expected to continue to draw approximately 30,000 visitors each year between Memorial Day and Labor Day under the No Action Alternative, which would equate to approximately 95 vehicles per day on U.S. Highway 180 (at 3.5 persons/vehicle). Table 3C-5 provides recent as well as projected

AADT for US Highway 180 in the vicinity of Snowbowl Road. The No Action Alternative is not anticipated to affect projections for 2020.

**Table 3C-5  
AADT for U.S. Highway 180**

<b>Location</b>	<b>AADT 1998</b>	<b>AADT 1999</b>	<b>AADT 2000</b>	<b>AADT 2020</b>
Schultz Pass Road (MP 218.55) to Snowbowl Road (MP 222.94)	3,396	3,721	4,150	5,935
Snowbowl Road to Curley Seep Spring (238.58)	2,934	3,644	4,065	5,825

Source: Arizona Department of Transportation, June 2003.; Flaherty, June 2003.

No modifications or upgrades to the Snowbowl Road would be necessary under Alternative 1.

As described within the Recreation analysis (Section F), a demonstrated demand exists for dispersed snowplay activities and would continue to go unmet under the No Action Alternative. The areas along the Snowbowl Road would remain closed to parking, and therefore snowplay activities. Despite efforts to inform the public of the parking and snowplay prohibitions, it is anticipated that numerous visitors (up to 500 vehicles per day, in some instances) would continue to drive up the Snowbowl Road only to be turned away by the parking staff.

*Parking*

Under the No Action Alternative, parking capacity (approximately 3,000 guests) would continue to constrain daily visitation at the Snowbowl. Peak days would likely continue to contribute guest parking demand in excess of 180 percent of CCC of 1,880.

**Alternative 2 – The Proposed Action**

*Traffic*

While average peak day attendance levels are not anticipated to increase under the Proposed Action, the frequency of these peak days is anticipated to increase throughout Snowbowl’s winter operating season – which would be expected to contribute commensurate increases in seasonal traffic on U.S. Highway 180. Therefore, wintertime ADT associated with more consistent attendance at the Snowbowl would be projected to increase under the Proposed Action, as attributable to a more consistent snow pack (due to the installation of snowmaking), increased lift capacity, increased terrain, small increases in parking, and the snowplay facility.

As indicated in the Recreation and Socio-Economics sections, if the Proposed Action were implemented, during the first eleven seasons following implementation, annual wintertime attendance at the Snowbowl would be expected to average approximately 185,000 visits. Applying 2.5 guests per vehicle, this equates to approximately 500 vehicles per day on U.S.

Highway 180 between November 15 and April 15 (150 days) of each year<sup>89</sup> that could be attributable to the Snowbowl's operations. Peak days, which have historically averaged approximately 3,400 guests, would be expected to occur on a more frequent basis under the Proposed Action (due to more reliable and consistent snow conditions) and could contribute as many as 1,360 vehicles per day on U.S. Highway 180 and Snowbowl Road.

The snowtubing facility has been designed with a capacity of 600 tubers-at-one-time. However, it is assumed that the snowtubing facility would only approach full capacity on weekends and during holiday periods. The snowtubing facility's contribution to additional wintertime attendance at Snowbowl has been projected to fluctuate from 34,000 to 42,000 annual users.<sup>90</sup> While an average of 2.5 persons/vehicle is used to calculate parking and traffic for skiers, an examination of snowtubing guests at other ski area facilities indicates that the ratio for snowtubers per vehicle is higher - at three persons/vehicle. Based on a 100 day operating season for the snowtubing facility, this equates to an ADT of approximately 113 to 143 vehicles on U.S. Highway 180 and Snowbowl Road. Peak day snowplay usage could approach as many as 1,680 guests<sup>91</sup> which would result in approximately 560 additional peak day vehicles.

As detailed within the Existing Conditions section, although signs have been posted at the bottom of the Snowbowl Road informing visitors that snowplay is not allowed, Snowbowl parking staff may turn away as many as 500 cars full of visitors seeking opportunities to play on a snowy day. In light of the current and on-going volume of snowplay traffic on the Snowbowl that is turned away at Snowbowl's base area, and assuming that many of these vehicles would patronize the Snowbowl's snowplay facility, it can be reasoned that the proposed snowplay facility would contribute only a minor incremental increase in traffic on U.S. Highway 180 or Snowbowl Road.

Given a combination of peak day skier and snowplay facility attendance, peak day traffic on both the Snowbowl Road and U.S. Highway 180 may total approximately 1,920 vehicles. This total would represent an incremental increase above the base line condition of approximately 560 vehicles per day on a peak day. These totals would remain well below the summer and winter ADT for U.S. Highway 180. While design capacities for U.S. Highway 180 could not be obtained for this analysis, the Snowbowl Road was designed and constructed following a wet winter with high ski area visitation. The Snowbowl Road's ability to accommodate increased, more consistent, peak day traffic associated with the Proposed Action is not in question.<sup>92</sup> While overall peak day traffic is not anticipated to increase significantly under the Proposed Action, the frequency of busy days would increase across the course of the winter season.

As indicated, ADT on U.S. Highway 180 during the summer months is much higher than during the winter. Therefore, with implementation of the Proposed Action, Snowbowl's summertime operations would be expected to draw an insignificant amount of traffic on U.S. Highway 180, as

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<sup>89</sup> The season length under the Proposed Action is assumed to be extended by approximately one month over Alternatives 1 and 3 due to the installation of snowmaking infrastructure.

<sup>90</sup> Snowtubing would only operate on weekends from Thanksgiving until December 22. At that point, the operation would begin daily operations. It is expected that the facility would operate until the third Sunday in March.

<sup>91</sup> Assuming four, two-hour sessions per day at a 70 percent use rate.

<sup>92</sup> Standing, Paul, October 2003

only minor modifications are proposed to the Sky Ride program (i.e., the opportunity for guests to hike down from the top of the Agassiz Chairlift). The summer Sky Ride program would be expected to continue to draw approximately 30,000 visitors each year between Memorial Day and Labor Day under the Proposed Action, which would equate to an average of approximately 95 vehicles per day on U.S. Highway 180 (at 3.5 persons/vehicle).

### Parking

Under the Proposed Action, skier parking would increase by approximately 0.3 acre, providing for an additional 35 vehicles. This would bring total spaces at the Snowbowl to approximately 1,235, accommodating roughly 3,087 skiers. In addition, construction of the 3.3-acre snowplay parking lot would provide roughly 400 spaces *for snowplay use only*. While the snowplay facility has been designed with a capacity of 600 guests-at-one-time, the arrival and departure of guests in advance of and following a snowplay session will involve a considerable overlapping of parking needs. Additionally, by its nature, snowplay activities attract a high percentage of non-participating attendants such as parents/grandparents accompanying children.

However, even with modest increases in *skier* parking called for in the Proposed Action, skier parking would continue to constrain overall skier attendance at Snowbowl.

Under the Proposed Action, no upgrades or modifications to the Snowbowl Road would be necessary, other than routine maintenance.

## **Alternative 3**

### Traffic

Under Alternative 3, wintertime attendance at the Snowbowl, and therefore associated traffic, is anticipated to increase slightly above the No Action Alternative, but far below that of the Proposed Action. Alternative 3 does not include snowmaking or installation of the snowtubing facility which are the two key components of the Proposed Action that would be expected to generate additional wintertime visitation and traffic. Therefore, projected traffic attributable to Snowbowl's operations under Alternative 3 would be significantly constrained by unreliable natural snowfall. However, small increases in projected traffic volumes in Alternative 3 (beyond the No Action Alternative) may be realized as a result of regional population growth, potential construction of the Humphreys Pod (additional lift capacity and terrain), small additions to parking, as well as trail grading projects. The trail grading projects included in Alternative 3 are designed to allow Snowbowl to open trails under reduced natural snow conditions, and thereby would be expected to contribute to incremental increases in annual visitation (assuming adequate natural snowfall) as compared to the No Action Alternative. Essentially the same year-to-year fluctuations in visitation, and therefore traffic, as presented in the No Action Alternative remain applicable to Alternative 3.

As with the No Action Alternative, seasonal traffic volumes attributable to Snowbowl's operations under Alternative 3 would be primarily dictated by weather conditions (i.e., better natural snow conditions would be expected to induce visitation and associated Snowbowl-related traffic). Conversely, poor natural snow conditions, and therefore better driving conditions, on U.S. Highway 180 would likely equate to increased travel between Flagstaff and the Grand Canyon.

As indicated in the Recreation and Socio-Economics sections, if Alternative 3 were implemented, during the first eleven seasons following implementation the annual wintertime attendance at the Snowbowl would be expected to average approximately 110,000 visits. Applying 2.5 guests per vehicle, this equates to approximately 365 vehicles per day on U.S. Highway 180 and Snowbowl Road between December and March (120 days) of each year. Similar to the No Action Alternative, peak days, which have historically averaged approximately 3,400 guests, would be expected to occur on a handful of days each year under Alternative 3 and could contribute as many as 1,360 vehicles on U.S. Highway 180 and Snowbowl Road.

As indicated, ADT on U.S. Highway 180 during the summer months is much higher than during the winter. Under Alternative 3, Snowbowl's summertime operations would be expected to draw an insignificant amount of traffic on U.S. Highway 180, as only minor changes are proposed to the Sky Ride program (i.e., the opportunity to hike down from the top of the Agassiz Chairlift). The summer Ski Ride program would be expected to continue to draw approximately 30,000 visitors each year between Memorial Day and Labor Day under Alternative 3, which would equate to approximately 95 vehicles per day on U.S. Highway 180 (at 3.5 persons/vehicle).

As described within the Recreation analysis (Section F), a demonstrated demand exists for dispersed snowplay activities and would continue to go unmet under Alternative 3. Under Alternative 3, the Snowbowl Road would remain closed to parking, and therefore to snowplay activities. Despite efforts to inform the public of the parking and snowplay prohibitions, it is anticipated that numerous visitors would continue to drive up the Snowbowl Road only to be turned away by the parking staff.

Under Alternative 3, skier parking would increase by approximately 0.3 acre, providing for an additional 35 vehicles. This would bring total spaces at the Snowbowl to approximately 1,235, accommodating roughly 3,087 skiers. Even with the modest increases in skier parking called for in Alternative 3, skier parking would continue to constrain overall skier attendance at Snowbowl.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

The temporal bounds of this cumulative effects analysis extend from the late 1930s, when Snowbowl was first established and began to draw vehicular traffic, into the foreseeable future in which the ski area can be expected to continue to draw summer and winter visitation.

#### **Spatial Bounds**

The spatial bounds of this cumulative effects analysis are limited to U.S. Highway 180, between the Snowbowl and Flagstaff, and along the Snowbowl Road.

## **Past, Present, and Reasonably Foreseeable Future Actions**

Past, present, and reasonably foreseeable activities that could cumulatively affect traffic flows on U.S. Highway 180 and/or Snowbowl Road include:

1. Miscellaneous Facilities and trail construction within Snowbowl's SUP area
2. Snowbowl Road Parking Restrictions
3. Private land development
4. Miscellaneous/ongoing recreational uses
5. Snowbowl Road paving
6. Miscellaneous improvements projects along U.S. Highway 180<sup>93</sup>
7. Grand Canyon traffic
8. Continued growth of the Phoenix metropolitan area
9. Reconstruction of approximately five miles of Highway 180 from Cheshire to Snowbowl Road in 1994 to address safety issues and increased traffic attributed to the Snowbowl.<sup>94</sup>
10. Historic traffic on Highway 180 related to dispersed snowplay and the Nordic Center

Appendix C includes the full list of past, present, and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

### **Alternative 1 - No Action**

The previously mentioned past, present, and reasonably foreseeable future activities have, and will, cumulatively affect seasonal traffic patterns along U.S. Highway 180 and the Snowbowl Road. Paving of the Snowbowl Road and parking restrictions along it have altered access and circulation. Likewise, miscellaneous improvement projects along U.S. Highway 180 over the past decade have increased visibility, safety, and speed. While selection/implementation of the No Action Alternative would not increase traffic numbers, private land development and miscellaneous/ongoing recreational uses in the vicinity of the Snowbowl that are accessible from U.S. Highway 180 can be expected to continue to increase traffic. However, as indicated in the Existing Conditions section, data indicates that ADT for U.S. Highway 180 typically peaks during the summer months, and decreases considerably during the winter – as attributable to reduced Grand Canyon traffic.

### **Alternative 2 – The Proposed Action**

Selection and full implementation of the Proposed Action would increase winter traffic on U.S. Highway 180 between Flagstaff and the Snowbowl. As noted in the direct/indirect effects analysis, average peak day skier attendance levels are not anticipated to increase under the Proposed Action. However; the frequency of these peak days is anticipated to increase throughout Snowbowl's winter operating season – attributable to a more consistent snow pack, increased lift capacity, increased skiable terrain, small increases in parking, and the snowplay facility. When considered with other past, present, and reasonably foreseeable future actions

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<sup>93</sup> Correspondence with the City of Flagstaff's Traffic Engineering division indicated that there are no current or future projects (scheduled through 2008) that may affect seasonal traffic patterns on U.S. Highway 180.

<sup>94</sup> This project was addressed in Forest Plan Amendment #10. The highway improvement projects involved tree clearing, wider shoulders, and a turn-lane to specifically accommodate Snowbowl-related traffic and safety issues.

within the study area, this could lead to increased/more frequent congestion at the intersection of Snowbowl Road and Highway 180 and could further affect residents of Coconino Estates, Cheshire, and Fort Valley during the winter months.

In terms of ADT, seasonal Grand Canyon traffic would still be expected to overshadow Snowbowl-related traffic in the winter. This also holds true for the other noted past, present, and reasonably foreseeable future projects.

### **Alternative 3**

Under Alternative 3, winter attendance at the Snowbowl, and therefore associated traffic, is anticipated to increase slightly above the No Action Alternative, but below that of the Proposed Action. When considered with other past, present, and reasonably foreseeable future actions, Alternative 3 would represent a very slight cumulative increase in traffic patterns on U.S. Highway 180 and the Snowbowl Road.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

No irreversible and/or irretrievable commitments of resources in relation to traffic have been identified in association with any of the alternatives analyzed in this document.

# 3D. AESTHETIC RESOURCES

## SCOPE OF THE ANALYSIS

The analysis area for aesthetic resources is the foreground, middle ground, and background views<sup>95</sup> of Snowbowl's SUP area.

While a general overview of the existing SUP area is provided in the Existing Conditions section, the aesthetics analysis for proposed activities has been based on the views from four representative viewpoints which were determined by the Forest Service ID Team:

- Hart Prairie (151 Road) – Summer
- U.S. Highway 180 at the Flagstaff Nordic Center – Summer
- Humphreys Trail (Wilderness Area) – Summer
- Interstate 40 East of Williams – Winter

The Environmental Consequences portion of this analysis provides a series of photographs taken from the representative viewpoints identified above. Each of the photographs depicts the existing condition and a simulation of the proposed changes.

The four selected view points represent those likely to be viewed by Forest visitors and serve as representative bench marks of aesthetic effects of the Proposed Action.

## FOREST PLAN DIRECTION

### FOREST SERVICE LANDSCAPE MANAGEMENT

The goal of landscape management on all NFS lands is to manage for the highest possible visual quality, commensurate with other appropriate public uses, costs, and benefits. Since the mid-1970s, the Forest Service has operated under the guidance of the Visual Management System (VMS) for inventorying, evaluating, and managing scenic resources on NFS lands. The VMS is defined in National Forest Landscape Management, Volume 2.<sup>96</sup> The VMS provides a system for measuring the inherent scenic quality of any forest area as well as a measurement of the degree of alteration for use in inventory and management.

### **VMS Visual Quality Objectives and Distance Zones**

This aesthetics analysis uses Visual Quality Objectives (VQOs) as defined within the VMS. VQOs are based on the physical characteristics of the land and the sensitivity of the landscape setting as viewed by humans. VQOs define how the landscape will be managed, the level of acceptable modification permitted in the area, and under what circumstances modification may be allowed.

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<sup>95</sup> Foreground, middle ground and background, as defined by the Forest Service, are detailed later in this section.

<sup>96</sup> USDA Forest Service, 1974

Viewing distance is important in determining how change is perceived across a landscape. Therefore, in addition to VQOs, the VMS uses distance zones to describe the part of a characteristic landscape that is being inventoried or evaluated. The three distance zones are described below.

*Foreground:* The limit of this zone is based upon distances at which details can be perceived. Normally in foreground views, the individual boughs of trees form texture. The foreground is limited to areas within and not to exceed ½ mile of the observer, but it must be determined on a case-by-case basis, as any distance zoning should be. Generally, detail of landforms and special landscape features (including human alteration) are more pronounced when viewed within the foreground.

*Middle ground:* Alterations in the middle ground (½ to four miles from the observer) become much less distinct. Texture normally is characterized by the masses of trees in stands or uniform tree cover. Individual tree forms are discernable in very open or sparse stands only.

*Background:* As the perspective shifts to the background, distance has a modifying and diluting effect to both landscape texture and color. This zone extends from the middle ground (minimum of four miles between the observer and the area being viewed) to infinity. In very open or sparse timber stands, textures begin to be lost. Shape, however, may remain evident beyond 10 miles, especially if it is inconsistent with other landscape forms. Beyond 10 miles, alteration in landscape character becomes obscured.

## **FOREST PLAN DIRECTION**

As per the Forest Plan, visual resource planning and inventory on the forest (pertinent to Snowbowl's operations) includes "Reviewing the VQO inventory as a part of project planning and making necessary corrections/refinements following field checking" and "Using the VQO inventory to analyze impacts to VQO classes due to management activities."<sup>97</sup>

Visual management direction specific to Management Area 15 includes managing for VQOs of *Retention* or *Partial Retention* with the exception of the Snowbowl. Visual resource management Standards and Guidelines specific to the Snowbowl SUP area are provided in the Forest Plan and direct that management activities meet the standards defined by the prescribed *Modification* and *Maximum Modification* VQOs at a minimum because of the ski area developments (such as roads, parking areas, buildings, and lifts) and cleared runs.<sup>98</sup>

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<sup>97</sup> USDA Forest Service 1987: 60

<sup>98</sup> USDA Forest Service 1987: 188-189

The *Modification* VQO is defined as:<sup>99</sup>

Management activities may visually dominate the original characteristic landscape. However, activities of vegetation and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that their visual characteristics are those of natural occurrences within the surrounding area of character type. Activities which are predominately introduction of facilities such as buildings, signs, and roads, should borrow naturally established form, line, color, and texture so completely and at such scale that its visual characteristics are compatible with the natural surroundings.

The *Maximum Modification* VQO is defined as:<sup>100</sup>

Management activities of vegetative and landform alterations may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding areas or character type. When viewed as foreground or middle ground, they may not appear to completely borrow from naturally established form, line color, or texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences as seen in foreground or middle ground.

## **SCENERY MANAGEMENT SYSTEM**

In 1995 an updated landscape management system - the Scenery Management System (SMS) – was introduced by the Forest Service. The SMS was developed to eventually replace the VMS; its principles and premises are based not only research findings but on over 20 years experience with implementing the VMS. In October 1996, the manual, Landscape Aesthetics: A Handbook for Scenery Management<sup>101</sup> was released to begin the transition to the new SMS. National direction has been given to incorporate, as applicable, the methods and philosophy of the SMS with each new planning project.<sup>102</sup> The Handbook was accompanied by direction from the Forest Service’s Washington Office to “begin using the concepts and terms contained in this Handbook as you work on new projects or initiate forest plan revisions.”

As indicated, full adoption of the SMS is to occur as each National Forest revises its land and resource management plan.<sup>103</sup> Direction for scenery management is contained within Forest Plan goals, objectives, standards, and guidelines. For Forests not currently undergoing the forest plan revision process, or for those requiring extensive time for revision, application of the SMS will occur at the sub-forest or project level.

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<sup>99</sup> USDA Forest Service, 1974

<sup>100</sup> USDA Forest Service, 1974

<sup>101</sup> USDA Forest Service, 1995

<sup>102</sup> USDA Forest Service, 1994; 1996; 1997; and 1998

<sup>103</sup> At this time Coconino Forest Plan is scheduled to begin Revision in 2006 and be completed by 2010.

The 1987 Forest Plan predates the 1995 SMS and therefore the SMS has not been formally integrated into CNF management direction. Until the CNF Forest Plan is revised, the VMS will continue to be used for inventorying, evaluating, and managing scenic resources on the Forest. Therefore, this aesthetics analysis provides the following brief description of the SMS to determine consistency both with the current visual management system and its future successor.<sup>104</sup> This dual assessment will determine both the level of VQO that will be achieved and the estimated equivalent SIL to be expected from the proposed activities in order to facilitate the eventual transition from the VMS to the SMS.

SMS terminology differs from the VMS, and updated research findings are incorporated. Conceptually, the SMS differs from the VMS in that it increases the role of constituents throughout the inventory and planning process and borrows from, and is integrated with, the basic concepts of Ecosystem Management. The SMS pertains primarily to the social/cultural dimension of ecosystem management – but also has links to the biological and physical.

The SMS measures the degree of “intactness” and “wholeness” of the landscape with “scenic integrity.” SMS uses Scenic Integrity Levels (SILs) in much the same way that the VMS uses VQOs. The frame of reference for measuring achievement of SILs is the valued attributes of the “existing” landscape character “being viewed.” The VQOs of *Modification* and *Maximum Modification* directly correspond to the SILs of *Low* and *Very Low*, respectively. The two SILs are defined below:

**SIL: *Low*** (corresponds to *Modification* VQO):

Refers to landscapes where the valued landscape character “appears moderately altered.” Deviations begin to dominate the valued landscape character being viewed, but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed but compatible to the character within.

**SIL: *Very Low*** (corresponds to *Maximum Modification* VQO):

Refers to landscapes where the valued landscape character “appears heavily altered.” Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles within or outside the landscape being viewed. However, deviations must be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.

The SMS uses the same distance zones as the VMS, however an immediate foreground distance zone is added in SMS which extends to 300 feet beyond the viewer.

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<sup>104</sup> Because the Forest Plan revision process for the CNF has not yet begun as of the publication of this EIS, this aesthetics analysis can only determine consistency with the SMS on a relative basis. Revised Forest and Management Area standards and guidelines, using the SMS, have not yet been established.

## EXISTING CONDITIONS

### AESTHETIC CHARACTERISTICS OF THE SAN FRANCISCO PEAKS

The San Francisco Peaks are the remnants of a large, heavily vegetated composite volcano that last erupted roughly two million years ago. Rising more than a mile above the surrounding pine forests and grasslands of the northern Arizona landscape, the San Francisco Peaks exhibit a rich diversity of past geologic events such as lava flows, volcanic eruptions, glaciation, and erosion. The Peaks is an outstanding example of past volcanic activity and preserves the best example of Ice Age glaciation in Arizona in lateral and medial moraines and former streambeds.<sup>105</sup>

With its peaks reaching the highest elevation in Arizona, the San Francisco Peaks are a prominent feature of the southern Colorado Plateau. The three main peaks are Humphreys Peak (12,633), Agassiz Peak (12,356 feet), and Fremont Peak (11,969 feet). The other peaks are Doyle, Reese, and Aubineau. Views from the summit of the San Francisco Peaks stretch northwest to the Grand Canyon's North Rim; northeast across the painted desert (including Sunset Crater); and over eighty miles to the north. On a clear day, the Peaks are visible from over 100 miles away.

### AESTHETIC CHARACTERISTICS OF THE SNOWBOWL SUP AREA

NFS lands within Snowbowl's 777-acre SUP area have been used for developed winter recreational use since 1938, when the ski area's original base area was established in Hart Prairie. Since that time, developed recreation at the Snowbowl has evolved and grown with the creation of additional trail systems, buildings, lifts, and infrastructure.

Snowbowl's SUP area is located on the western face of the San Francisco Peaks, and is defined by a prominent, V-shaped valley. The majority of Snowbowl's formal and gladed terrain can be found on this valley's north/northwest-facing aspects, with the exception of the Hart Prairie area, which has a predominantly west-southwest aspect. In all, the Snowbowl has 32 developed trails and approximately 130.4 acres of formal,<sup>106</sup> lift-served terrain within its SUP area. NFS lands within and immediately adjacent to the SUP area are defined by open bowls (at higher elevations), dense stands of spruce-fir throughout and well mature aspen stands in the lower elevations.

Snowbowl's base area facilities and parking areas are located at the Agassiz and the Hart Prairie lodges, located at 9,550 and 9,350 feet elevation, respectively. With the exception of chairlifts and the ski patrol head quarters (located at the top of the Agassiz Chairlift), no ski area infrastructure or services are located above the Agassiz Lodge.

With the exception of the Hart Prairie area (approximately 40 acres), which is a natural alpine meadow, approximately 100 acres of overstory vegetation have been removed throughout Snowbowl's development history. For the most part, cleared vegetation breaks have been "feathered" throughout the history of development in an attempt to avoid hard edges and to mimic natural breaks in the vegetation across the San Francisco Peaks. With some exceptions

<sup>105</sup> USDA Forest Service, 1987: 101

<sup>106</sup> This does not account for undeveloped, skiable terrain (i.e., glades and naturally-open/hike-to terrain) within the SUP area.

(noted below), the feathering technique has successfully reduced the potential visual effects of the developed terrain as compared to the surrounding, undisturbed natural landscape. The most obvious vegetation break in the SUP area is the corridor that was cut for the Agassiz Chairlift. The Agassiz Chairlift corridor, in particular, introduces a long linear element that is absent from the surrounding natural landscape of the San Francisco Peaks.

### **Compliance with VQOs/SILs**

Inevitably, the lift and trail network within Snowbowl's SUP area introduces some elements that are unrelated to features in the adjacent, natural landscape on the San Francisco Peaks. Despite the best efforts of the Forest Service and Snowbowl to blend the lift corridors and trails into the natural landscape, some unnatural vegetation breaks are quite obvious, particularly in the foreground view. However, once the observer moves to the middle ground and, especially, background views, the Snowbowl's trail and lift network begins to blend into the natural surrounding and becomes more difficult to distinguish.

Within the foreground view, the Snowbowl facilities are most frequently viewed by guests visiting the ski area. Therefore, developed facilities, trails, and lifts represent the anticipated landscape and are not a deviation from what most ski area visitors expect and value. The majority of viewsheds from which the Snowbowl can be seen from along the U.S. Highway 180 corridor fall into the middle ground and background views. However, the Snowbowl can be seen in the foreground view in certain instances. Because in Arizona developed winter ski areas are rare, these types of facilities are not expected by the majority of travelers who pass the Snowbowl on U.S. Highway 180. Therefore, in some cases Snowbowl's developed facilities are visible to those who may not expect or value the appearance of such facilities.

Nonetheless, the analysis completed indicates that Snowbowl's existing facilities, trails, and lifts corridors currently meet the established VQOs of *Modification* and *Maximum Modification*, and are consistent with Forest Plan direction. Therefore, when compared to the corresponding SILs of *Low* and *Very Low*, the analysis also concluded that the existing facilities are consistent with the SMS.

## **ENVIRONMENTAL CONSEQUENCES**

### **DIRECT AND INDIRECT EFFECTS**

*Proposed ground disturbance and vegetation removal within the SUP may incrementally affect the aesthetic quality of the west face of the San Francisco Peaks.*

Indicator:

The Incremental Aesthetic Effects of the Proposed Projects Compared to Historic Landscape Alterations Within the SUP Area

#### **Alternative 1 – No Action**

Selection of the No Action Alternative would not directly or indirectly change Snowbowl's current operations, trail/lift network, or infrastructure. From an aesthetics standpoint, no changes to Snowbowl's SUP area would occur under the No Action Alternative and its facilities would continue to comply with Forest Plan VQOs of *Modification* and *Maximum Modification*. The

description of existing conditions within this section describes both the history of landscape modifications and the present conditions which would persist with selection of the No Action Alternative.

## **Alternative 2 – The Proposed Action**

### **Temporary Aesthetic Impacts**

Some ground disturbing activities contained in the Proposed Action would be considered temporary in nature, since these areas would be promptly revegetated. These direct, temporary ground disturbing activities include: 1) installation of snowmaking pipelines on existing trails; 2) terrain grading on existing trails; 3) utility line installation; and development of the proposed snowplay facility. As quantified in Table 2-4 (located in Chapter 2), temporary ground disturbances under the Proposed Action would total approximately 236 acres. During construction periods, ground disturbances would be temporarily visible. As revegetation matures over a period of a few years, these disturbances would ultimately return to a condition similar to the present.

### **Permanent Aesthetic Impacts**

Direct, permanent aesthetic impacts are associated with components of the Proposed Action that, whether occurring in new or previously disturbed areas, would represent long-term visible elements of the ski area's presence within the SUP area when perceived in either the foreground, middleground or background views. These elements include:

- Construction of the snowmaking water impoundment above the top terminal of the existing Sunset Chairlift
- Installation and realignment of chairlifts/surface lifts throughout the SUP area
- Construction of a 400-space snowtubing parking lot
- Construction of a hiking trail between the mid-station and the top terminal of the Agassiz Lift
- Construction of a 6,000 square foot addition to the Hart Prairie Lodge for a total of 24,900 square feet
- Construction of a 10,000 square foot guest services facility adjacent to the Agassiz Lodge
- Replacement of existing on-mountain ski team buildings with three new buildings
- Removal of approximately 76.3 acres of existing overstory vegetation associated with the development of skiing terrain, lift corridors, and tree thinning for construction of glades<sup>107</sup>
- Construction of a halfpipe (with a dirt form) below the bottom terminal of the Sunset Chairlift
- Construction of a snowtubing facility in the lower portion of Hart Prairie
- Construction of the 14.8 mile reclaimed water pipeline between Flagstaff and the SUP area

Under the Proposed Action, permanent ground disturbances would total approximately 10.4 acres. While essentially all of these proposed projects would be visible in the immediate foreground view (i.e., from within the SUP area and isolated points from within the surrounding

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<sup>107</sup> Construction of gladed areas would required minimal removal of overstory vegetation (approximately 20 percent) and would concentrate on dead and dying timber. Therefore, construction of glades is not anticipated to substantially impact visual quality in the SUP area.

Kachina Peaks Wilderness), once the viewpoint extends further into the foreground view and into middle ground/background views, the dominating, permanent features of Snowbowl's Proposed Action become the lift and trail network. While vegetation removal associated with these projects can be considered permanent in nature, and would obviously incrementally add to the developed character of the SUP area, the visual simulations (see next section) conducted for this analysis indicate that visual mitigation techniques incorporated into the design of the proposed elements were successful in blending with the form and texture of the surrounding landscape. This analysis determined that the proposed landscape alterations can be implemented while maintaining full consistency with the VQOs of *Modification* and *Maximum Modification*.

For the most part, construction of the reclaimed water pipeline between Flagstaff and the SUP area would occur within previously-disturbed corridors. Therefore, construction of the pipeline would not cause additional visual disturbances. An exception includes portions of the corridor that cross property owned by the Lowell Observatory.

### **Alternative 3**

Alternative 3 eliminates temporary ground disturbance associated with snowmaking line installation, but includes (essentially) all of the lift and trail additions contained in the Proposed Action. While Alternative 3 increases temporary ground disturbance associated with trail grading – necessary to provide for increased skiability under reduced natural snow conditions – overall temporary ground disturbances would be reduced to approximately 130 acres. Permanent ground disturbances are reduced under Alternative 3 by excluding the snowmaking water impoundment, snowtubing facility, snowtubing parking lot, and the Aspen Chairlift realignment and would total approximately 1.7 acres. Additionally, Alternative 3 would result in the removal of approximately 64.4 acres of existing overstory vegetation associated with the development of skiing terrain, lift corridors, and tree thinning for construction of glades.

Overall, the aesthetic impacts are slightly reduced between Alternatives 2 and 3. However, for the purposes of this analysis, they can be considered virtually identical, especially when perceived in the middle ground and background distance zones.

#### Indicator:

#### Visual Simulations, from Identified Representative Viewpoints, of the Proposed Landscape Alterations as Compared to the Existing Condition.

The reader is directed to Figures 3D-1 through 3D-4 for photographs taken from the identified representative viewpoints. Each unaltered photograph is accompanied by an identical photograph that has been photo-simulated to depict proposed project elements which are anticipated to remain visually evident. For the purposes of this analysis, the Proposed Action and Alternative 3 can be considered identical when observed from these viewpoints, and are thus analyzed together.

Simulated views were analyzed from the following viewpoints:

- Hart Prairie (151 Rd) – Summer
- Highway 180 at the Flagstaff Nordic Center – Summer
- Humphreys Trail (Wilderness Area) – Summer
- Interstate 40 East of Williams – Winter

### **Photo Simulation Methodology**

Photo simulations represent a visually accurate method of realistically portraying proposed project elements on the existing landscape. These simulations are accomplished using a combination of GIS (Geographic Information Systems) and photo-editing software applications and the following techniques.

The first step in this process involved identifying the representative viewpoints from the surrounding landscape based on locations with high exposure and/or close proximity to the project area. These viewpoints are then photographed during the desired season to capture the baseline or existing conditions. The photographs are converted to digital images for simulation purposes.

Once the locations have been identified, the corresponding GIS data, such as trails, structures, vegetation lines, and proposed elements, are assembled. Once the pertinent data has been gathered, these GIS files are used to build a three-dimensional model specific to the scene portrayed in the image. The three-dimensional model identifies the viewable project elements for the selected perspective accounting for topography and vegetation which may lie between the observation point and the target view.

The three-dimensional model is converted and imported into an image editing software application. Using the digital image, the model is overlain and referenced to the original image. Using the proposed elements from the model as reference, a copy of the image is created simulating the proposed elements and features. The result is a spatially accurate, photo realistic simulation of the proposed project elements from the desired viewpoint. Additional consideration is given for the contrast between snow covered ground and dark tree cover that will occur in winter throughout the project area; even though this contrast is shown in only one of the four simulations.

### **Alternative 1 – No Action**

Alternative 1, the No Action Alternative, represents the Arizona Snowbowl in its existing condition. No changes to the visual landscape would occur under this alternative. The existing condition, and therefore the No Action Alternative is represented in the photo simulations as the baseline condition.

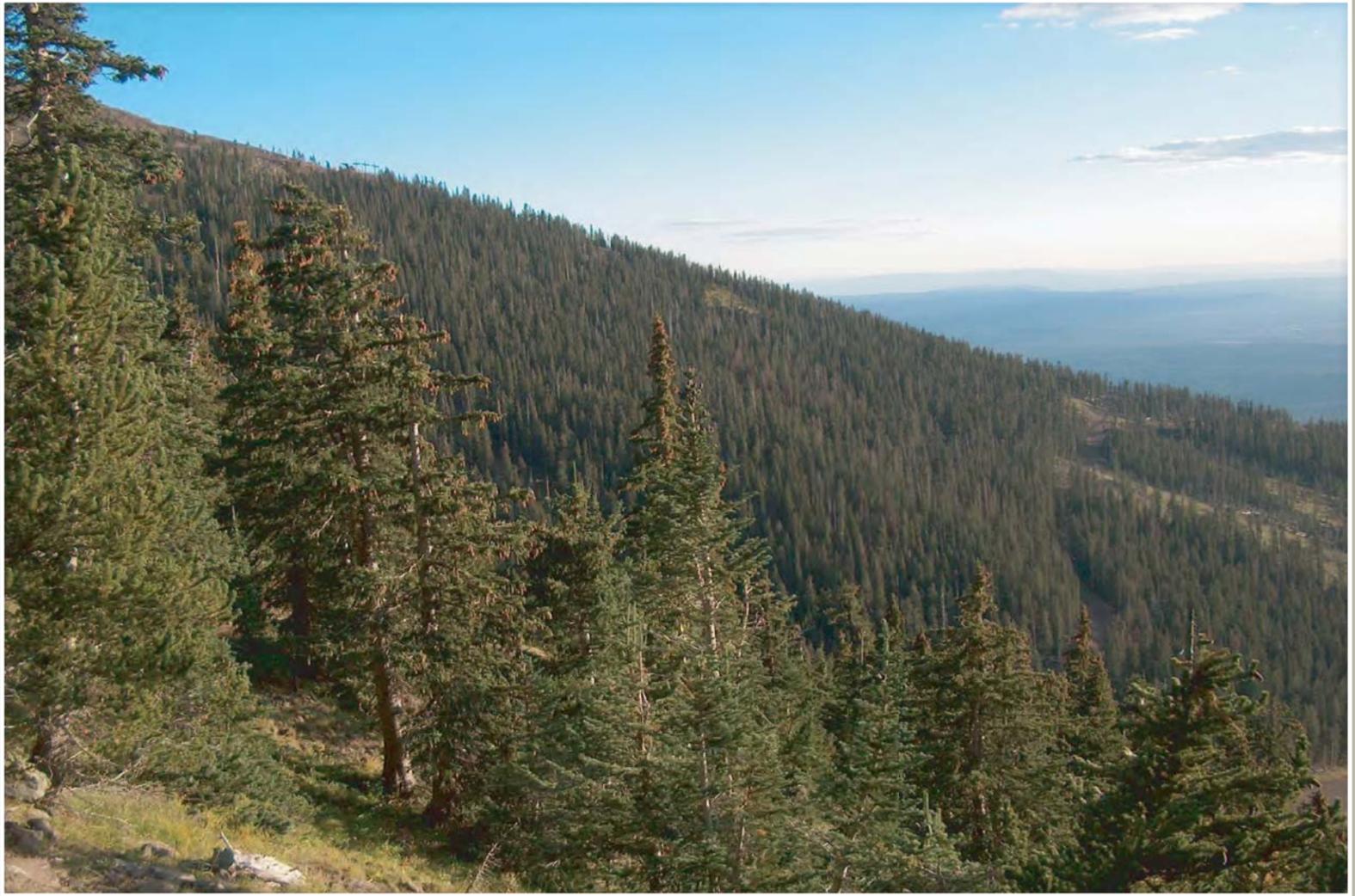
### **Alternatives 2 and 3**

Figure 3D-1 displays the Snowbowl SUP area in the foreground distance zone looking south from the Humphreys Trail in the Kachina Peaks Wilderness. This viewpoint is representative of all views of the Snowbowl facility seen from this primary route into the Wilderness and is one of the best sites for viewing the proposed facilities and trails.

This middleground viewpoint presently falls within the basic standards of a “partial retention” VQO (Moderate SIL). The proposed developments would introduce additional elements (such as portrayed in the simulation) that in total would fall within the standards for a modification VQO as seen from all viewpoints along the Humphrey’s Trail.

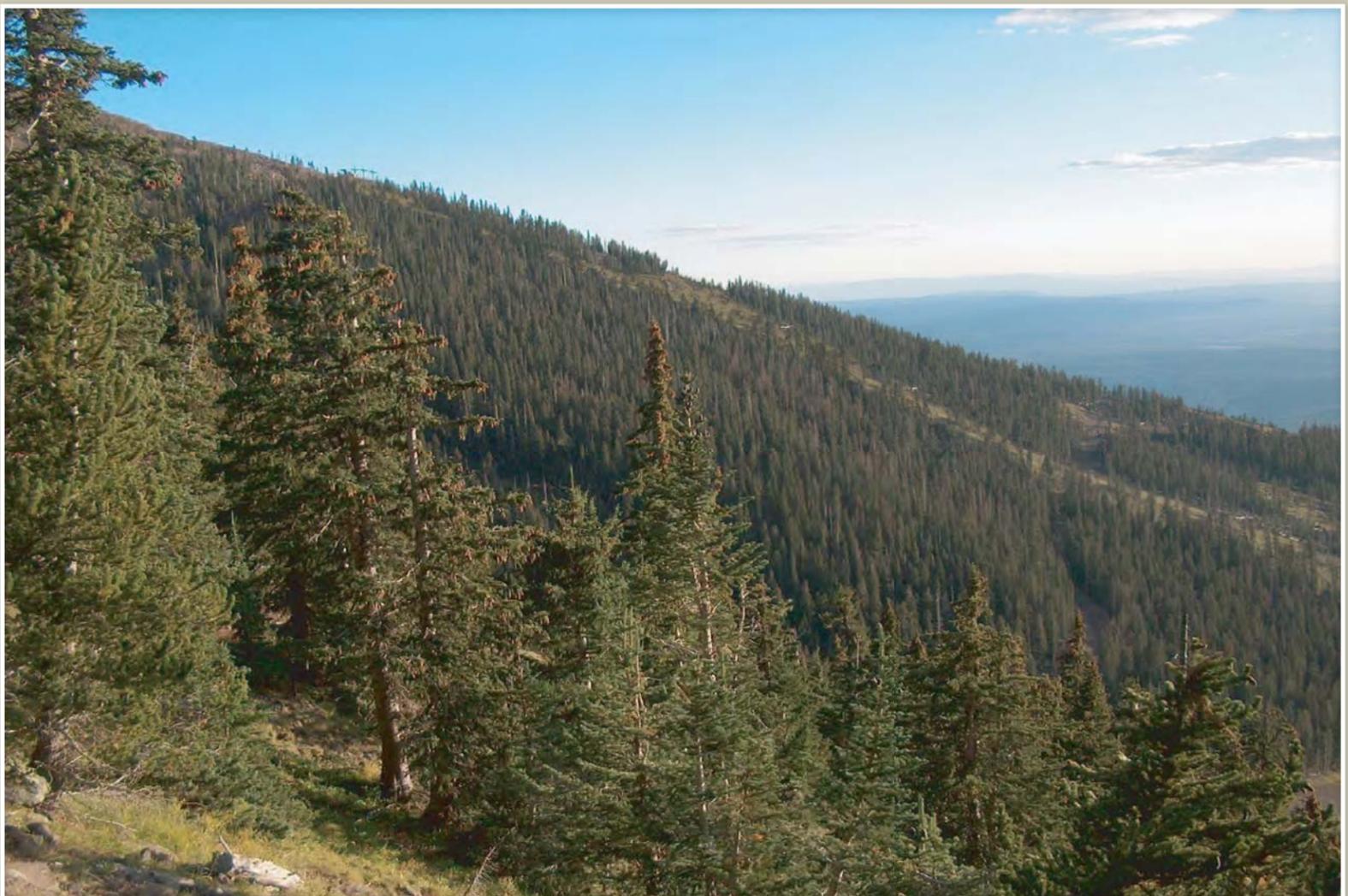
In the “Existing” view, although two existing trails - *Volcano* and *Casino* (trail #43a and #23) - are visible from this location, they remain partly obscured by existing vegetation that occurs along the trail edges. The *Midway Catwalk* and *White Lightning* (trails #24 and #28) appear as dark openings in the vegetation overstory and are essentially unnoticed. In the “Proposed” view, the proposed vegetation clearing from planned Trail 43b becomes moderately apparent as it causes the existing vegetative opening to continue uphill of *Volcano* (trail #43a) to the edge of the treeline occurring near the top of the Agassiz Chairlift. However, the portion of proposed Trail 43b that comes off of *Upper Ridge* (trail #26) across the existing Agassiz Chairlift corridor creates a gap in the existing vegetation that becomes visible due to its northwest aspect and location near the crest of Agassiz Ridge. A similar incidence occurs at the location of proposed Trail 38. Though not as noticeable, the trail clearing from Trail 38 occurs near the crest of Agassiz Ridge creating another depression in the existing vegetation. Although trail widening is proposed for *White Lightning* (trail #28), the impacts are not evident.

## Existing



*View of the Arizona Snowbowl looking Southwest from the Humphrey's Peak Trail in the Kachina Peaks Wilderness.*

## Proposed



*View of the Arizona Snowbowl looking Southwest from the Humphrey's Peak Trail in the Kachina Peaks Wilderness showing the proposed trails and clearing.*

Figure 3D-2 depicts the entire western face of the San Francisco Peaks in the middle ground distance zone. The picture was taken from the top of a small hill just west of Forest Road 151, looking east, from approximately 1.5 miles away. From this viewpoint, existing trails and lift corridors are easily distinguishable, particularly the Agassiz Chairlift and the following trails: *Lower Ridge* (trail #21); *Upper Ridge* (trail #26); *Rattlesnake* (trail #13); *Volcano* (trail #41a) and *Casino* (trail #23). In the “Proposed” view, the anticipated Sunset Chairlift corridor, terrain park, and trails 37, 38, 39, and 43b become most apparent due to their locations in the densely vegetated southern portion of the SUP area. The proximity of proposed trails 37, 38, and 39 to existing trails, combined with their direct western exposure, create a mosaic of new vegetative openings that become visible along the lower portions of Agassiz Ridge from this viewpoint. The proposed Humphreys Pod, located just uphill of Hart Prairie, is also visible from this location. However, the proposed vegetation clearing in the Humphreys Pod is absorbed well due to the braided trail design and existing stands of tree islands that would remain.

The view from this middleground viewpoint presently falls well within the basic standards of the Modification VQO (low SIL) with the diagonal linear element of the Agassiz Chairlift being the most noticeable unnatural element visible. The proposed development would introduce additional elements that in total would fall well within the standards for the Maximum Modification VQO” (Very Low SIL) but would fall somewhat short of the Modification VQO standard.

## Existing



*View of the Arizona Snowbowl looking East, taken just West of Forest Road 151.*

## Proposed



*View of the Arizona Snowbowl looking East with proposed trails and clearing, taken just West of Forest Road 151.*

Figure 3D-3 shows the western face the San Francisco Peaks, with Agassiz Peak prominently displayed, in the background distance zone. The picture was taken from U.S. Highway 180 at the junction of the Nordic Center entrance road from a distance of approximately five miles. The bottom half of the Snowbowl's SUP area is obscured by foreground trees and vegetation from this viewpoint. Only existing and proposed trails with north and west orientations are visible from this location. Portions of the existing Agassiz Chairlift corridor and *Upper Ridge* (trail #26) and *Volcano* (trail #43a) are visible. In the "Proposed" view, proposed trails 37, 38, 39, 42, 43b, and a portion of the Sunset Chairlift corridor become visible. While in a comparative format the proposed alterations are distinguishable, viewers at this distance are unlikely to notice a substantial change.

Alterations seen from this viewpoint meet standards for the Modification VQO (Low SIL).

## Existing



*Southeast view of the Arizona Snowbowl from the junction of Highway 180 and the Nordic Center entrance road.*

## Proposed



*Southeast view of the Arizona Snowbowl from the junction of Highway 180 and the Nordic Center entrance road showing proposed trails and clearing.*

Figure 3D-4 again shows the western face of the San Francisco Peaks in the background distance zone. The picture was taken during winter conditions on Interstate 40 East of Williams, approximately 16 miles away. From this distance only *Upper Ridge* (trail #26) can be distinguished while the remaining existing trails blend well with the surrounding natural vegetation. The “Proposed” view displays the addition of Trail 39 and the Humphreys Pod trail network. However, the location of the Snowbowl SUP area in the background zone makes the visual impact of the proposed trails virtually indiscernible when compared to the surrounding forest and canopy openings.

Alterations seen from this viewpoint meet standards for a Partial Retention VQO (Moderate SIL).

**Existing**



*View of the Arizona Snowbowl from I-40 East of Williams*

**Proposed**



*View of the Arizona Snowbowl from I-40 East of Williams with proposed trails and clearing*

This analysis indicates that construction of all proposed projects could be accomplished while meeting the VQOs for *Modification* and *Maximum Modification*. In addition, implementation of these projects would be consistent with SILs of *Low* and *Very Low*.

## CUMULATIVE EFFECTS

### Scope of Analysis

#### Temporal Bounds

For the purpose of this cumulative assessment, it is assumed that visual impacts to the San Francisco Peaks landscape began with construction of the original ski area facilities in the late 1930s, increased with approval of projects analyzed in the 1979 ES, continue to the present day and extend into the foreseeable future (i.e., as long as the Snowbowl operates).

#### Spatial Bounds

Table 3D-1 defines the spatial bounds of this cumulative effects analysis and identifies potentially effected viewers within each distance zone, as per the VMS.

**Table 3D-1  
Viewshed**

VMS Distance Zone	Potentially effected Viewers
<b>Foreground</b> (out to ½ mile)	<ol style="list-style-type: none"> <li>1. Snowbowl visitors/employees (large majority of users; expect to see ski area facilities) – view from access road and from Snowbowl</li> <li>2. Local residents – (small number but growing and with high concern for scenic quality) – view from access roads and from summer homes in Lower Hart Prairie</li> <li>3. Forest visitors other than Snowbowl visitors and residents. Includes Wilderness trail/trailhead, Arizona Trail/trailhead and those driving for pleasure</li> </ol>
<b>Middleground</b> (½ mile out to four miles)	<ol style="list-style-type: none"> <li>1. (see #1. above)</li> <li>2. (see #2. above)</li> <li>3. Forest visitors (majority of users affected ), using U.S. Highway 180, FR 151, and other Forest roads and trails, people using Forest areas away from roads and trails (i.e. hunters/ cross country hikers)</li> </ol>
<b>Background</b> (Four miles to infinity)	<ol style="list-style-type: none"> <li>1. Forest visitors/travelers through the Forest – mostly people driving along Highways 180 and 89 north of the Peaks with moderate to high concern for scenic quality.</li> <li>2. Travelers along I-40 from just west of Flagstaff out to Williams</li> </ol>

The affected environment relevant to a discussion of cumulative affects for aesthetic resources includes the extent of locations from which the analysis area is visible. This area extends from the Snowbowl generally to the north and west and diminishes as viewer distance increases and detail of alterations to the natural landscape diminishes. This also includes areas from which the proposed reclaimed water pipeline (that follows the existing Transwestern Lateral Natural Gas Pipeline corridor and existing roads) is visible. Areas to the south and east of the Snowbowl within the Kachina Peaks Wilderness have limited visibility into the Snowbowl SUP area up to

the surrounding ridgelines and peaks including views through tree cover along the upper part of the Humphreys Trail up to Humphreys saddle. Locations outside of the ridge system that encloses the Snowbowl facilities are screened from these affects by the mountainous topography and are not visible to the viewer on the ground. The existing facilities are visible to the discerning viewer from I-40 near Williams, approximately 25 miles away, when snow on the ground maximizes the contrast between the trail and lift corridors and the surrounding tree cover (referred to figure 3D-4). The area is also visible from the north side of Kendrick Park from U.S. Highway 180, about eight miles distant, but becomes undetectable due to topographic screening as the road proceeds north. The SUP area is not visible from Highway 89.

### **Past, Present, and Reasonably Foreseeable Future Actions**

Past, present, and reasonably foreseeable projects which could cumulatively affect scenic resources include:

1. Bebbs Willow Restoration project in Hart Prairie
2. Residential and summer home development in Hart Prairie
3. Assorted and ongoing utility line clearing and maintenance
4. Snowbowl cellular tower (approved in August 2000 but not yet built)
5. Hart Hill restoration
6. Ongoing utility line construction and maintenance (on- and off-Forest)
7. Arizona Trail construction and designation

Of the above-mentioned projects, Hart Hill restoration, Bebbs Willow Restoration, and the Arizona Trail are all within the spatial extent of the cumulative impact area, but are not of an extent or development scale/character to cause appreciable degradation to the natural appearing environment. The Hart Hill and Bebbs Willow Restoration projects will restore elements of the natural appearing landscape thereby creating long term positive changes with possible short-term minor negative impacts to scenic quality during the activities implementation.

Of the projects listed, projects most relevant to a discussion of cumulative effects to scenic resources include:

#### **Residential and Summer Home Development in Hart Prairie**

Ongoing development in Hart Prairie has introduced features not inherent to a natural appearing landscape within the middle ground viewshed seen by people using the Snowbowl facilities and by others making use of the general area. Some of the developments occur as foreground elements from FR 151 with the Snowbowl facility seen behind the residences in the middle ground. Residential developments in the area generally borrow from naturally occurring materials and color and occur at such a scale as to not contribute significantly to the area's overall visual quality.

Residential and summer home development exists on private lands in Hart Prairie, below the Snowbowl facility. While generally borrowing from naturally occurring color and materials found in the area, the existence of these structures adds to the extent of the area where the natural

appearing landscape has been altered. Alterations to the natural appearing landscape within the residential/summer home area are less severe than within the Snowbowl facility due to the smaller scale of individual residential/summer home structures. While not bound by visual quality standards provided in the Forest Plan, these residential facilities generally fall within the guidelines for *Partial Retention* and *Modification* VQOs (*Moderate* to *Low* SIL).

#### Snowbowl Cellular Tower

Installation of a cellular tower near Snowbowl's maintenance shop was approved via a Decision Notice in August 2000.<sup>108</sup> However, it has not yet been constructed. If constructed, this facility will introduce an incongruous element to a natural appearing landscape in the foreground viewshed of the Snowbowl facility as seen from the Snowbowl Road. This facility, if constructed, would meet a VQO standard of *Modification* (*Low* SIL) from foreground views and would meet the *Retention* VQO from FR 151 (middleground).

#### Ongoing Utility Line Construction and Maintenance

Ongoing utility line and pipeline clearance and maintenance highlights the contrast between utility and pipeline corridors and facilities and the natural appearing forest landscape. Clearing and maintenance activities will continue to produce unnatural appearing linear elements.

Appendix C includes the full list of past, present, and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

### **Alternative 1 - No Action**

The addition of residential/summer home development in the area, the cellular tower, and ongoing utility and pipeline operation/maintenance to the original extent of the Snowbowl development extends the area meeting *Partial Retention* and *Modification* VQO standards (SIL *Moderate* to *Low*) from within the foreground view of the Snowbowl facility to the foreground view as seen from FR 151. From middleground and background views the effect of all of the cumulative elements discussed, except for the ski runs and lift tower corridors, diminishes and disappears for most forest visitors. As shown in the "before" photos (3D-1 through 3D-4) from middleground and background views, some of the existing ski trails and chairlift corridors are presently visible as unnaturally appearing shapes on the otherwise natural appearing landscape. The background and middleground views of the ski area facilities fall within the standard for a *Partial Retention* VQO (*Moderate* SIL) from the background to a *Modification* VQO (*Low* SIL) from middleground views.

### **Alternative 2 – The Proposed Action**

Above and beyond those described in the No Action Alternative, the addition of facilities identified in the Proposed Action would have the following cumulative effects to aesthetic resources in the area:

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<sup>108</sup> A review of current circumstances and documentation according to FSH 1909.15, Chapter 18 will need to occur before implementation may proceed due to the length of time that has passed since the decision was made (3 to 5 years).

- Foreground views from within the Snowbowl SUP area of snowmaking equipment, the water impoundment, snow tubing facilities, additional parking, lift installations, and new buildings
- Middle ground and background views of addition linear and feathered corridors. These corridors would cut diagonally through the existing tree canopy in contrast to the generally homogenous tree cover occurring on adjacent slopes of the San Francisco Peaks.
- Short-term ground disturbance within the existing Transwestern Lateral Natural Gas Pipeline corridor and along the access road corridor and the long-term effect of a wider corridor (in some locations) to accommodate Snowbowl's proposed reclaimed water pipeline. These effects are confined to the foreground of the pipeline, occur mostly outside of the viewshed affected by most of the other Proposed Action elements, and are not seen by most visitors to the area.

### **Alternative 3**

The effect of adding facilities proposed with this alternative would be virtually identical to the PA excluding the effect of the reclaimed water pipeline and the snowtubing facility.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Additional developed terrain and infrastructure in previously undisturbed portions of the SUP area would represent irretrievable effects to visual resources for the life of the Snowbowl. However, this commitment of the visual resource is not irreversible because facilities and lifts could be removed and, in time, the area could be reclaimed and revegetated, restoring its natural appearance.

## **3E. SOCIAL AND ECONOMIC RESOURCES**

### **SCOPE OF THE ANALYSIS**

The development elements contained in the Snowbowl's proposal have the potential to affect not only the physical aspects of the project area's physical environment, but also the socioeconomic environment. Development of the proposed facilities has the potential to attract more skiers and other recreationists, to generate employment and to require additional public services. This analysis targets the specific issues within this broad framework as identified during scoping.

A correlation exists between the consistent operation of the ski area and the Flagstaff/Coconino County economy. This correlation encompasses; seasonal tourism; employment and income levels; and tax revenues. The strength of this correlation needs to be assessed and disclosed.

Socially, Snowbowl provides a source of wintertime recreation for a large number of people in northern and central Arizona. The relative importance of this local source of wintertime recreation needs to be assessed.

### **EXISTING CONDITIONS**

#### **POPULATION, HOUSING AND THE ECONOMY**

In contrast with a number of other ski resorts in the Rocky Mountain region, the Arizona Snowbowl is not a dominant driver of growth and the economy in its host community. Coconino County and more particularly the City of Flagstaff have economies that draw upon a number of elements – including tourism and recreation – to maintain viability. Thus, while the Arizona Snowbowl's business activity is not the singular driver of the area economy and growth, the ski area's business activity does have a positive economic impact on the community and any major change in ski area activity – to the positive or negative – would be expected to have effects in the area.

Population, housing and the area economy are usually regarded as the most significant indicators of growth and are important to the Arizona Snowbowl from several perspectives:

- A growing population provides more potential customers for the Snowbowl's business.
- The regional housing stock provides housing for Snowbowl employees and, to a lesser extent, seasonal housing for Snowbowl visitors.
- A positive economy provides discretionary dollars for local residents and is likely to spur increases in recreational spending.

Further, these indicators are significant to a host community as measures of desired growth and ability to provide adequate housing for residents. The indicators are assessed below, with a focus

on Coconino County and the City of Flagstaff.<sup>109</sup> In addition, statewide data is shown for Arizona to provide comparative rates of change.

### **Population**

The table below shows total population for Arizona, Coconino County and the City of Flagstaff for 1990 and 2000. In addition, estimated population is shown for 2002, along with absolute and percentage statistics regarding rate of growth.<sup>110</sup>

**Table 3E-1  
Total Population Change  
Arizona, Coconino County, Flagstaff (1990 – 2002)**

	<b>1990</b>	<b>2000</b>	<b>Absolute Change 1990-2000</b>	<b>Percentage Change 1990-2000</b>	<b>Est. 2002</b>	<b>Absolute Change 2000-2002</b>	<b>Percentage Change 2000-2002</b>
Arizona	3,665,228	5,130,632	1,465,404	40.0%	5,472,750	342,118	6.7%
Coconino Co.	96,591	116,620	19,729	20.4%	125,420	9,100	7.8%
Flagstaff	45,857	52,894	7,037	15.3%	59,160	6,266	11.8%

During the 1990s, the State of Arizona had a *strong* population growth rate of 40 percent. This compares to a U.S. population growth rate during the same period of 12.8 percent. While Coconino County and Flagstaff experienced solid population growth, their rates of growth were well below those for the state as a whole. However, it appears that recent growth rates for the county and city (2000 through 2002) have accelerated and that they are now experiencing population growth at rates exceeding that for the state as a whole.

Comparative distributions of populations by race in 1990 and 2000 are shown for Arizona, Coconino County and Flagstaff in the table below. The table shows the number and percentage of total population for each racial group.<sup>111</sup>

<sup>109</sup> City of Flagstaff is the only political entity for which data is consistently available within Coconino County and which is near the Arizona Snowbowl. Data is available for other communities that are remote from the Snowbowl's location. The Snowbowl is located within an unincorporated portion of the county.

<sup>110</sup> U.S. Bureau of the Census, Arizona Dept. of Employment Security-Population Statistics Unit.

<sup>111</sup> U.S. Bureau of the Census. Note that the Bureau used different systems for classifying race in the 1990 and 2000 censuses. In 2000, respondents were permitted to designate multiple racial backgrounds. The data in the table only includes figures for those who reported one race. Over 97 percent of all respondents indicated only one race in each of the three areas.

**Table 3E-2  
Racial Distribution of the Population<sup>a</sup>  
Arizona, Coconino County, Flagstaff (1990, 2000)**

		White		Black		American Indian, Eskimo or Aleut		Hispanic or Latino (of any race)	
		Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Arizona	1990	2,963,186	68.1%	110,524	2.5%	203,527	4.7%	688,338	15.8%
	2000	3,873,611	60.3%	158,873	2.5%	255,879	4.0%	1,295,617	20.2%
Coconino County	1990	61,836	58.2%	1,419	1.3%	28,233	26.6%	9,696	9.1%
	2000	73,381	56.9%	1,215	1.0%	33,161	25.7%	12,727	9.9%
Flagstaff	1990	36,519	69.1%	1,135	2.1%	4,210	8.0%	6,972	13.2%
	2000	41,214	67.1%	927	1.5%	5,284	8.6%	8,500	13.8%

<sup>a</sup> Data does not represent total population or every group accounted for in 1990 and 2000 census

Coconino County population has a substantially higher percentage of minorities than the state or Flagstaff populations. American Indians make up almost 26 percent of the county's population.

The table below shows population projections for 2005, 2010 and 2015 for Arizona, Coconino County and the City of Flagstaff.<sup>112</sup> In addition, comparative percentage change is shown for 2000 to 2005, 2000 to 2010, and 2000 to 2015.

**Table 3E-3  
Population Projections  
Arizona, Coconino County, Flagstaff (2000 – 2015)**

	2000	2005	Percentage Change 2000-2005	2010	Percentage Change 2000-2010	2015	Percentage Change 2000-2015
Arizona	5,130,632	5,553,849	8.2%	6,145,108	19.8%	6,744,754	31.5%
Coconino Co.	116,320	135,595	16.6%	147,352	26.7%	158,753	36.5%
Flagstaff	52,894	66,552	25.8%	71,981	36.1%	77,133	45.8%

While the state's population grew at a faster rate during the 1990s, projections call for above average population growth in Coconino County and City of Flagstaff for the period 2000 through 2015. It is expected that the city would grow at a particularly strong rate during the next 15 years. For purposes of comparison, projected rates of population for the U.S. as a whole are:<sup>113</sup> 2000 to 2005 - 2.2 percent, 2000 to 2010 – 6.6 percent and 2000 to 2015 – 11.0 percent.

Overall, it is clear that Arizona as a whole, and Coconino County and Flagstaff in particular, would experience well above average rates of population growth during the coming years.

<sup>112</sup> U.S. Bureau of the Census, Arizona Dept. of Employment Security. 2000 figure based on Census figure, all other figures Arizona projections.

<sup>113</sup> U.S. Bureau of the Census, Population Estimate Series, Middle Series

## Housing

The table below shows total housing units for Arizona, Coconino County and Flagstaff for 1990 and 2000, as well as statistics on absolute and percentage change.<sup>114</sup>

**Table 3E-4**  
**Total Housing Units**  
**Arizona, Coconino County, Flagstaff (1990, 2000)**

	1990	2000	Absolute Change	Percentage Change
Arizona	1,659,430	2,189,189	529,759	31.9%
Coconino Co.	42,914	53,443	10,529	24.5%
Flagstaff	16,313	21,396	5,083	31.2%

Although Coconino County and Flagstaff population growth rates fell well below that for the entire state during the 1990s, Flagstaff's rate of housing increase matched that for the state, while the county's rate of increase did not fall substantially behind that for the state.

The table below contains more detailed data regarding year 2000 housing stocks for Arizona, Coconino County and Flagstaff including, total units, occupied units and owner and renter-occupied units.<sup>115</sup> In addition, comparative statistics are shown regarding the detailed data.

**Table 3E-5**  
**Housing Stock Details**  
**Arizona, Coconino County, Flagstaff (2000)**

	Arizona	Coconino County	Flagstaff
Total Housing Units	2,189,189	53,443	21,396
Occupied Units	1,901,327	40,448	19,306
% of Total	86.9%	75.7%	90.2%
Owner-Occupied	1,293,556	24,835	9,304
% of Occupied	68.0%	61.4%	48.2%
Renter-Occupied	607,771	15,613	10,002
% of Occupied	32.0%	38.6%	51.8%

A review of the data reveals the following; 1) Almost 25 percent of Coconino County's housing stock is classified as vacant (see below); 2) The rate of housing ownership is lower than average in Coconino County and; 3) The rate of housing ownership is particularly low in Flagstaff. However, this is consistent with an urbanized center.

<sup>114</sup> U.S. Bureau of the Census

<sup>115</sup> Id.

The table below contains more detailed data on ‘vacant’ housing stocks in Arizona, Coconino County and Flagstaff.<sup>116</sup> This includes total vacant units (and as a percentage of total housing stock) and vacant units classified as ‘for seasonal, recreational or occasional use.’

**Table 3E-6  
Vacant Housing Stock  
Arizona, Coconino County, Flagstaff (2000)**

	Arizona	Coconino County	Flagstaff
Total Housing Units	2,189,189	53,443	21,396
Vacant Housing Units	287,862	12,995	2,090
% of Total	13.1%	24.3%	9.8%
For Seasonal, Recreational or Occasional Use	141,965	9,155	977
% of Total	6.5%	17.1%	4.6%
% of Vacant	49.3%	70.5%	46.7%

As noted above, Coconino County has an above average percent of vacant housing, while Flagstaff’s vacant housing falls below the statewide average. A more detailed examination of the vacant housing stocks makes it clear that a substantial portion of the county’s vacant stock (70.5 percent) is being held for seasonal, recreational or occasional use. There are over 9,100 housing units in the county that are held as vacation or second homes – accounting for 17.1 percent of the county’s total housing stock. In comparison, only 6.5 percent of the state’s total housing stock is held for the same purpose. This is an indication that the county is a significant draw to people seeking strong scenic and recreational values. Just as significantly, with 17.1 percent of the total housing stock held for seasonal use, there is substantial population fluctuation in the county dependent on the level of occupancy in these units. These non-local homeowners bring additional dollars to the local economy.

### **The Economy**

With a population of over 115,000 persons and an urban center in Flagstaff, the Coconino County economy is driven by a number of elements. While the Arizona Snowbowl alone is not a dominant force in the economy, tourism, of which the Snowbowl is a part, is usually identified as the Flagstaff area’s primary industry. While a number of factors play a part in tourism, it is clear that the presence of the Grand Canyon roughly 60 miles north of Flagstaff brings a substantial number of persons through the area. A summary of major economic indicators follows.

The table below shows the distributions of Coconino County and Arizona employment by industry, as well as average wages by industry.<sup>117</sup>

<sup>116</sup> Id.

<sup>117</sup> Arizona Dept. of Employment Security. Figures for 2001.

**Table 3E-7  
Distribution of Employment by Industry and Average Wages  
Coconino County, Arizona**

	Coconino County			Arizona		
	Employment	% of Total	Average Annual Wages	Employment	% of Total	Average Annual Wages
Agriculture	349	0.7%	\$22,680	56,853	2.5%	\$18,404
Mining	108	0.2%	\$24,480	5,365	0.2%	\$48,892
Construction	2,689	5.3%	\$28,388	164,771	7.3%	\$35,628
Manufacturing	2,779	5.4%	\$39,992	198,521	8.8%	\$48,352
Trans/Utility	1,412	2.8%	\$33,808	106,604	4.7%	\$41,632
Wholesale Trade	942	1.8%	\$41,400	108,228	4.8%	\$49,168
Retail Trade	13,179	25.8%	\$15,648	432,253	19.1%	\$20,108
Fin/Insurance/RE	1,268	2.5%	\$33,000	150,077	6.6%	\$44,512
Services	14,770	28.9%	\$27,200	662,640	29.3%	\$34,676
Government	13,582	26.6%	\$37,340	372,033	16.5%	\$35,764
Non-Classified	14	0.0%	\$23,500	2,782	0.1%	\$43,592
<b>Totals</b>	<b>51,092</b>		<b>\$28,224</b>	<b>2,260,127</b>		<b>\$34,648</b>

An examination of the data shows that the Coconino County economy differs from the statewide economy in several ways. Most notably, the segment of workers employed in the Retail Trade and Government industries is notably higher in the county than in the state. The emphasis on Retail Trade is reflective of an economy dependent on tourism. Conversely, a comparatively smaller segment of Coconino County's workers are in Manufacturing and Finance/Insurance/Real Estate. The data also shows that county wage rates are significantly lower than statewide averages.

Labor force trends are also significant, as they reflect overall growth and the demands that jobs are creating for workers. From an employer's perspective, a growing labor force creates a pool from which to draw new workers. The table below shows changes in labor force and unemployment rates for the City of Flagstaff, Coconino County, the Flagstaff Metropolitan Statistical Area (MSA) and Arizona for the period 1998 through 2003.<sup>118</sup>

<sup>118</sup> Arizona Dept. of Employment Security. All figures with exception of 2003 are annual averages. 2003 figures averages through July. The Flagstaff MSA is virtually the same geographic area as Coconino County.

**Table 3E-8  
Labor Force and Unemployment Rates  
Flagstaff, Coconino County, Flagstaff MSA, Arizona (1998 – 2003)**

	City of Flagstaff		Flagstaff MSA		Coconino County		Arizona	
	Labor Force	Un-employment	Labor Force	Un-employment	Labor Force	Un-employment	Labor Force	Un-employment
1998	30,512	5.8%	59,469	7.2%	56,850	7.3%	2,254.9	4.1%
2000	34,459	4.6%	66,855	5.7%	64,000	5.8%	2,480.0	4.0%
2001	35,324	4.3%	68,382	5.4%	65,525	5.4%	2,579.5	4.7%
2002	36,250	4.6%	70,202	5.8%	67,325	5.8%	2,671.7	6.2%
2003*	35,468	5.3%	68,898	6.6%	66,000	6.7%	2,660.0	5.8%
<i>Change 1998-2002</i>	<i>18.8%</i>		<i>18.0%</i>		<i>18.4%</i>		<i>18.5%</i>	

Labor forces in all of the comparative areas grew by similar amounts between 1998 and 2002. However, it should be noted that the Flagstaff MSA and Coconino County (similar areas) have generally experienced above average unemployment rates while the City of Flagstaff has enjoyed below average unemployment rates in recent years. 2003 data for all areas reflects the national and regional economic downturn of recent years.

### Tourism

Tourism is a significant industry in the State of Arizona and in Coconino County/Flagstaff area. A recent report noted the following points:<sup>119</sup>

- By various estimates, two-to-five million visitors travel to Flagstaff on an annual basis.
- For Coconino County as a whole, it is estimated that over eight million persons visit on an annual basis.
- Tourism is estimated to account for 12 percent of the county’s total income – this is four times the national average.

A year 2000 examination of the impact of tourism on the Flagstaff area economy indicated the following:<sup>120</sup>

- Tourism is the most significant economic activity in Coconino County.
- During the latter part of the 1990s, approximately 13,345 Coconino County residents were employed in the tourism industry.
- Of the 17 economic sectors in which tourism plays an employment role, ‘Miscellaneous Amusement & Recreation Services,’ was the fifth most important. This sector includes ski areas.

<sup>119</sup> Morlock, B., 2001

<sup>120</sup> Morrison Institute for Public Policy, January 2000

The table below shows total estimated visitors (Domestic and International) to Arizona on an annual basis for the period 1996 through 2001. In addition, total tourism related employment (Direct and Indirect) as well as the total economic impact of statewide tourism is shown.<sup>121</sup>

**Table 3E-9  
Visitation and Economic Impacts of Tourism Activity  
Arizona (1996 – 2001)**

	Visitors in Millions					
	1996	1997	1998	1999	2000	2001
Domestic Visitors	23.70	25.60	25.10	26.80	26.80	27.1
International Visitors	2.47	2.54	2.55	2.62	2.73	NA
Total Visitors	26.17	28.14	27.65	29.42	29.53	
Tourism Related Employment (Direct & Indirect)	326,542	347,202	358,685	366,236	375,502	377,621
Economic Impact (\$Billions)	\$11.1	\$11.4	\$12.3	\$12.7	\$13.8	NA

In recent years, Arizona has attracted almost 30 million visitors on an annual basis. Just as significantly, direct and indirect tourism employment totals over 375,000 jobs and creates almost \$14 billion in annual economic impact.

With two major tourism attractions – Grand Canyon National Park and Glen Canyon National Recreation Area – Coconino County attracts a substantial segment of Arizona’s tourism activity. Recent estimates have placed total estimated visitation in the county in the eight-to-nine million range, or approximately 30 percent of Arizona’s total activity level.<sup>122</sup>

In summary, it is clear that tourism is critical to the Coconino and Flagstaff area economies and that the Arizona Snowbowl is one of a number of regional attractions that play a role in attracting tourism activity. The Snowbowl is a unique attraction in that it is a winter oriented facility in a region that is commonly perceived as being oriented toward warm weather activities.

### Skiing

From a statistical perspective, Alpine skiing accounts for a minor segment of the State of Arizona’s travel activity. With an average of just under 300,000 skier visits during the most recent seven seasons, skiing volume does not have a major impact on statewide visitation.<sup>123</sup> However, skiing’s impact is more significant from several qualitative perspectives, as explored in more detail below. Skiing brings winter-oriented travel activity to the state – a group that otherwise might not make travel expenditures in Arizona. Further, based on historical usage records at the Snowbowl, it is apparent that there is strong demand for skiing; the Snowbowl is typically used at or near its capacity level on days when there is good or excellent quality skiing.

<sup>121</sup> Arizona Office of Tourism, Office of Tourism Research Library

<sup>122</sup> Bureau of Business & Economic Research, College of Business Administration, Northern Arizona University

<sup>123</sup> Skier visits include Alpine skiers, telemarkers and snowboarders.

The table below shows annual skier visits for the U.S., the Pacific West region (includes Arizona), all of Arizona, and for the Arizona Snowbowl for the 1996/97 through 2002/03 seasons.<sup>124</sup> The table also shows year-to-year percentage change in total visits.

**Table 3E-10**  
**Annual Skier Visit Totals**  
**U.S., Pacific West Region, Arizona, Arizona Snowbowl**  
**(1996/97 – 2002/03)**

	Annual Skier visits						
	1996/97	1998	1999	2000	2001	2002	2003
U.S. (Millions)	52.52	54.12	51.96	51.65	57.34	54.40	57.60
% Change		3.1%	-4.0%	-0.6%	11.0%	-5.1%	5.9%
Pacific West (Millions)	9.84	11.17	11.08	10.61	11.28	12.13	10.60
% Change		13.5%	-0.8%	-4.3%	6.3%	7.5%	-12.6%
Arizona (State)	365,787	384,665	246,941	243,685	355,780	214,135	277,305
% Change		5.2%	-35.8%	-1.3%	46.0%	-39.8%	29.5%
Arizona Snowbowl	153,176	180,082	35,205	66,152	162,175	2,857	87,354
% Change		18%	-80%	88%	145%	-98%	2,958%

While there has been much discussion of a ‘flat market,’ U.S. skier visit trends have generally been positive in recent years, with the 2002/03 season setting an all-time record. While there are fluctuations, the overall trend has also been positive for the Pacific West region – which represents a *broad* geographic spectrum, from Alaska to Arizona. The data also makes it clear that the level of fluctuation in the Arizona market is much more significant than at the regional or U.S. level and that the level of year-to-year fluctuation in skier visits is *extreme* at the Arizona Snowbowl. Roughly 82 percent of the ski areas in the U.S. have snowmaking facilities that allow them to more consistently provide a skiing product.<sup>125</sup> Because the Snowbowl does not have snowmaking, its ability to provide a skiing product is far less consistent. Not surprisingly, operational records for the Snowbowl indicate that the number of days of operation in any season is closely related to skier visit totals.

The table below shows total Arizona skier visits as a percentage of the Pacific West market and Arizona Snowbowl skier visits as a percentage off the Arizona market for the 1996/97 through 2002/03 ski seasons.

<sup>124</sup> National Ski Area Association (NSAA) *Kottke National End-of-Season Surveys* and the Arizona Snowbowl. The Pacific West region, as defined by NSAA, includes Nevada, Arizona, California, Oregon, Washington and Alaska.

<sup>125</sup> Based on respondents to NSAA annual survey 2002/03.

**Table 3E-11  
Arizona and Arizona Snowbowl Skier Visits as Percentage of Larger Markets  
(1996/97 – 2002/03)**

	1996/97	1998	1999	2000	2001	2002	2003
Arizona as % of Pacific West Market	3.7%	3.4%	2.2%	2.3%	3.2%	1.8%	2.6%
Arizona Snowbowl as % of Arizona Market	41.9%	46.8%	14.3%	27.1%	45.6%	1.3%	31.5%

During the past seven seasons, total Arizona skier visits have averaged only 0.5 percent of the U.S. market as a whole. While Arizona’s share of the Pacific West market is more significant, it remains at a relatively low level, with a fair amount of variability. Over the past seven seasons, Arizona Snowbowl skier visits have averaged 29.8 percent of the Arizona market. However, market share has varied dramatically – from 1.3 to 46.8 percent – again pointing to the variability of the Snowbowl’s business due to lack of consistent snow. The Snowbowl’s highly variable share of the Arizona market makes it clear that the ski area’s competitors within the state enjoy a more stable flow of business from year-to-year.

### **Arizona Snowbowl Employment**

Ski operations at the Arizona Snowbowl create a significant amount of employment. During the past seven seasons of operation (1996/97 through 2002/03) the Snowbowl employed an average of 22.1 persons on a full-time, year-round basis, 272.4 persons on a full-time seasonal basis and 204.3 persons part-time, seasonal basis. During the same seven seasons, the average number of persons employed during the peak week of employment was 370.3. For purposes of this analysis, the employment values have been converted to Full-Time-Equivalents (FTEs) for comparisons with projections of future employment levels.<sup>126</sup> During the past seven seasons, the Arizona Snowbowl provided an average of 172.0 FTE jobs.

Although the Arizona Snowbowl does not ‘drive’ the Flagstaff area economy, it is apparent that the ski area is a provider of jobs and that ski area visitors are positive contributors to the area economy.

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<sup>126</sup> One Full-Time-Equivalent is sufficient work to employ one worker on a full-time basis for one year. Total employed to FTE conversion rates used for this analysis are as follows: Full-Time Year-Round = 1.0 FTE, Full-Time Seasonal = 0.4 FTE and Part-Time Seasonal = 0.2 FTE.

## ENVIRONMENTAL CONSEQUENCES

### SUMMARY OF ENVIRONMENTAL CONSEQUENCES AND CONCLUSIONS

Major conclusions and determinations of this Social and Economic Resources analysis are summarized below. A more detailed analysis of the direct and indirect environmental consequences – from which this summary was derived – follows.

- The City of Flagstaff and Coconino County have experienced solid growth in recent years. Further, their rates of growth appear to have accelerated since 2000. Economic data makes it clear that tourism is a significant component of the Flagstaff area economy. It is estimated that over 24 percent of the Flagstaff economy is generated by tourism activity. While local events and weather do have short-term impacts on tourism volume, year-to-year totals are primarily driven by events in the U.S. macro economy. The significance of recreational activity and scenery in Coconino County is further established by an assessment of the housing stock; 17.1 percent of the county's total housing stock is held for seasonal or recreational purposes. This compares to 6.5 percent for all of Arizona.
- The Arizona Snowbowl is a positive contributor to area tourism and thus, the Flagstaff area economy. The Snowbowl generates jobs, draws dollars to the local economy via visitor expenditures at area businesses and is significant to the area in that it offers a winter attraction in a region that is typically oriented toward summer tourism. However, in an economy of this size, and with countywide tourism drawing over eight million visitors annually, it is unrealistic to think that the Snowbowl would be a significant driver of tourism activity or the economy. This is a positive, as communities in which a ski area is the most significant economic engine are often too affected by the ups and downs of those businesses.
- The Snowbowl has been unprofitable in four of its most recent 11 operating seasons. Without question, variability in natural snowfall and the lack of a snowmaking system have been the primary factors resulting in unprofitable seasons. Moreover, net cumulative profits, during those 11 seasons have been more than exhausted by on-going maintenance needs and small capital investments in the ski area. These capital investments have only been sufficient to maintain the ski area at its current level of quality and maintenance, and have not included any major improvements to increase competitiveness. Under these circumstances, continuation of the current operation as a for-profit business may not be sustainable; the ski area would likely decrease expenditures on maintenance and non-essential services leading to an overall reduction in the quality of the services offered.
- With an annual average of less than 300,000 skier visits, Arizona's ski industry is not a major player in the U.S. ski market. However, the state's ski areas are significant to the state's recreational offerings in that they offer a snow-based attraction in a state that is primarily oriented toward warm weather activities. The Arizona ski industry shows more variability in year-to-year skier visit totals than does the U.S. industry. Year-to-year skier visit totals at the Snowbowl are *extremely* variable when compared to the industry as a whole. This is a factor of absolute reliance on natural snowfall. For the industry as a whole, the installation of snowmaking systems is the standard for mitigating the impacts of variable snowfall.

- The Snowbowl currently *averages* 98,000 skier visits annually, but the annual figure varies dramatically, dependent on natural snowfall. The major positive economic impact of the Snowbowl is triggered by visitor expenditures – both at the Snowbowl and at other area businesses. Any significant change in the Snowbowl’s economic impact – either to the positive or negative – will be triggered by changes in visitation levels. Further, the consistency of the ski area’s economic impact would be affected by changes that would reduce the variability in year-to-year visitation totals.
- Currently, Snowbowl visitors average direct expenditures of \$9.79 million annually in Coconino County, including spending at the Snowbowl and at other area businesses. This spending directly supports 190 full-time job equivalents (FTEs). When the Snowbowl’s full range of direct and indirect economic impacts are considered, the ski area currently supports 232 FTEs and \$12.08 million in economic output in the private sector.
- The Snowbowl’s current public sector inputs include an annual average of \$90,000 in fee payments to the U.S. Treasury of which approximately 25 percent is provided to Coconino County, \$257,000 in state and county sales taxes and \$36,000 in county personal property tax. These payments help to support a number of local programs and services, including: schools, libraries and the fire district.
- The Snowbowl is a significant recreational/social asset to the Flagstaff area:
  - The Snowbowl is the primary winter recreational attraction in the area.
  - The Snowbowl provides access to an Alpine environment to those who would otherwise not be able to visit this area.
  - The Snowbowl provides support – both programmatic and financial – to a number of area groups.

### **Alternative 1 – No Action**

- Under this alternative, the ski area would continue operations with the existing facilities. While the Snowbowl has operated in its current form for a number of years, the financial analysis makes it clear that this may not be a viable business model – the business has been unprofitable in four of 11 years and the required capital investment has more than exhausted profits over that period. Thus, a continuation of the current operation and level of services would probably not be regarded as sustainable by a prudent owner or investor. While there is a demonstrated market for quality skiing in the Flagstaff area, the absence of natural snowfall in a number of years would keep the ski area from achieving a sustainable business position. A prudent owner/investor would eventually be forced to significantly curtail operations by reducing capital investment/maintenance expenditures and the level of services being provided depending on the weather.
- Assuming continued operations, the alternative would result in a small increase in visitation over the 10 year planning period; from an annual average of 98,000 to 110,000, primarily in response to regional population growth. However, annual totals would continue to be highly variable (plus or minus 70 percent from the average) due to variability in natural snowfall.

- Increases in average visitation would result in some additional economic impact. At the end of the 10 year planning period, these added expenditures would support an additional 11 FTEs and \$1.47 million in economic output. Thus, the ski area would support a total of 261 FTEs.
- Increases in ski area activity would support minor increases in average annual Forest Service Special Use Permit and sales tax payments.

## **Alternative 2 – The Proposed Action**

- All costs associated with the planning, development, construction, operation and maintenance of all proposed infrastructure would be fully the responsibility of the Arizona Snowbowl or future SUP permittees.
- Under this alternative, the Snowbowl would experience a major improvement in the skiing facility, create an entirely new snowtubing/snowplay area, significantly improve skier services and, put a snowmaking system in place. The snowmaking system is the most significant improvement from an economic impact perspective; snowmaking would allow the ski area to *consistently* operate with quality skiing conditions an average of 125 days per season. With a proven demand for quality skiing in this market, a consistent operating season would allow the ski area to significantly increase total annual visitation. Increases in visitor expenditures are closely correlated with a positive economic impact.
- The alternative would result in a significant increase in total visitation over the 10 year planning period; from an annual average of 98,000 to 257,000 (includes skiers and snowplayers). Year-to-year variations in visitation would be minimized (plus or minus 15 percent) because of the inclusion of a snowmaking system.
- The short-term impacts of the construction of the alternative's improvements would result in the creation of 232 FTEs and \$21.24 million in economic output in Coconino County.
- Increases in average visitation would result in a substantial positive economic impact. At the end of the 10 year planning period, these added expenditures would support an additional 331 FTEs and \$17.23 million in economic output. Thus, the ski area would support a total of 564 FTEs in Coconino County. This would be a significant result; a substantial number of Flagstaff area residents would gain employment opportunities as a result of increased activity at the Snowbowl.
- This alternative would result in substantial increases in fees and taxes paid to the public sector. At the end of the 10 year planning period, it is projected that the Snowbowl would pay an annual average of \$193,000 in Forest Service Special Use Permit fees of which 25 percent (approximately \$48,250) would be provided to the County for schools and roads, \$650,000 in state/county sales taxes and \$455,000 in county personal property taxes. Significantly, these fees/taxes would not vary substantially from year-to-year because ski area visitation would be more consistent in response to the installation of the snowmaking system. These fees and taxes would

be significant sources of support for local programs and services, including schools, libraries and the fire district.

- The Snowbowl's function as a recreational/social facility in the Flagstaff area would be enhanced and secured. With a larger facility and more secure financial base, the Snowbowl would be able to increase its role in the community – both from programmatic and resource perspectives. Further the addition of a snowplay area would enable a new demographic of guests to gain access to snow and the Alpine environment.

### **Alternative 3**

- All costs associated with the planning, development, construction, operation and maintenance of all proposed infrastructure would be fully the responsibility of the Arizona Snowbowl.
- It is highly unlikely that Alternative 3 would ever be fully implemented, either by current or future Arizona Snowbowl owners. Alternative 3 would include significant improvements to ski facilities, but the alternative does not include snowmaking. As such, skier visits and thus revenues would continue to fluctuate dramatically. With a higher break-even resulting from the investment in Alternative 3 improvements, the ski area would be unprofitable a high percentage of the time. Given these circumstances, the prudent owner/investor would likely not make the choice to complete all of the Alternative 3 project elements. At most, an owner/investor might make several of the minor improvements included in the alternative; these improvements would likely have little or no impact on skier visitation and ski area viability. In the event that an owner/investor were to fully complete the Alternative 3 improvements, the ski area could be placed in a highly tenuous financial situation potentially leading to the cessation of business operations within several years depending on the weather.
- Because Alternative 3 is unlikely to be fully accomplished, the effective economic impact would be similar to that for Alternative 1; minor increases in visitor expenditures would support some additional employment and dollar flows in the local economy and small increases in public sector fees and taxes. Further, the Snowbowl would continue to operate in a highly tenuous business situation, one that might not be sustainable over a period of years.
- In the unlikely event that Alternative 3 were to be fully completed, any increases in skier visits and expenditures would be short-term. Because visitation would continue to fluctuate dramatically, and the ski area's break-even level would increase, the operation would be tangibly unprofitable and could potentially cease business operations within several years. Under this situation, a significant number of persons would no longer be employed – both at the Snowbowl and at other area businesses that are supported by visitor spending.

## DETAILED ANALYSIS OF DIRECT AND INDIRECT EFFECTS

### *Issue:*

*Implementation of the Proposed Action may have social and economic effects on Flagstaff and Coconino County.*

### Indicator:

The Potential for the Proposed Action to Affect a Change In Key Local Economic Indicators (Population; Long- and Short-Term Employment, Housing, and Tax Revenues, etc.).

### Impact Analysis Methods

A variety of information and data sources were utilized to develop the analysis of economic impact. Capital cost estimates for the alternatives were developed in conjunction with Arizona Snowbowl ski area planners. Skier visit projections for the alternatives were developed based on historic data from the Arizona Snowbowl, projections regarding increases in facility scope and information regarding market area growth from the U.S. Bureau of the Census and the Arizona Department of Employment Security. Data on skier expenditures were based on surveys of skier expenditures from several western states (including Utah and Colorado) as well as surveyed expenditures by Arizona Snowbowl skiers from University Associates, Inc. An IMPLAN input-output analysis was conducted to determine total effects from construction, employment, and visitor expenditures.

The economic impact analysis was accomplished in several major steps:

1. *Skier visit Projections* – average level visit projections were prepared for a point 10 years following the completion of each alternative. (In addition, a snowtubing visit projection was prepared for Alternative 2.) The visit projections were based on the improvement – or lack of improvement – that each alternative would offer as well as background factors. The factors that were considered included; change in lift capacity, change in skiing terrain, development of a tubing/snowplay facility, change in parking capacity, development of snowmaking capability and potential population growth in the region.

Based on the most recent seven seasons of operation, the Arizona Snowbowl averaged just over 98,000 skier visits per season. However, it is essential to note that this is only an average figure and that, due to inconsistent snowfall, the year-to-year figure fluctuates dramatically. During the most recent seven seasons, the skier visit total fluctuated by as much as 97 percent below and 70 percent above the median. In recent seasons, day visitors have accounted for 65.5 percent of the total, while destination skiers accounted for 34.6 percent of the total.<sup>127</sup> Projections for each alternative are summarized below.

*Alternative 1* – Increases in average annual visitation would be minor and would only occur in response to projected population increases in the region. Average visits are

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<sup>127</sup> *The Arizona Snowbowl Snow Users Surveys.* Destination skiers are those who stay overnight in the area as part of their trip to the Snowbowl.

projected to increase from the current level of 98,000 to 110,500 in 10 years, a net increase of 12,500 visits. However, because Alternative 1 does not include snowmaking, year-to-year visits can be expected to continue to fluctuate dramatically. Based on historic data, total visits are projected to fluctuate plus or minus 70 percent from the average in three of four years. In one of four years, the fluctuation would be more extreme having reached 97 percent below the median. The breakdown between day and destination skiers is not projected to change from the current level.

*Alternative 2* – Increases in average annual visitation would be significant and would occur in response to all of the factors listed above, including the addition of a snowtubing facility. The most significant factor by far would be the addition of a snowmaking system. This system would allow the ski area to consistently average 125 days of operation per season and allow the ski area to consistently offer quality ski conditions on a variety of terrain. Based on past operations, an increase in operating days would clearly result in an increase in total annual visitation. Again, operational records make it clear that the number of days of operation is closely related to skier visit totals. Further, the addition of a snowmaking system would increase consumer confidence in the ski area, resulting in an increase in season pass sales and making the ski area more attractive to destination skiers. Average annual visitation is projected to increase from the current level of 98,000 to 214,500 in 10 years: a net increase of 116,500. These incremental visits will represent significant additional travel activity and a positive contribution to the area economy. Year-to-year fluctuations in visits are projected to be far less significant than under alternatives 1 or 3 and are projected to be on the order of plus or minus 15 percent from the average. Destination visitors are expected to increase as a percentage of the total, to 41.5 percent. In addition, it is projected that the snowtubing operation would generate an annual average of 42,000 visits. The great majority of snowtubers are expected to be day visitors.<sup>128</sup>

*Alternative 3* – As documented below under ‘Financial Viability,’ it is unlikely that the ski area improvements as listed under Alternative 3 would ever be fully achieved. Because of the lack of snowmaking, the investment required to achieve Alternative 3 would have no reasonable opportunity to be repaid and would, in fact, result in a ski area that is less financially viable than the current condition. As such the ‘projected increase’ in skier visits under this alternative is only a hypothetical that has little chance of every being achieved.

In the unlikely event that Alternative 3 was ever fully achieved, increases in average annual visitation would be minor, but somewhat higher than those projected for Alternative 1. Increases would occur in response to all of the factors listed above, with the exception of two major factors – the addition of snowmaking capability and

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<sup>128</sup> Snowtubing would only operate on weekends from Thanksgiving until December 22. At that point, the operation would begin daily operations. It is expected that the facility would operate until the third Sunday in March.

the addition of a snowtubing facility. Average visits would be projected to increase from the current level of 98,000 to 117,750 in 10 years, a net increase of 19,750 visits. However, because Alternative 3 does not include snowmaking, year-to-year visits would be expected to fluctuate dramatically. Based on historic data, total visits would be projected to fluctuate plus or minus 70 percent from the average in three of four years. In one of four years, the fluctuation would be more extreme having reached 97 percent below the median in recent years. A small increase in destination skiers would be anticipated in response to the ski area's increased facility offering.

2. *Visitor Spending* – the economic impact of the alternatives would be primarily dependent on increases in spending generated by additional visits to the Arizona Snowbowl. These expenditures would support additional jobs and wages at the ski area as well as additional jobs and wages at other area businesses where Snowbowl visitors make expenditures. Further, these expenditures would create both indirect and induced employment and economic activity in the impact area. Daily, visitor per capita expenditure levels were estimated in five major categories; Eating-Drinking-Entertainment, Retail, Hotel-Lodging, Services, and Lifts-Ski School. Further, breakdowns were developed for day and destination visitors and for spending within the ski area and outside the ski area. It is significant to note that per capita level spending is higher for destination visitors than for day visitors, primarily because of increased spending on Eating-Drinking-Entertainment, Retail and Hotel-Lodging. Further, destination visitors represent a net inflow to the economy – bringing in dollars from outside the local economy.<sup>129</sup> Thus, an alternative that increases the number of destination visitors would be a positive for the Flagstaff area economy.

Based on the average annual visitation levels of the past seven seasons, total spending by Arizona Snowbowl visitors (including spending inside and outside of the resort) is \$9.79 million on an annual basis. Thus, the Snowbowl currently generates almost \$10 million in spending in the local economy. This benefits both the Snowbowl and a number of other area businesses where Snowbowl visitors make expenditures.

3. *Input/Output Analysis* – the projected visitor expenditures were analyzed using an input/output model to project economic impacts to the region. The IMPLAN model was used for making projections regarding prospective employment outside of the resort and employment to be generated on indirect bases.<sup>130</sup> IMPLAN is a broadly accepted model for making projections regarding employment and economic impacts and is commonly used in Environmental Impact Statements prepared as part of the NEPA process.

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<sup>129</sup> Per capita spending estimates based on surveys of skier expenditures in several western states including Colorado and Utah and data from *The Arizona Snowbowl Snow Users Surveys*.

<sup>130</sup> IMPLAN Professional is a product of MIG, Inc. and is an economic impact assessment modeling system. IMPLAN allows the user to build economic models to estimate that impacts of economic changes in their states, counties or communities.

Employment economic activity creation is defined in three ways in this report, as defined by the IMPLAN model:

*Direct* – employment created as a direct impact of the project. On-site construction jobs, resort-based jobs and non-resort jobs generated by visitor expenditures are included in this category. The majority of these jobs would be created in the resort or within the greater Flagstaff area.

*Secondary* – employment created by industry-to-industry spending. For instance, increased food & beverage spending at the Arizona Snowbowl would cause the ski area to purchase more goods from food suppliers. Increased business levels would allow these food suppliers to create more employment. These are *secondary* jobs. These jobs would be created both locally and throughout the geographic area in which construction contractors and the ski area regularly conducts business.

*Induced* – employment created by increased household spending. The additional jobs and income created by the alternatives and increased visitation would allow consumers to increase their spending on goods and services. This spending would allow a number of businesses to create more jobs. These are *induced* jobs. Induced jobs would be generated over a relatively broad geographic area.

Within this analysis, the combination of *secondary* and *induced* impacts is referred to as *indirect* impacts. It is essential to note that all employment estimates are shown in terms of ‘Full-Time-Equivalents,’ (FTEs). One FTE is sufficient work to employ one person on a full-time basis for one year. One FTE often represents more than one job position, particularly in situations where many workers are seasonal or employed on a part-time basis.

IMPLAN also provides an ‘Output’ statistic, the total dollar value of production by all industries.

The IMPLAN model has been constructed to use a geographic area that includes all of Coconino County. The model’s output regarding employment impacts considers economic activity throughout this region.<sup>131</sup> Employment records indicate that a great majority of the Snowbowl’s employees live in Coconino County.

The input-output analysis indicates the following regarding Arizona Snowbowl’s current economic impact – in terms of FTEs and total output.

**Table 3E-12  
Current Economic Impact Arizona Snowbowl**

	<b>Direct</b>	<b>Indirect</b>	<b>Totals</b>
Employment (FTEs)	189.3	43.1	232
Output (\$Millions)	\$9.10	\$2.98	\$12.08

Under current conditions, the Arizona Snowbowl is a clear, positive contributor to the area

<sup>131</sup> It is possible that the economic impacts of the alternatives would extend beyond Coconino County.

economy. In total, the Snowbowl is responsible for generating 232 full-time employment equivalents and just over \$12 million and annual economic output.

### Assumption

This methodology is based on the following assumptions:

- Existing information provides an adequate basis for analysis and disclosure of the socioeconomic impacts of this proposal; no original research was conducted.
- Cost and revenue projections are expressed in 2003 dollars, without adjustment for inflation. Economic impact projections are oriented toward a ‘planning year’ ten years after the completion of the chosen alternative.

This analysis focuses on the Alpine skiing and snowtubing impacts that are directly associated with the Arizona Snowbowl proposal, leaving qualitative discussion of other forms of recreation to the Recreation section within this document.

### Anticipated Impacts

The table on the following page summarizes the analysis presented within the remainder of this section. The data provided represents the anticipated impacts of each alternative estimated at a point ten years following implementation of the respective alternative.

**Table 3E-13  
Summary of Impacts of Alternatives**

	<b>BUILD-OUT PROJECTIONS - 10 Years</b>			
	<b>BASE 2003</b>	<b>Alt 1 No-Action</b>	<b>Alt 2 Proposed Action</b>	<b>Alt 3</b>
<b>Skier Visitation</b>				
Day Skiers	64,234	72,372	125,685	75,012
Destination Skiers	33,908	38,204	89,015	42,705
<b>TOTAL (Annual Average)</b>	<b>98,142</b>	<b>110,576</b>	<b>214,700</b>	<b>117,716</b>
<b>Coconino County Demographics</b>				
Population (2002)	125,420		Year 2015 Projection:	158,753
Housing Units (2000)	53,443			
<b>Development Costs (\$Millions)</b>				
Spent within impact area	-	\$0.75	\$15.45	\$5.90
Spent outside impact area	-		\$4.32	\$4.32
<b>TOTAL</b>	<b>-</b>	<b>\$0.75</b>	<b>\$19.77</b>	<b>\$10.22</b>
<b>Visitor Spending (\$Millions)</b>				
Food & Beverage	\$1.7	\$1.9	\$4.3	\$2.1
Retail	\$2.7	\$3.0	\$6.7	\$3.3
Hotel & Lodging	\$1.3	\$1.4	\$3.2	\$1.6
Services	\$0.8	\$0.8	\$1.9	\$0.9
Lifts & Ski School	\$3.3	\$3.8	\$7.7	\$4.0
<b>TOTAL</b>	<b>\$9.8</b>	<b>\$11.0</b>	<b>\$23.7</b>	<b>\$11.9</b>
<b>Employment (FTEs)</b>				
<b>Short-Term (Construction)</b>		(EIS Process Only)		
Direct	-	7	142	50
Secondary	-	2	43	16
Induced	-	2	47	16
<b>TOTAL Construction Employment</b>	<b>-</b>	<b>11</b>	<b>232</b>	<b>82</b>
<b>Long-Term (Expenditures)</b>				
Direct Employment				
On-Site	172	175	211	175
Off-Site	17	38	248	54
Indirect Employment				
Off-Site	43	48	105	52
<b>TOTAL Employment</b>	<b>232</b>	<b>261</b>	<b>564</b>	<b>282</b>
<b>Fiscal Considerations</b>				
Forest Service Fees (Average Annual)	\$90,000	\$99,500	\$193,000	\$106,000
Property taxes to Coconino County	\$36,000	\$36,169	\$455,833	\$245,152
Sales Taxes (County & State)	\$257,000	\$289,500	\$669,000	\$308,000

Table data makes it clear that from an economic perspective, Alternative 2's impact would far outweigh either Alternative 1 or 3. As noted, it is unlikely that Alternative 3 would ever be fully developed.

### **Alternative 1 – No Action**

#### Economic Impacts

During previous seasons, Arizona Snowbowl skier visits have shown no regular pattern of increase or decline, as year-to-year totals fluctuate dramatically in response to weather/snow conditions and the number of days the ski area is able to operate in a given year. Market

response to the Snowbowl’s product is strong when quality skiing conditions exist. This is an indication that an increase in the number of available days of quality skiing would increase skier visit totals. Over the course of the 10 year study period, the *average* annual number of skier visits is expected to increase by 12.7 percent under Alternative 1. However, year-to-year totals would continue to fluctuate dramatically with typical variances in the plus/minus 70 percent range from the average level.

No direct construction would take place under Alternative 1. However, the EIS process would have some economic impact, with total direct spending of \$750,000 (refer to Table 3E-20 for a comparison of project related capital expenditures by alternative). The employment and economic output impacts of this spending would be short term and are not expected to last beyond the completion of the process. These FTE and economic output impacts are summarized in the table below.

**Table 3E-14  
Short-Term Impacts  
Alternative 1**

	Direct	Indirect	Totals
Employment FTEs)	7.0	4.4	11.4
Output (\$Millions)	\$0.75	\$0.28	\$1.03

The EIS process would have the short-term impact of creating over 11 FTEs and \$1.03 million in output.

In the longer term, average level increases in annual visitation at the Snowbowl would result in longer term impacts on employment and output. However, it is significant to note that under Alternative 1, these impacts would not be consistent, as year-to-year visitation would continue to fluctuate by a substantial amount. The *average* level of visitor increase at the end of the 10 year planning period, incremental expenditures by Snowbowl visitors over the amount spent in recent years would total \$1.19 million. This would include \$527,000 in additional spending within the ski area and \$664,000 in additional spending outside the ski area – in the remainder of Coconino County.<sup>132</sup> When combined with base level (current) expenditures, spending by Snowbowl visitors would total \$10.98 million. While this is not a dramatic increase over the current level of economic input, it does emphasize the Snowbowl’s current positive contribution to the economy.

Using IMPLAN, the incremental expenditures have been analyzed to determine Alternative 1’s incremental impact in terms of direct and indirect employment and output. This is shown in the following table.

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<sup>132</sup> ‘Outside’ the ski area includes other businesses operated by the Arizona Snowbowl, including lodging and Nordic skiing operations.

**Table 3E-15  
Long-Term Incremental Impacts  
Alternative 1**

	Direct	Indirect	Totals
Employment (FTEs)	23.1	5.3	29
Output (\$Millions)	\$1.11	\$0.36	\$1.47

At the end of the 10 year planning period, Alternative 1 would generate a total of 29 additional FTEs and \$1.47 million in additional economic output within Coconino County. Based on the Snowbowl’s estimate of the employment that would be created under Alternative 1 (2.8 FTEs), Alternative 1 would generate 26 FTEs outside of the ski area, in the remainder of Coconino County.

In total (current and incremental), the Arizona Snowbowl would generate 261 FTEs at the completion of the 10 year planning period.

**Fiscal Impacts**

The No Action alternative could have impacts on payments made by the Arizona Snowbowl to governmental entities, such as the U.S. Government, the State of Arizona, Coconino County and the City of Flagstaff. These fees are used for a variety of public purposes, supporting programs at the Federal, state and local levels.

***Forest Service Fees***

During recent years, Snowbowl made the following annual payments to Forest Service.

**Table 3E-16  
Arizona Snowbowl Payments  
to Forest Service (1998 – 2002)**

Year	Forest Service Fees
1998	\$159,715
1999	\$24,633
2000	\$89,912
2001	\$103,875
2002	\$24,488
<i>Median</i>	<i>\$89,912</i>

Fees are collected annually, and are based on skier visitation. The Snowbowl has paid the Forest Service an average of approximately \$0.90 per skier visit over the past five seasons. These “Receipt Act” payments are generated from fees paid to National Forests by permittees, such as the Snowbowl, and are distributed pursuant to the Receipt Act. Such payments have historically varied according to the level of revenues generated by the permittee, which in the case of the Snowbowl is directly tied to skier visitation. Because Snowbowl visitation fluctuates dramatically, Receipt Act payments have varied by a substantial amount – 78 percent over, and 73 percent under, the median of the values shown in the table. A segment of the Forest Service

fees are allocated to Coconino County. 75 to 80 percent of this allocation is then used to support local schools. As such, the fees are significant to local education.

Annual fees can be expected to increase as the average skier visit level at the Snowbowl increases. However, skier visit totals under Alternative 1 would continue to fluctuate dramatically, so fees would fluctuate from year-to-year. It is projected that at the end of the 10 year planning period, annual Forest Service fees would average \$99,500, with a typical variation range from \$30,000 to \$169,000.

### Sales Tax

The Arizona Snowbowl pays sales taxes to the State of Arizona and Coconino County. Sales taxes support a number of state and local programs and services. The sales tax is essentially based on all Snowbowl revenue, with the exceptions of private ski lessons and labor-based revenue for ski repairs in the rental shop. The table below shows Sales Tax paid by the Snowbowl in recent years.<sup>133</sup>

**Table 3E-17  
Sales Taxes Paid by Arizona Snowbowl  
(1998 – 2003)**

	<b>Sales Tax (State &amp; County Combined)</b>
1998	\$350,590
1999	\$98,991
2000	\$311,877
2001	\$363,352
2002	\$100,079
2003*	\$202,493
Cumulative	\$1,427,382
<b>Median Annual</b>	<b>\$257,185</b>

Note: 2003 through April only.  
Source: Arizona Snowbowl.

Because sales tax is directly related to revenues, the tax paid by the Snowbowl varies significantly dependent on visitation levels. During the years shown in the table, the tax paid varied from 62 percent below to 41 percent above the median.

Over the years shown, sales tax paid to the state/county averaged approximately \$2.60 per skier visit. The potential future increment in sales tax to be paid by the Snowbowl under Alternative 1 is based on the projected average increase in skier visits times this per visit figure. Skier visit totals under Alternative 1 would continue to fluctuate dramatically, so sales tax payments would fluctuate from year-to-year. It is projected that at the end of the 10 year planning period, the *incremental increase* in annual sales tax payments would average \$32,500, with a typical variation range from \$9,750 to \$55,000.

<sup>133</sup> Note that during the years shown in the table, the Snowbowl made cumulative sales tax payments to the City of Flagstaff in the amount of \$14,754 as a result of the Snowbowl's downtown store.

### Personal Property Tax

The Arizona Snowbowl pays an annual Personal Property Tax to Coconino County. The tax supports county operations. The tax is based on an assessed value of personal property at the Snowbowl. Property taxes are allocated the county school district, the library and the fire district. As such, they are essential for supporting local programs and services. Because the Snowbowl is on NFS land, the value is based on 'built' facilities or improvements of possessory rights. Recent Personal Property Tax payments to the county are summarized in the table below.<sup>134</sup>

**Table 3E-18  
Personal Property Tax Payment Made by  
Arizona Snowbowl to Coconino County  
(1998 – 2002)**

	<b>Personal Property Tax Payments</b>
1998	\$29,266
1999	\$37,189
2000	\$37,120
2001	\$36,367
2002	\$36,169

Source: Arizona Snowbowl.

Because Personal Property Tax payments are based on the 'depreciated market' value of built facilities and improvements, they do not fluctuate in response to variation in skier visit totals. The current (2003) 'full value' assessment of the Snowbowl is \$1,639,528.<sup>135</sup> The Snowbowl's assessed value is not expected to change under Alternative 1. As such, no significant change in Personal Property Tax payments is anticipated.<sup>136</sup> This is shown in the table below.

**Table 3E-19  
Estimated Annual Personal Property Payments  
Alternative 1**

	<b>Current Personal Property Value</b>	<b>Added Value + Under Alternative</b>	<b>Total Estimated Personal Property = Value</b>	<b>Annual Estimated Personal Property Tax</b>
Alternative 1	\$1,639,528	\$0	\$1,639,528	\$36,169

<sup>134</sup> Values based on tax payments made by the Snowbowl Alpine ski facility alone and do not include payments for property at the Nordic facility.

<sup>135</sup> Based on 'Personal Property Notice of Value' forms from the Coconino County Assessor's office.

<sup>136</sup> Assessments are based on depreciated value of personal property. As such, the assessment would decrease with time unless improvements are completed.

## Alternative 2 – The Proposed Action

### Economic Impacts

During previous seasons, Arizona Snowbowl skier visits have shown no regular pattern of increase or decrease, as year-to-year totals fluctuate dramatically in response to weather/snow conditions and the number of days the ski area is able to operate in a given year. Over the 10 year study period, the increase in the *average* annual number of skier visits plus the addition of snowtubing/snowplayer visits under Alternative 2 is expected to increase total visitation at the Snowbowl by 162 percent over current annual average visitation and 132 percent over the existing condition. In addition, fluctuation in year-to-year totals would decrease dramatically because of the addition of a snowmaking system. Year-to-year fluctuation is expected to be plus or minus 15 percent from average annual visitation.

As detailed in Table 3E-20, substantial direct construction would take place under Alternative 2. The total construction value of Alternative 2 improvements is estimated at \$19,773,000, of which approximately \$15,453,000 would be primarily local spending.<sup>137</sup>

**Table 3E- 20**  
**Project Capital Expenditures by Alternative<sup>a</sup>**

	Alternative 1	Alternative 2	Alternative 3
Snowmaking Infrastructure	n/a	\$8,200,000	n/a
Snowplay – Terrain	n/a	\$350,000	n/a
Snowplay – Parking	n/a	\$300,000	n/a
Snowplay – Facility	n/a	\$700,000	n/a
Lifts – Local Construction	n/a	\$1,080,000	\$1,080,000
Lifts – Non-Local Equipment	n/a	\$4,320,000	\$4,320,000
Terrain Improvements	n/a	\$558,000	\$558,000
Guest Service facilities – All	n/a	\$2,800,000	\$2,800,000
Summer Trails	n/a	\$65,000	\$65,000
Infrastructure – Sewer	n/a	\$350,000	\$350,000
Infrastructure – Roads/Underpass	n/a	\$200,000	\$200,000
Parking, Roads	n/a	\$100,000	\$100,000
Entitlements	\$750,000	\$750,000	\$750,000
<b>Total for Alternative</b>	<b>\$750,000</b>	<b>\$19,773,000</b>	<b>\$10,223,000</b>

Source: Arizona Snowbowl Management, Landvest, Sno.matic Controls & Engineering, SE GROUP

<sup>a</sup> Recurring capital expenditures for maintenance are not included here, but are discussed elsewhere within this section.

The employment and economic output impacts of this construction spending would be significant, but would be short-term and are not expected to last beyond the completion of the construction activity. The FTE and economic output impacts of Alternative 2 construction are summarized in the table below.

<sup>137</sup> Approximately \$4,320,000 would be expended on equipment (primarily ski lifts) that would be manufactured outside of the Coconino County study area.

**Table 3E-21  
Short-Term Impacts  
Alternative 2-The Proposed Action**

	<b>Direct</b>	<b>Indirect</b>	<b>Totals</b>
Employment FTEs)	142.0	89.6	231.6
Output (\$Millions)	\$15.10	\$6.14	\$21.24

Alternative 2 construction activity would have the short-term impact of creating over 230 FTEs and generating \$21.24 million in economic output. While short-term in nature, this would represent a significant number of construction related jobs and economic activity.

In the longer term, average level increases in visitation at the Snowbowl would result in long term impacts on employment and output. These impacts would be relatively consistent under Alternative 2, as visitation at the Snowbowl would not fluctuate significantly due to the introduction of a snowmaking system. In addition, the long-term viability of the Snowbowl would be enhanced under this alternative. At the average level of annual visitor increase at the end of the 10 year planning period, incremental expenditures by Snowbowl visitors over the amount spent in recent years would total \$14.00 million. This would include \$5.66 million in additional spending within the ski area and \$8.30 million in additional spending outside the ski area – in the remainder of Coconino County.

When combined with base level (current) expenditures, spending by Snowbowl visitors would total \$23.74 million. This would be a significant positive impact to the area economy, giving a boost to both the Snowbowl and a significant number of other businesses that would draw expenditures from Snowbowl visitors. Most significantly, these expenditures would support additional local employment, as detailed below.

Using IMPLAN, the incremental expenditures have been analyzed to determine Alternative 2’s incremental impact in terms of direct and indirect employment and output. This is shown in the table below.

**Table 3E-22  
Long-Term Incremental Impacts  
Alternative 2-The Proposed Action**

	<b>Direct</b>	<b>Indirect</b>	<b>Totals</b>
Employment (FTEs)	269.6	61.6	331
Output (\$Millions)	\$12.97	\$4.26	\$17.23

At the end of the 10 year planning period, The Proposed Action would generate a total of 332 additional FTEs and \$17.23 million in additional economic output in Coconino County. Respectively, these exceed the effects of the No Action Alternative by 303 FTEs and \$15.76 million in economic output. Based on the estimate of the employment that would be created under Alternative 1 (38.9 FTEs), Alternative 2 would generate 292 FTEs outside of the ski area, in the remainder of Coconino County.

In total (current and incremental), the Arizona Snowbowl would generate 564 FTEs at the completion of the 10 year planning period. While the Snowbowl would still not be the major drive of the Flagstaff area economy, the importance of 564 full-time equivalent jobs is difficult to overstate.

### *Fiscal Impacts*

Alternative 2 could have impacts on payments made by the Arizona Snowbowl to governmental entities, such as the U.S. Government, the State of Arizona, Coconino County and the City of Flagstaff.

### *Forest Service Fees*

Annual payments to the Forest Service in recent years are shown under Alternative 1 above.

Fees are collected annually, and are based on skier visitation. The Snowbowl has paid the Forest Service an average of approximately \$0.90 per skier visit over the past five seasons. These “Receipt Act” payments are generated from fees paid to National Forests by permittees, such as the Snowbowl, and are distributed pursuant to the Receipt Act. Such payments have historically varied according to the level of revenues generated by the permittee, which in the case of the Snowbowl is directly tied to skier visitation. Because Snowbowl visitation fluctuates dramatically, Receipt Act payments have varied by a substantial amount – 78 percent over and 73 percent under the median of the values shown in the table. A segment of the Forest Service fees are allocated to Coconino County. 75 to 80 percent of this allocation is then used to support local schools. As such, the fees are significant to local education.

Annual fees can be expected to increase as the average skier visit level at the Snowbowl increases. Total annual visitation (skiers and snowplayers) would be relatively consistent under Alternative 2, as a result of the introduction of a snowmaking system. As a result, fees can be expected to be relatively steady from year-to-year – only fluctuating within a range of 15 percent plus or minus. It is projected that at the end of the 10 year planning period, annual Forest Service fees would average \$193,000, with a typical variation range from \$164,000 to \$222,000. Average annual fees generated by Alternative 2 would exceed those to be generated by the No Action Alternative by approximately \$93,500 and would be consistent from year-to-year. The incremental increase in fees is significant in two ways: 1) it will provide additional funding for programs; and 2) because the fee level will be consistent, will provide stability in program funding.

### *Sales Tax*

The Arizona Snowbowl pays sales taxes to the State of Arizona and Coconino County. The tax supports a number of state and local programs and services. The sales tax is essentially based on all Snowbowl revenue, with the exceptions of private ski lessons and labor-based revenue for ski repairs in the rental shop. Sales taxes paid by the Arizona Snowbowl in recent years are shown under Alternative 1 above. Because sales tax is directly related to revenues, the tax paid by the Snowbowl varies significantly dependent on visitation levels. During the years shown in the table, the tax paid varied from 62 percent below to 41 percent above the median.

Over the years shown, sales tax paid to the state/county averaged approximately \$2.60 per skier visit. The potential future increment in sales tax to be paid by the Snowbowl under Alternative 2 is based on the projected average increase in skier visits times this per visit figure. Skier visit totals under Alternative 2 would be relatively consistent as a result of the introduction of a snowmaking system, so sales tax payments would not change significantly from year-to-year. It is projected that at the end of the 10 year planning period, the *incremental increase* in annual sales tax payments would average \$412,000, with a typical variation range from \$350,000 to \$474,000. The incremental increase in sales taxes under Alternative 2 exceeds the incremental increase under the No Action alternative by \$380,000 on an annual basis. In total (current plus projected sales tax), it is projected that if Alternative 2 were to be accomplished, the Arizona Snowbowl would generate \$650,000 in sales tax on an annual basis. This is a substantial to programs and services funded by the sales tax.

### *Personal Property Tax*

The Arizona Snowbowl pays an annual Personal Property Tax to Coconino County. Property taxes are allocated to the county school district, the library and the fire district. As such, they are essential for supporting local programs and services. The tax is based on an assessed value of personal property at the Snowbowl. Because the Snowbowl is on NFS land, the value is based on 'built' facilities or improvements of possessory rights. Recent Personal Property Tax payments to the county are summarized under Alternative 1 above. The tax supports a number of county programs and services.

Because Personal Property Tax payments are based on the 'depreciated market' value of built facilities and improvements they do not fluctuate in response to variation in skier visit totals. The current (2003) 'full value' assessment of the Snowbowl is \$1,639,528.<sup>138</sup> The Snowbowl's assessed value would increase substantially under Alternative 2, as a number of new facilities and improvements would be made under the alternative's construction program. In total, the construction program calls for \$19.023 million in new facilities and improvements at the Arizona Snowbowl.<sup>139</sup> As such, annual personal property tax payments would increase substantially. This is shown in the table below.

**Table 3E-23  
Estimated Annual Personal Property Tax Payments - Alternative 2**

	<b>Current Personal Property Value</b>	<b>Added Value + Under Alternative</b>	<b>Total Estimated Personal Property = Value</b>	<b>Annual Estimated Personal Property Tax</b>
Alternative 2	\$1,639,528	\$19,023,000	\$20,662,528	\$455,833

It is estimated that upon completion Alternative 2 would generate over \$450,000 annually in Personal Property Tax payments. This is an increment of \$420,000 annually over the current level (Alternative 1) and would be a significant source of support for county programs and services.

<sup>138</sup> Based on 'Personal Property Notice of Value' forms from the Coconino County Assessor's office.

<sup>139</sup> This figure includes the value of ski lifts that would be manufactured outside the study area but does not include the cost of the EIS process.

### Alternative 3

It is the conclusion of the analysis that Alternative 3 is highly unlikely to be fully implemented, either by the current or a future owner. This is documented below under “Financial Viability of the Ski Area.” Alternative 3 would include significant improvements to ski facilities, but the alternative does not include snowmaking. As such, skier visits and thus revenues would continue to fluctuate dramatically. With a higher break-even resulting from the investment in Alternative 3 improvements, the ski area would be unprofitable a high percentage of the time. Given these circumstances, a prudent owner/investor would likely not fully implement Alternative 3. At most, an owner/investor might make several of the minor improvements included in the alternative; these improvements would have little or no impact on skier visitation and ski area economic impact. In the event that an owner/investor did complete Alternative 3, the ski area could be placed in a highly tenuous financial situation which could potentially lead to the cessation of operations within several years depending on the weather.

Viewed from a realistic perspective, Alternative 3 can be viewed as virtually the same as Alternative 1; if Alternative 3 were to be approved, essentially no change would take place at the Snowbowl.

The analysis of Alternative 3 economic and fiscal impacts below should thus be regarded as unlikely to occur in nature as the analysis concludes that the prudent investor would not fully complete these improvements. In the event that the alternative were fully implemented, it is likely that skier visits and thus revenues would continue to fluctuate dramatically. With a higher break-even resulting from the investment in Alternative 3 improvements, the ski area would be unprofitable a high percentage of the time. The ski area could be placed in a highly tenuous financial situation potentially leading to the cessation of business operations within several years depending on the weather.

#### Economic Impacts

During previous seasons, Arizona Snowbowl skier visits have shown no regular pattern of increase or decline, as year-to-year totals fluctuate dramatically in response to weather/snow conditions and the number of days the ski area is able to operate in a given year. In the event that Alternative 3 were to be fully accomplished, the *average* annual number of skier visits is expected to increase by 19.9 percent over current average annual visitation and 6.5 percent over Alternative 1 over the 10 year planning period. Year-to-year totals would continue to fluctuate dramatically with typical variances in the plus/minus 70 percent range from the average level. Again, it is unlikely that these changes would fully occur.

Significant direct construction would take place under Alternative 3, if it were to be accomplished. The total construction value of Alternative 3 improvements is estimated at \$10,223,000, of which approximately \$5,903,000 would be primarily local spending.<sup>140</sup> The employment and economic output impacts of this construction spending would be significant, but would be short-term and would not be expected to last beyond the completion of the

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<sup>140</sup> Approximately \$4,320,000 would be expended on equipment (primarily ski lifts) that would be manufactured outside of the Coconino County study area.

construction activity. The FTE and economic output impacts of Alternative 3 construction are summarized in the table below.

**Table 3E-24  
Short-Term Impacts  
Alternative 3**

	Direct	Indirect	Totals
Employment (FTEs)	50.2	32.1	82.3
Output (\$Millions)	\$5.55	\$2.20	\$7.75

Alternative 3 construction would have the short-term impact of creating over 80 FTEs and generating \$7.75 million in economic output.

In the hypothetical instance in which the Alternative 3 projects were to be completed, average increases in annual visitation at the Snowbowl would result in impacts on employment and output. However, these impacts would likely only occur until the ski area ceased operations – a likely outcome if Alternative 3 were to be fully implemented. Further, under Alternative 3, these impacts would not be consistent, as year-to-year visitation would continue to fluctuate by a substantial amount. At the *average annual* level of visitor increase at the end of the 10 year planning period, incremental expenditures by Snowbowl visitors over the amount spent in recent years would total \$2.09 million. This would include \$0.84 million in additional spending within the ski area and \$1.25 million in additional spending outside the ski area – in the remainder of Coconino County.<sup>141</sup> When combined with base level (current) expenditures, spending by Snowbowl visitors would total \$11.88 million.

Using IMPLAN, the hypothetical incremental expenditures were analyzed to determine Alternative 3’s incremental impact in terms of direct and indirect employment and output. This is shown in the table below.

**Table 3E-25  
Long-Term Incremental Impacts  
Alternative 3**

	Direct	Indirect	Totals
Employment (FTEs)	40.2	9.2	50
Output (\$Millions)	\$1.94	\$0.64	\$2.58

At the end of the 10 year planning period, Alternative 3 would generate a total of 50 additional FTEs and \$2.58 million in additional economic output in Coconino County. Respectively, these exceed the impacts of the No Action Alternative by 21 FTEs and \$1.11 million in economic output. Based on the estimate of the employment that would be created under Alternative 3 (3.5 FTEs), Alternative 3 would generate 46 FTEs outside of the ski area, in the remainder of Coconino County.

<sup>141</sup> ‘Outside’ the ski area includes other businesses operated by the Arizona Snowbowl, including lodging and Nordic skiing operations.

### Fiscal Impacts

Alternative 3 could have impacts on payments made by the Arizona Snowbowl to governmental entities, such as the U.S. Government, the State of Arizona, Coconino County and the City of Flagstaff.

The analyses below assesses the hypothetical instance in which Alternative 3 projects were to be fully accomplished. This situation is highly unlikely and, if it were to occur, could result in the cessation of business activity by the ski area.

### *Forest Service Fees*

Annual payments to the Forest Service in recent years are shown under Alternative 1 above.

Fees are collected annually, and are based on skier visitation. The Snowbowl has paid the Forest Service an average of approximately \$0.90 per skier visit over the past five seasons. These “Receipt Act” payments are generated from fees paid to National Forests by permittees, such as the Snowbowl, and are distributed pursuant to the Receipt Act. Such payments have historically varied according to the level of revenues generated by the permittee, which in the case of the Snowbowl is directly tied to skier visitation. Because Snowbowl visitation fluctuates dramatically, Receipt Act payments have varied by a substantial amount – 78 percent over and 73 percent under the median of the values shown in the table.

Annual fees would be expected to increase as the average skier visit level at the Snowbowl increases. However, in the unlikely event that the alternative was to be fully accomplished, annual skier visit totals under Alternative 3 would continue to fluctuate dramatically, so fees would fluctuate from year-to-year. It is projected that at the end of the 10 year planning period, annual Forest Service fees would average \$106,000, with a typical variation range from \$32,000 to \$180,000.

### *Sales Tax*

The Arizona Snowbowl pays sales taxes to the State of Arizona and Coconino County. The sales tax is essentially based on all Snowbowl revenue, with the exceptions of private ski lessons and labor-based revenue for ski repairs in the rental shop. Sales taxes paid by the Arizona Snowbowl in recent years are shown under Alternative 1 above. Because sales tax is directly related to revenues, the tax paid by the Snowbowl varies significantly dependent on visitation levels. During the years shown in the table, the tax paid varied from 62 percent below to 41 percent above the median.

Over the years shown, sales tax paid to the state/county averaged approximately \$2.60 per skier visit. The potential future increment in sales tax to be paid by the Snowbowl under Alternative 3 is based on the projected average increase in skier visits times this per visit figure. Annual skier visit totals under Alternative 3 would continue to fluctuate dramatically, so sales tax payments would fluctuate from year-to-year. It is projected that at the end of the 10 year planning period, the *increment* in annual sales tax payments would average \$51,000, with a typical variation range from \$15,250 to \$86,500. The incremental increase in sales taxes under Alternative 3 would exceed the increment under the No Action Alternative by \$18,500 on an annual basis.

### Personal Property Tax

The Arizona Snowbowl pays an annual Personal Property Tax to Coconino County. The tax supports county operations. The tax is based on an assessed value of personal property at the Snowbowl. Because the Snowbowl is on NFS land, the value is based on 'built' facilities or improvements of possessory rights. Recent Personal Property Tax payments to the county are summarized under Alternative 1 above.

Because Personal Property Tax payments are based on the 'depreciated market' value of built facilities and improvements, they do not fluctuate in response to variation in annual skier visit totals. The current (2003) 'full value' assessment of the Snowbowl is \$1,639,528.<sup>142</sup> The Snowbowl's assessed value would increase if Alternative 3 were to be accomplished, as a number of new facilities and improvements would be made under the alternative's construction program. In total, the construction program calls for \$9.473 million in new facilities and improvements at the Arizona Snowbowl.<sup>143</sup> As such, annual personal property tax payments would increase substantially. This is shown in the table below.

**Table 3E-26**  
**Estimated Annual Personal Property Payments**  
**Alternative 3**

	<b>Current Personal Property Value</b>	<b>Added Value + Under Alternative</b>	<b>Total Estimated Personal Property = Value</b>	<b>Annual Estimated Personal Property Tax</b>
Alternative 3	\$1,639,528	\$9,473,000	\$11,112,528	\$245,152

#### Indicator:

#### Financial Viability of the Ski Area Under All Alternatives

During the most recent eleven ski seasons (1992/93 to 2002/03) the Arizona Snowbowl's business record has been inconsistent; in seven years, revenues have exceeded costs of operation and the ski area has been profitable. However, in the remaining four seasons, costs have exceeded revenues and the business has lost money. Common sense says that any business that loses money during 36 percent of its operational periods would be regarded as a one of marginal viability. Further, the Snowbowl is in a capital-intensive business, one where capital expenditures are required on a regular basis to offer a quality product, offer an adequate level of guest service and to maintain a reasonable level of competitiveness. Over the past eleven operating years, the Snowbowl has invested a cumulative total of \$4.42 million in capital expenditures, all of which has been oriented toward ski area maintenance.<sup>144</sup> These expenditures have merely served to maintain the Snowbowl's existing competitive situation. In the ski

<sup>142</sup> Based on 'Personal Property Notice of Value' forms from the Coconino County Assessor's office.

<sup>143</sup> This figure includes the value of ski lifts that would be manufactured outside the study area but does not include the cost of the EIS process.

<sup>144</sup> The Snowbowl's capital expenditures have been oriented toward maintenance of the current level of quality, including items such as restrooms, groomers, water trucks, and background infrastructure. Capital investment has not been sufficient to add improvements that would be evident to the skier, such as new lifts, lodge space, terrain, etc.

industry, it is generally assumed that at least six percent of gross revenues should be allocated for maintenance capital – capital expenditures sufficient to maintain a ski area at an acceptable level of quality, but not to make significant improvements to the facility. The Snowbowl’s capital investment over the past eleven years has equaled 8.87 percent of gross revenues.<sup>145</sup> However, as shown below, this level of expenditure has required the ski area’s owners to infuse additional capital as these expenditures have exceeded net revenues. Alternative 2 envisions significant additional capital expenditures, with the intent of improving the offerings and quality of the ski area and, most significantly, allowing the ski area to provide a more consistent operation from year-to-year. While Alternative 3 includes ski area enhancements, it is significantly constrained by a continued reliance upon natural snowfall and is highly unlikely to ever be fully accomplished.

The Snowbowl is dependent on skier visits – and skier expenditures – to generate revenues.<sup>146</sup> As such, the revenue stream is directly related to skier visits from season-to-season. The ski industry is sensitive to weather conditions (snow) and the presence or absence of quality ski conditions. Because the industry is so dependent on the presence of snow, 82 percent of U.S. ski areas have installed snowmaking systems.<sup>147</sup> Snowmaking systems allow ski areas to open earlier in the season and remain consistently open through the length of the season. Just as significantly, snowmaking allows ski areas to offer a quality skiing product during periods when there is no natural snow or when weather conditions would otherwise result in poor skiing conditions or a ski area closing. With no snowmaking system, the Arizona Snowbowl is entirely dependent on the weather and the presence of natural snowfall. Although the climate data presented in Soils Section I details that temperatures are adequate for snowmaking application, natural snowfall at the Snowbowl is highly variable. The graphic below shows total snowfall at the Snowbowl during the past 22 seasons.

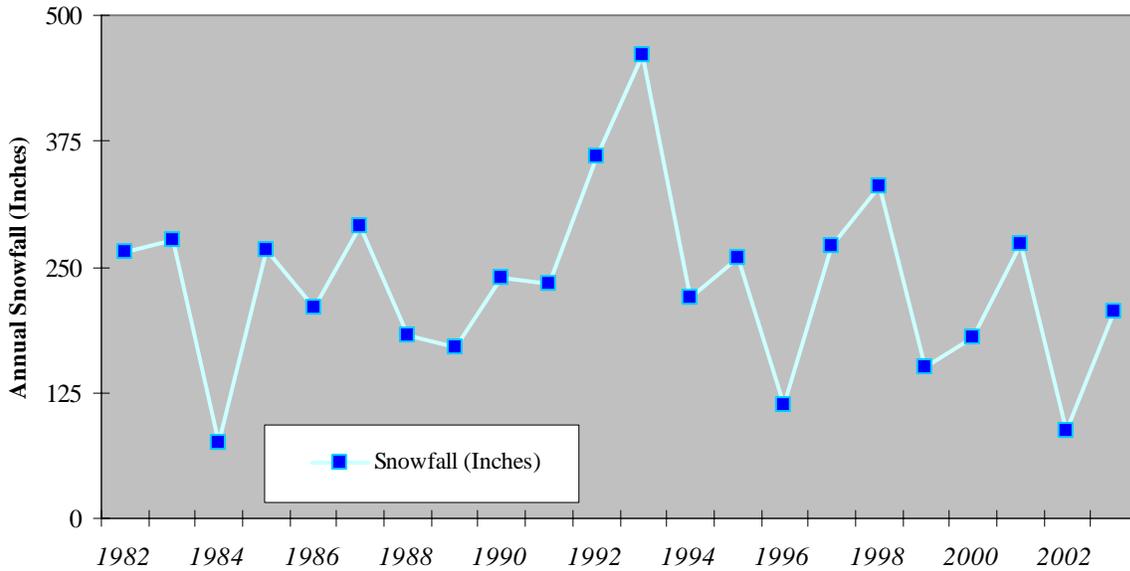
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<sup>145</sup> 11 year Gross Revenues - \$49.78 million. 11 Year Capital Expenditures - \$4.42 million. 8.87 percent of Gross Revenues. Source: Arizona Snowbowl Controllars Office.

<sup>146</sup> The Snowbowl also operates a Sky Ride business during the summer months.

<sup>147</sup> Based on respondents to NSAA annual survey 2002/03. Typically, ski areas that do not have snowmaking fall into two categories: 1) Ski areas with locations that enjoy plentiful and consistent natural snow and; 2) Small ski areas (average less than 20,000 skier visits) that do not have the financial resources to install snowmaking.

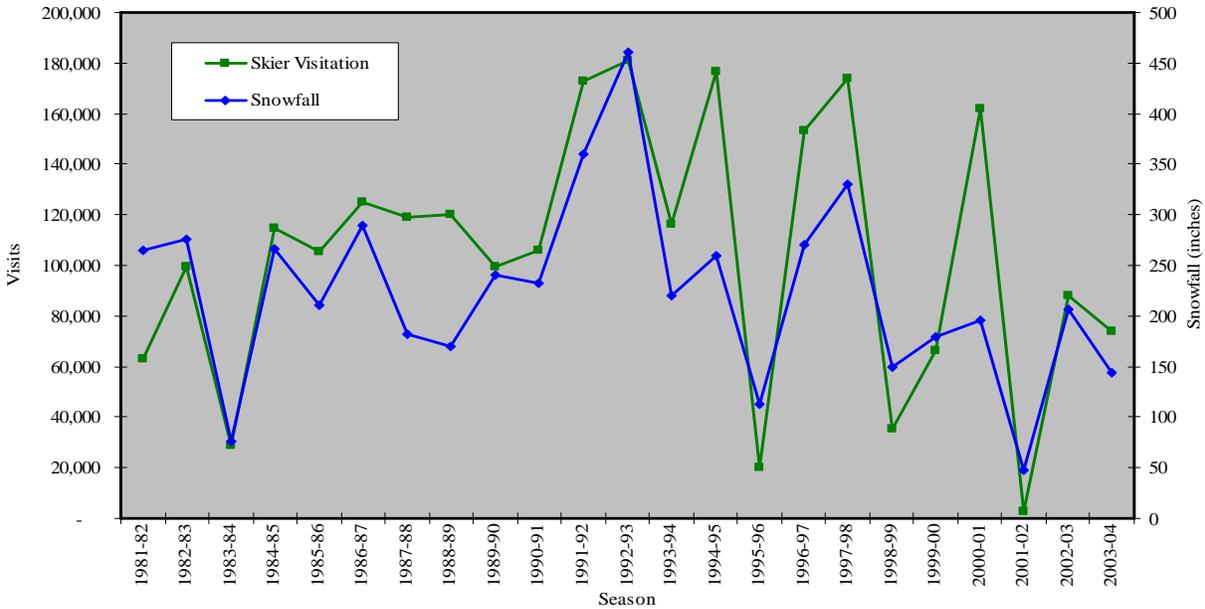
**Figure 3E-1  
Natural Snowfall at Arizona Snowbowl (1981/82 – 2002/03)**



During the 22 seasons shown in the Figure 3E-1, the Snowbowl’s median snowfall was 236 inches. However, snowfall in individual seasons ranged from 68 percent below the median (76 inches) to 95 percent above the median (460 inches). Significantly, median snowfall during the most recent five seasons – at 180 inches – has fallen well below the longer term median.

The Snowbowl’s dependency on natural snowfall to generate skier visits is clearly shown in the following graphic, which compares variation in natural snowfall with variation in skier visits.

**Figure 3E-2  
Comparison of Natural Snowfall and Skier Visits  
(1981/82 through 2003/04)**



By analyzing Figure 3E-2, it is apparent that up and down variation in snowfall results in similar variation in skier visits. The effect has been even more significant in the past 11 seasons, with above average snowfall resulting in well above average visits and below average snowfall resulting in well below average visits. In conclusion, the Snowbowl is highly dependent on natural snowfall to deliver skier visits and associated revenues. During the past decade, natural snowfall has fallen below the longer term median 60 percent of the time.

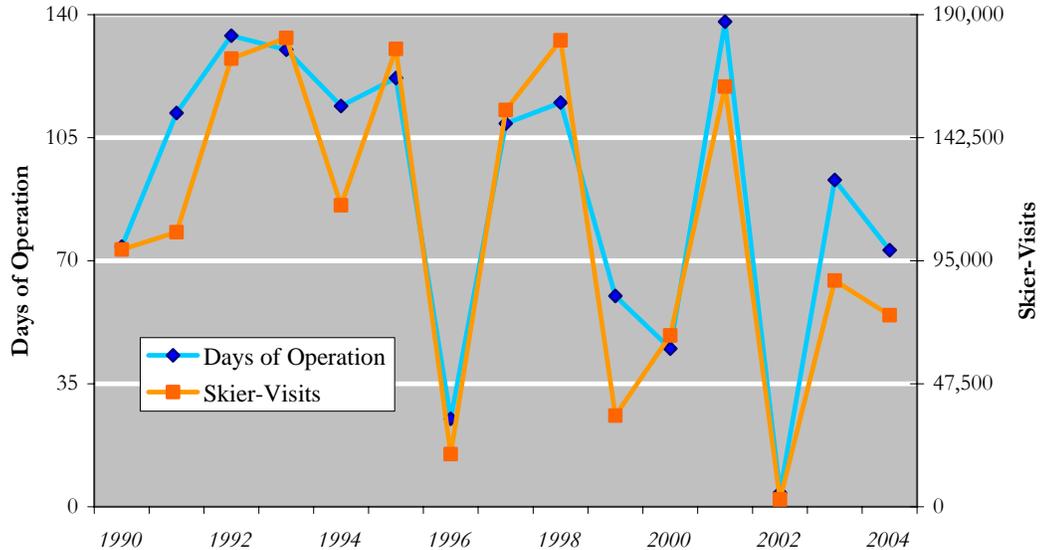
The impact of this skier visit variation on the Arizona Snowbowl as a for-profit business is shown in the graphic below. The graphic shows the Snowbowl's fiscal year net income over the past 11 seasons, as it has varied above and below the 'break-even' point.<sup>148</sup>

The relationship between skier visits and operating days is further illustrated in the figure below which depicts the historical relationship between operating days and skier visits at the Snowbowl.

The demand for skiing at the Snowbowl is clearly elastic – when more supply (operating days) are available, more skier visits result. Statistical correlation analysis indicates that the relationship is very strong, with variation in operating days being a useful statistic in predicting skier visits 87 percent of the time. The relationship is clear; there is substantial demand for skiing when the product is available. Further, increases in supply (operating days) result in increased use/skier visits.

<sup>148</sup> Source: Arizona Snowbowl Controller's Office. Net Income defined as total revenue from skiing operation less Cost of Sales, Expenses-Selling, G&A and Interest. Break-even point is the point where revenues equal costs.

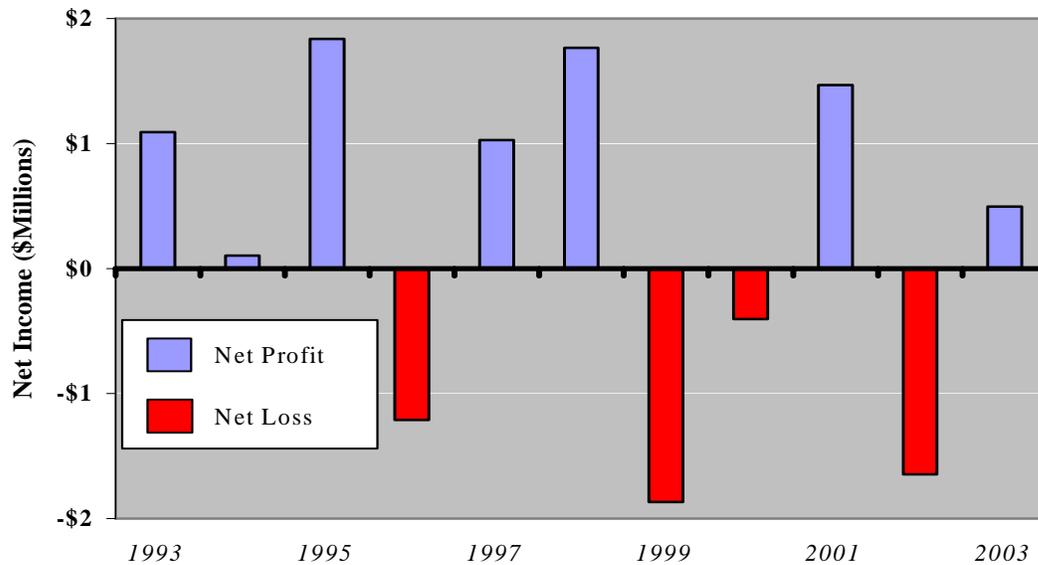
**Figure 3E-3  
Comparison of Days of Operation and Skier Visits  
(1990/91 – 2003/04)**



Strong demand for skiing in the Flagstaff market can be assessed from another perspective. Ski areas commonly assess utilization rate as an indicator of performance. The utilization rate is expressed as the annual skier visitation divided by capacity. Capacity is defined as the ski area's daily comfortable carrying capacity. The annual capacity is daily CCC times the number of operating days. The Snowbowl's current CCC is 1,880 skiers. Thus, in a year such as 2002/03, when the facility operated 93 days, the total capacity was 174,840. The utilization rate is determined by dividing the number of skier visits in that year (87,354) by total capacity, resulting in a utilization rate of 50 percent for the 2002/03 season. Over the period 1990 through 2004, the Snowbowl's average utilization rate was 64 percent. Moreover, the ski facility achieved an 83 percent utilization rate in 1998, a year when operating days were above average. These figures are an indication that demand exceeds supply for Alpine skiing in the Flagstaff market.

U.S. ski areas typically view demand to be strong when they achieve utilization rates in excess of 40 percent. Only those ski areas that experience unusually strong demand achieve utilization rates of 50 percent or more.

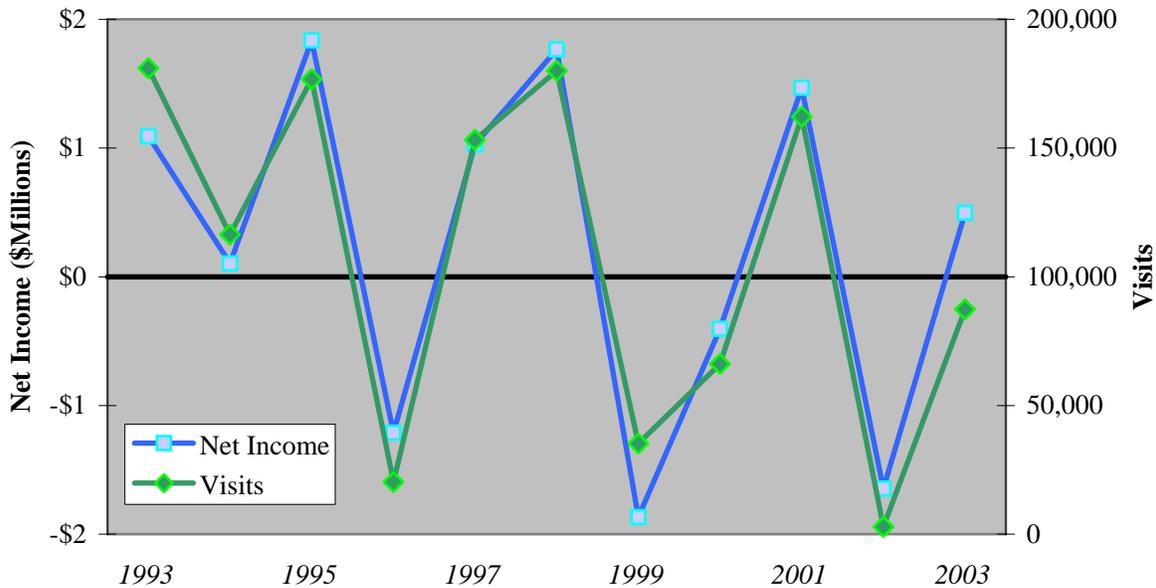
**Figure 3E-4  
Net Profit Season to Season  
(1992/93 – 2002/03)**



As indicated in Figure 3E-4, during the past 11 seasons, the Snowbowl experienced a net profit in seven years and a net loss in four years. Over the 11 year period, the cumulative net income of the ski area was \$2.66 million. However, as noted above, during the same period the Snowbowl has made a total capital investment of \$4.42 million, simply to maintain existing facilities and retain a consistent level of facility quality. Ski areas routinely need to invest six percent or more of gross revenues back into their facility simply for maintenance purposes. While the Snowbowl owners have been willing to infuse additional capital over the past 11 years for maintenance and quality purposes, it is apparent that the differential between net income and minimum required capital investment has been a losing proposition, resulting in a net loss of \$1.77 million over the period. It is unlikely that the owner of any business would continue to operate on this basis over an extended period of time.

The extremely close relationship between skier visits and net income is shown in the graphic below.

**Figure 3E-5  
Comparison of Skier Visits and Net Profit  
(1992/93 – 2002/03)**



As indicated in Figure 3E-5, given the variability of snowfall at the ski area, the pattern of net profit/loss can be expected to continue for the foreseeable future, unless steps are taken to mitigate the impact of natural snowfall variability. Further, the pattern of profit and loss makes it difficult for owners to continue to provide the required capital (six percent of gross revenues) to maintain the facility. During the past 11 operating seasons, invested capital has exceeded the ski area's net profits.

Business owners may apply a variety of criteria in making decisions regarding the viability of an existing or potential business; Profit/Loss, Return on Investment, Internal Rate of Return, Tax Implications may all come into play. However, at the most basic level, the viability of any for-profit business rests on its ability to make a profit from year-to-year. The Arizona Snowbowl's record over the past 11 operating seasons shows a loss in four years, or 36 percent of the time. Further, it is clear that these losses are closely associated with significant variation in skier visits, a factor of inconsistent snowfall and skiing conditions. For most potential business owners, the prospect of owning a business that is likely to operate at a loss in four of 11 years would not be attractive. Just as significantly, current business owners are unlikely to continue to operate a business that often shows a loss, particularly when maintenance of the physical plant has required them to infuse 'out-of-pocket' capital.

The analysis clearly indicates that the full implementation of Alternative 3 is not viable from a purely financial perspective and that the prudent owner/investor would be highly unlikely to undertake completion of the alternative. While the alternative includes ski area improvements, the lack of reliable snowfall would continue to subject the ski area to inconsistent operations and

skier visit totals that would vary dramatically from year-to-year. Significantly, the ski area's break-even point (the point at which revenues from skier visits equal operational and debt costs) would increase due to the investment in the Alternative 3 improvements. Because average annual skier visits would not increase by a substantial amount, the ski area would experience a financial loss in a higher percentage of its operating seasons.

In summary:

- The Arizona Snowbowl is in a tenuous business position and would continue to be so under Alternative 1. With net income in the negative range for a significant percentage of its operating seasons, and minimal required capital investment exceeding cash flow, it is not reasonable to expect that the business will continue to operate unless improvements are made to generate more consistent skier visits or by substantially reducing the current level of maintenance and operational expenditures. The Snowbowl's record indicates that it is capable of operating profitably when there are sufficient skier visits. However, one major factor beyond the Snowbowl's control – inconsistent natural snowfall – results in unprofitable operations in an unacceptably high percentage of its operating seasons.
- Alternative 2 would improve the ski area's financial viability, make it a more attractive investment and help to ensure that the facility's positive economic contribution is enhanced and maintained.
- The prudent investor would likely not undertake all of the improvements included within Alternative 3.

### **Alternative 1 – No Action**

Alternative 1 would result in no significant change in the Snowbowl's viability as a for-profit business. While average annual skier visits are projected to increase by 12.7 percent over the current level, season-to-season totals would continue to fluctuate dramatically. As such, it is reasonable to project that under Alternative 1, the ski area would continue to experience negative net income in 30 to 40 percent of its operating seasons. Thus, the viability of the ski area would remain tenuous.

In the event that the ski area continued to operate, it is unlikely that owners would continue to provide capital investment at the minimum required six percent of gross revenues, as this has required investment in excess of net profit in the past. Rather, it is likely that owners would revert to a lower investment level and that the ski area would offer a decreased level of services and/or a lower quality experience.

## **Alternative 2 – The Proposed Action**

Alternative 2-The Proposed Action would result in a significantly altered business environment for the Arizona Snowbowl as a result of several major factors:

1. The alternative would result in a dramatic increase in average annual skier visits over the current level. Skier visits<sup>149</sup> are projected to increase by 119 percent under this alternative.
2. The skier visit total would be consistent under this alternative in contrast with current operating conditions. The addition of a snowmaking system would allow the ski area to consistently operate for 125 days per season. It is projected that season-to-season total skier visits would only vary by plus or minus 15 percent from the average.
3. Significant improvements to the skiing facility and the addition of a snowplay/snowtubing facility along with more consistent operations would result in greater season pass sales and attract a higher percentage of destination visitors. Destination skiers typically spend more per capita than do day visitors. Further, the Snowbowl would become more competitive in the Arizona market.
4. A higher and more consistent level of ski area revenues would make it possible for owners to continue to invest at least the minimum six percent of gross revenues to maintain the physical facilities and maintain quality levels.

For the business owner, the prospect of consistent business operations would be the most attractive outcome of Alternative 2. Under this alternative, annual skier visit totals are only expected to vary from the average by plus or minus 15 percent. While the investment required to achieve Alternative 2 is substantial and would result in a higher break-even point (more skier visits required to achieve profitable operations), year-to-year variations in business levels would be minimized and would result in positive net income in a higher percentage of seasons than under current operating conditions. The ski area would be in a significantly better financial position from which to maintain the physical facilities and maintain quality levels.

The viability of the Arizona Snowbowl as a for-profit business would be enhanced under this alternative. Further, Alternative 2 would result in the ski area becoming a more attractive investment, both for current or prospective owners. Again, this would improve the facility's longer term viability as a generator of winter-based economic activity in the Flagstaff area.

## **Alternative 3**

Because of the lack of a consistent and reliable operating season due no snowmaking capabilities under this alternative, the ski area's continuing financial viability would effectively be similar to that for Alternative 1 - no significant change in the Snowbowl's viability as a for-profit business. The viability of the ski area would remain tenuous.

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<sup>149</sup> This does not account for snowplay visits.

In the unlikely event that Alternative 3 was to be fully accomplished, the viability of the Arizona Snowbowl as a for-profit business would decrease. Two major factors would result in decreased viability:

1. While average annual level skier visits would be projected to increase by 19.9 percent over the current level, season-to-season totals would continue to fluctuate dramatically. It is reasonable to project that visitor totals in a significant percentage of seasons would continue to fall below the current break-even point.
2. The substantial investment called for under Alternative 3 would result in a higher break-even point for year-to-year operations. Thus, the percentage of seasons in which operations would fall under the break-even point could increase.

A prudent business operator would not make the majority of the investments in Alternative 3, as the break-even point for profitable operations would increase while skier visit totals would continue to fluctuate dramatically. The viability of the ski area would decline significantly.

In the event that the ski area continued to operate, it is unlikely that owners would continue to provide capital investment at the minimum required six percent of gross revenues, as this has required investment in excess of net profit in the past. Rather, it is likely that owners would revert to a lower investment level and that the ski area would offer a decreased level of services and/or a lower quality experience.

Indicator:

Narrative Description of the Recreational/Social Function Which Snowbowl Serves

The Arizona Snowbowl serves a variety of recreational and social functions in the Flagstaff area. A summary of these functions follows:

- The Snowbowl is the primary facility for winter sports recreation in the greater Flagstaff area. With a location that is easy to access from the center of Flagstaff, the Snowbowl provides an outlet for winter recreation to the population of the entire region. It is significant to note that the Snowbowl is the only ski area in the Flagstaff area – the next closest ski area (Sunrise Park Resort) is more than 125 miles from Flagstaff. The Snowbowl is also the most accessible ski area for residents of the Phoenix metro area.
- The Snowbowl provides the regional population with its only facility<sup>150</sup> for quality Alpine skiing and snowboarding.
- The Snowbowl hosts and supports the Flagstaff Ski Club that provides a facility and training for Alpine and snowboard training and competition.
- The Snowbowl also provides a recreational outlet for those who are not involved in Alpine or Nordic skiing. Hiking trails and the Sky Ride provide a way for non-skiers to get into the

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<sup>150</sup> The Williams Ski Area, located approximately 30 miles west of Flagstaff in Williams, is primarily a family day ski area with two lifts and seven trails. The Williams Ski Area is currently up for sale.

mountains and enjoy the mountain environment. The Sky Ride is significant, as many persons are not physically capable of hiking into the mountains. The Sky Ride provides a means to get direct access to this environment for those who cannot hike or ski.

- The Snowbowl provides one of the few true winter recreation attractions in the greater Flagstaff area. In addition to boosting winter visitation in the area, the facility provides Flagstaff with a recreational offering that is unusual in Arizona.
- The Snowbowl also is significant to the Flagstaff community from a social perspective:
  - The Snowbowl assists over 200 area organizations with fundraising efforts – primarily with lift ticket donations.
  - The Snowbowl hosts several large fundraisers and other major events, including: the Climb a Mountain to Conquer Cancer; the Huega Ski Express; Grand Canyon State Winter Games; the Special Olympics; Wine Fests; 5<sup>th</sup> Grade Learn to Ski; and others.
  - Local contributions: the Snowbowl recently donated ski tickets with a value of \$30,000 to local public schools because of budget shortfalls.
- The Snowbowl holds memberships in a number of civic organizations and contributes to their causes. These include: Flagstaff Chamber of Commerce, Flagstaff Convention and Visitor Bureau.
- The Snowbowl supports over 25 programs at Northern Arizona University and assists with its educational goals by participating in a number of surveys and business studies.
- The Snowbowl makes a measurable contribution to the area economy by virtue of the expenditures made by ski area visitors. These contributions are summarized under ‘Economic Indicators’ above.

In summary, the Snowbowl is a unique facility – a winter recreation center in a state that is far better known for warm weather offerings – providing the only quality outlet for Alpine and Nordic activity in the region. The Snowbowl is also important to NAU in that it historically has been known as a University proximate to skiing opportunities. The ski area’s existence benefits enrollment by attracting students who desire to include winter recreation as part of their university experience.

### **Alternative 1 – No Action**

Alternative 1 would not result in a significant change to the Snowbowl’s recreational and social functions as summarized above. However, as detailed under ‘Financial Viability of the Ski Area,’ the continuation of the current operation as a for-profit business may not be sustainable; the ski area would likely decrease expenditures on maintenance and non-essential services leading to an overall reduction in the quality of the services offered under Alternative 1. In this event, much of the social and economic functions summarized above may be reduced or lost. Perhaps most importantly, the quality of the most significant Alpine recreation venue within the Flagstaff area would be greatly diminished as compared to Alternative 2.

## **Alternative 2 – The Proposed Action**

The recreational and social functions of the Snowbowl would be enhanced under Alternative 2. These enhancements are summarized below:

- The addition of a snowtubing/snowplay area would make the Snowbowl an accessible winter recreation venue for non-skiers. Snowtubing and snowplay require no experience or expertise and would allow persons who would otherwise not be involved in winter recreation to become involved.
- Annual visitation and thus visitor expenditures would be substantially increased under this alternative. As such, the Snowbowl's contribution to the area economy would increase.
- Because the Snowbowl's business volume would become more consistent under this option, the Snowbowl would have the capability to make more consistent contributions to area organizations, to more consistently host special events at the ski area and to commit to long-term social involvement in the community.
- The combination of an expanded Alpine skiing facility (lifts and trails) and greatly enhanced and consistent skiing conditions would make the Snowbowl more attractive to destination skiers. This would enhance the Snowbowl as the Flagstaff area's primary winter attraction and increase dollars spent by non-locals in the community.

## **Alternative 3**

The prudent owner/investor would likely not undertake the full range of ski area projects envisioned under Alternative 3 quickly. As such, the impact of Alternative 3 could be similar to those for Alternative 1.

In the event that Alternative 3 was to be fully accomplished, the recreational and social functions now associated with the Snowbowl would be placed in jeopardy if current weather trends continued. Expenditure of the capital necessary to complete Alternative 3 could place the ski area in a perilous financial situation and business operations could potentially cease within several years due to lack of reliable operating seasons. If this occurred, the Snowbowl's recreational and social functions would be lost. The Flagstaff area would lose its most significant Alpine recreation venue and the area population would lose a highly accessible portal to the mountains.

### Indicator:

#### A Discussion of Snowbowl Business Activity and Its Relationship With Flagstaff Area Tourism, Winter Tourism and Trends in Local Taxes.

A number of the identified indicators address a series of interrelated issues. Specifically, this indicator addresses: 1) the role that winter tourism plays in the Flagstaff area economy; 2) how snowfall and Snowbowl visitation relate to broader winter tourism activity in the Flagstaff area; 3) the possibility of a correlation between Snowbowl visitation and the BBB tax; and 4) how weather conditions affects tourism and the BBB tax.

The common thread running through this indicator is the role that the Snowbowl's activity plays in influencing the Flagstaff area tourism economy. More specifically, the indicator focuses on the question of whether Snowbowl activity is a major factor in year-to-year trends in tourism activity. The preceding economic analyses make it clear that the Snowbowl is a positive economic force in the region, in a number of ways: 1) the Snowbowl creates employment and generates significant economic output; 2) the Snowbowl draws visitors to the Flagstaff area who spend dollars at the ski area and at other area businesses; and 3) the Snowbowl offers a unique winter attraction in the Flagstaff area and plays a number of recreational and social roles in the community.

While the Snowbowl is clearly a positive economic contributor, even a cursory examination of the scope of the ski area operation in comparison with the full scope of the Flagstaff area economy makes it clear that the ski area is of insufficient size to be a dominant driver of trends in tourism or the broader economy. Thus, the issues posed by several of these indicators are essentially moot. A review of the issues and findings follows:

Several analytical exercises were completed to assess 'the percentage of Flagstaff's total economy represented by winter tourism in comparison with other major economic components of the community.' The table below shows the overall distribution of employment in Coconino County for 2002.<sup>151</sup>

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<sup>151</sup> Arizona Dept. of Employment Security as made available on FlagData web site. Figures are averaged for 2002. Employment breakdown for City of Flagstaff alone were not available. However, total employment in the City of Flagstaff is approximately 35,500 persons, or 60.2 percent of the Coconino County total. The City is clearly the primary economic center in the county.

**Table 3E-27  
Distribution of Non-Farm Employment  
Coconino County (2002)**

	Annual Averages - 2002	
	Employment	% of Total
<b>Goods Producing</b>	<b>5,625</b>	<b>9.5%</b>
Natural Resources and Mining	125	0.2%
Construction	2,550	4.3%
Manufacturing	2,950	5.0%
<b>Service-Providing</b>	<b>53,325</b>	<b>90.4%</b>
Trade, Transportation, and Utilities	9,575	16.2%
Information	475	0.8%
Financial Activities	1,475	2.5%
Professional and Business Services	2,675	4.5%
Educational and Health Services	6,425	10.9%
Leisure and Hospitality	10,950	18.6%
Other Services	1,725	2.9%
Government	20,050	34.0%
Federal Government	3,500	5.9%
State and Local Government	16,550	28.1%
<b>Total Private</b>	<b>38,925</b>	<b>66.0%</b>
<b>Total Non-farm</b>	<b>58,975</b>	<b>100.0%</b>

The three major sources of employment in the county are Government, Leisure & Hospitality and Trade/Transportation & Utilities. This is a service-based economy with Goods Producing sectors only accounting for 9.5 percent of total nonfarm employment. Manufacturing only accounts for one in 20 jobs (five percent.)

While the Leisure & Hospitality figure provides some indication of the significance of tourism to the area economy, this category alone does not account for tourism's full economic impact. Recent research on the Flagstaff area economy has attempted to quantify tourism as an economic sector:

- A recent research study assessed 'industry clusters' to assess how significant these clusters are to the area economy.<sup>152</sup> The term 'cluster' refers to a geographic concentration of interdependent companies, suppliers, products, labor pool and institutions that together constitute an important competitive advantage for a region. The study found that the 'Tourism Cluster' is the "leading economic activity in Coconino County." Further, the study found that the 'Tourism Cluster' accounted for the employment of 13,345 persons in 1996. Based on a 1996 average employment level of 54,500, the 'Tourism Cluster' accounted for 24.5 percent of the county's employment in that year.<sup>153</sup>

<sup>152</sup> Morrison Institute for Public Policy, January 2000

<sup>153</sup> County employment figure source: U.S. Bureau of Labor Statistics.

- A 2001 article sponsored by Northern Arizona University indicated that, “Directly and indirectly, tourism in Flagstaff accounts for more than 20 percent of all business in town.”<sup>154</sup>

In summary, the research indicates that tourism (in total) accounts for 24.5 percent of Flagstaff’s economy. During the most recent five years for which data is available, an average of 35.3 percent of Flagstaff tourism occurred during the winter months.<sup>155</sup> Since tourism in total is estimated to account for approximately 24.5 percent of the Flagstaff area economy, winter tourism can be estimated to account for approximately 8.6 percent of the Flagstaff area economy.<sup>156</sup> In comparison, recent research indicated that the Northern Arizona University “helps keep more than 8,000 people employed.”<sup>157</sup> With total county employment of approximately 59,000, it can be estimated that the University accounts for approximately 13.6 percent of the Flagstaff area economy.

The ‘historic relationship between winter tourism level in Flagstaff, annual snowfall and annual skier visitation at the Arizona Snowbowl’ was analyzed from a statistical perspective with analyses of the three data sets. While snowfall and skier visit data are readily available from the Snowbowl, there is no absolute count of winter tourism visitors in Flagstaff. As such, a proxy for annual tourism was developed using available tax data. Specifically ‘Hotel BBB Sales’ and actual BBB tax revenue data were used to develop a proxy for tourism activity on monthly and annual bases.<sup>158</sup>

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<sup>154</sup> Morlock, 2001.

<sup>155</sup> Tourism volume based on monthly BBB tax receipts. Winter defined as December through April – consistent with the typical Arizona Snowbowl operating season.

<sup>156</sup>  $24.5\% \times 35.3\% = 8.64\%$ .

<sup>157</sup> Source: *Arizona’s Universities: An Economic Engine for the State*, Arizona Board of Regents Web Site. This figure includes jobs generated on indirect bases. Direct employment is approximately 2,300 persons.

<sup>158</sup> ‘Hotel BBB Sales’ represent gross revenues at Flagstaff hotels that are subject to the BBB tax. BBB tax collections are actual BBB tax revenues. The BBB tax is a two percent tax on all lodging and restaurant/lounge sales in the City of Flagstaff. While ‘Hotel BBB Sales’ is a pure representation of lodging activity (including business travel) BBB tax revenues reflects a mix of restaurant/lounge and lodging sales. Source: Flagstaff Sales Tax Administrator.

**Table 3E-28  
Snowfall, Snowbowl Skier Visits and Winter Tourism Proxy  
Historic Data Sets**

	<b>Snowfall (Inches)</b>	<b>Skier visits</b>	<b>Winter Tourism Proxy</b>
1990/91	233	106,000	1.945
1992	360	173,000	2.275
1993	460	181,000	2.315
1994	220	116,388	2.456
1995	259	176,778	2.592
1996	113	20,312	2.569
1997	270	153,176	2.580
1998	330	180,062	2.667
1999	150	35,205	2.548
2000	180	66,152	2.670
2001	272	162,175	2.656
2002	87	2,872	2.636
2003	206	87,354	NA

The variables were tested separately to determine if statistical relationships exist.<sup>159</sup>

- *Relationship of Skier visits to Snowfall* - there is a strong relationship with a coefficient of determination of 0.803, indicating that snowfall is a useful statistic in predicting skier visits 80 percent of the time.<sup>160</sup> This relationship is shown graphically below.
- *Relationship of Winter Tourism to Snowfall* - there is a minimal relationship with a coefficient of determination of 0.105, indicating that snowfall is a useful statistic in predicting winter tourism only ten percent of the time.<sup>161</sup>
- *Relationship of Winter Tourism to Skier visits* - there is a minimal relationship with a coefficient of determination of 0.029, indicating that skier visits are a useful statistic in predicting winter tourism only three percent of the time.<sup>162</sup>

<sup>159</sup> The analyses were completed using the 'linest' function in Microsoft Excel. Linest is a regression function that uses the 'least square' method to calculate a straight line that best fits the data. The primary linear relationship between the variables was assessed with the 'coefficient of determination' variable that results from the analysis. A coefficient of 1.0 would indicate a perfect correlation in the sample, while a value of 0.0 would indicate that the variables are not related. A value of 0.80 would indicate that the equation can predict the dependent variable 80 percent of the time and would be regarded as a positive indicator of a statistical relationship.

<sup>160</sup> Analysis completed on data for period 1990/91 to 2002/03.

<sup>161</sup> Id.

<sup>162</sup> Id.

- *Relationship of Winter Tourism to Combined Snowfall/Skier visits* - there is a small relationship with a coefficient of determination of 0.179, indicating that the combination of snowfall/skier visits is a useful statistic in predicting winter tourism 18 percent of the time.<sup>163</sup>

In summary, it is apparent that snowfall is a strong predictor of skier visits at the Snowbowl. However, neither snowfall nor skier visits are useful for projecting total winter tourism in Flagstaff. Without question, snowfall and skier visits do have impacts on winter tourism in Flagstaff. Snowfall brings skiers who make expenditures at the Snowbowl and in Flagstaff. However, skier visits are only one component of all of the tourism activity that occurs during the winter and because the impact of these skier visits is relatively small in absolute terms, it is not a useful predictor of total activity levels.

The issue of ‘the effects of dry roads/fair weather on tourism in Flagstaff and the BBB’ tax was assessed from several perspectives. The relationship between annual Flagstaff tourism (and the BBB tax) and dry roads was analyzed using several historic data sets. The presence or absence of dry roads was assessed using snowfall and precipitation data for the area. There is no absolute count of tourism visitors in Flagstaff. As such, a proxy for annual tourism was developed using available tax data, as described above. The data sets were combined to assess how tourism has varied from month-to-month and year-to-year over recent years. The variables were tested separately to determine if statistical relationships exist.<sup>164</sup> Results are summarized below.

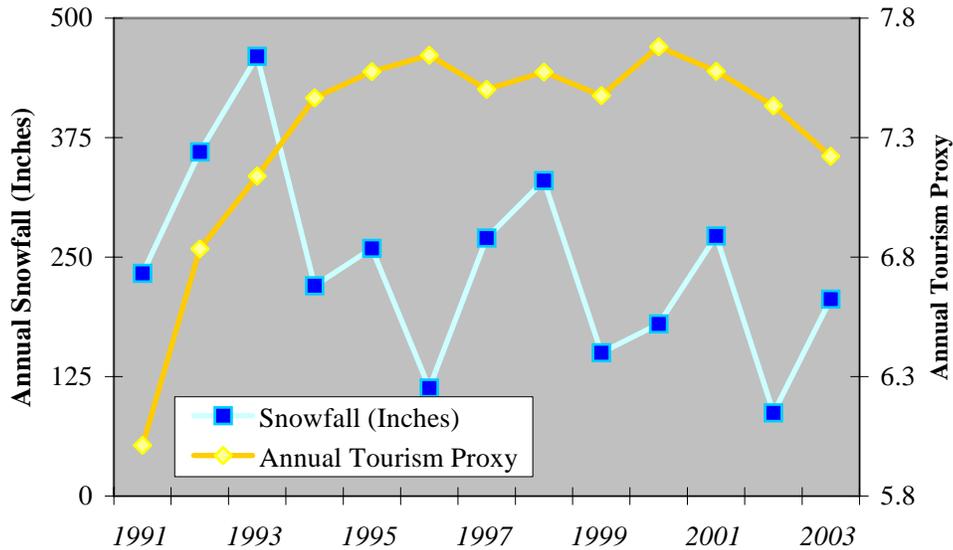
- *Relationship of Flagstaff Annual Tourism to Snowfall* – if dry roads were assumed to have a positive impact on Flagstaff tourism, then a high snowfall year would be expected to have a negative impact on tourism volume. The relationship between annual snowfall and Flagstaff’s annual tourism volume is shown in the following graphic.

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<sup>163</sup> Id.

<sup>164</sup> The analyses were completed using the ‘linest’ function in Microsoft Excel.

**Figure 3E-6  
Relationship of Flagstaff Annual Tourism and Annual Snowfall**

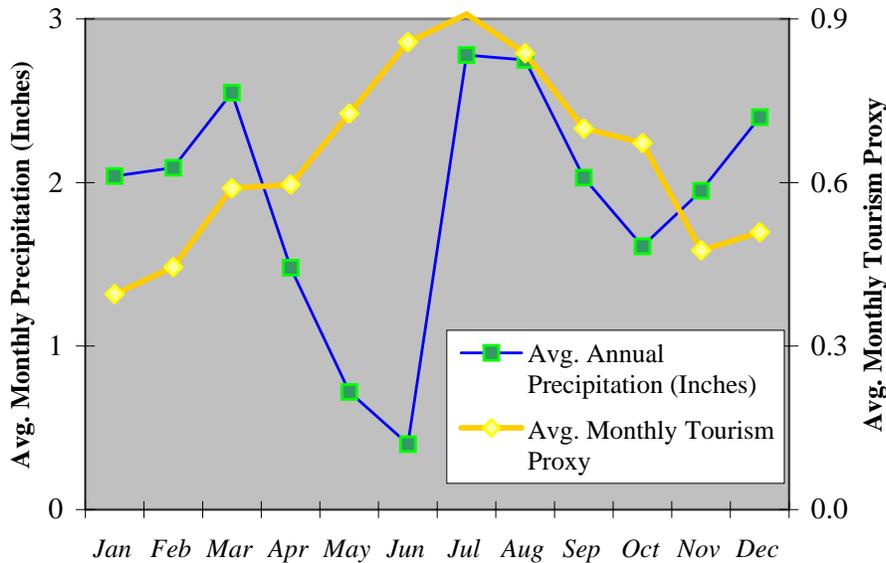


As shown in Figure 3E-6, there is no obvious relationship between snowfall and Flagstaff tourism. The two lines do not move in concert or in opposition to one another. The statistical analysis indicates there is minimal relationship between the two factors with a coefficient of determination of 0.063, indicating that snowfall is a useful statistic in predicting annual Flagstaff tourism only six percent of the time.<sup>165</sup>

- *Relationship of Flagstaff Tourism to Precipitation* – if dry roads were assumed to have a positive impact on Flagstaff tourism, then tourism volume would be higher in months with minimal precipitation and lower in months with higher precipitation. The relationship between average monthly precipitation and average variation in Flagstaff’s monthly tourism volume is shown in the following graphic.

<sup>165</sup> Analysis completed on data for period 1990/91 to 2002/03.

**Figure 3E-7  
Relationship of Flagstaff Monthly Tourism and Monthly Precipitation**



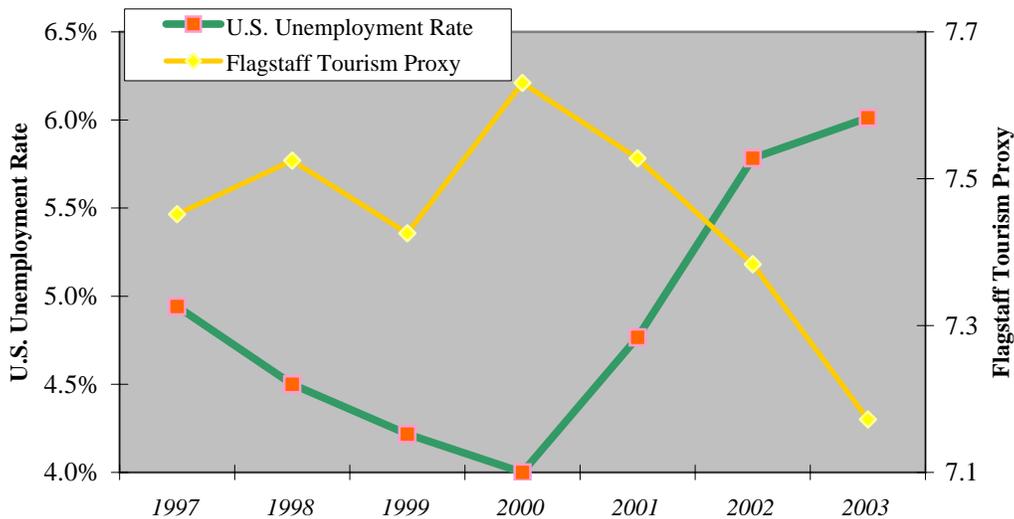
There is no obvious relationship between tourism and precipitation, as seen in Figure 3E-7. While declining precipitation appears to relate to increasing tourism in May and June, tourism is at its highest level in the month with the highest average precipitation (July). The statistical analysis shows a minimal relationship between the two factors with a coefficient of determination of 0.018, indicating that monthly precipitation is a useful statistic in predicting monthly Flagstaff tourism only two percent of the time.<sup>166</sup>

The data analysis suggests that, over the years, dry roads/wet weather bears little relationship to Flagstaff tourism volume and thus the BBB tax. While short-term events, such as a major snowfall, can clearly affect tourism volume over a period of several days, the reality is that with only 22.8 inches of precipitation annually, the impact of bad weather is limited to a small segment of the year.

Total tourism volume is more closely linked to the economy than to isolated weather events. The following chart shows annual Flagstaff tourism volume compared with the U.S. unemployment rate.

<sup>166</sup> Analysis completed on precipitation data averaged over 30 years. Monthly tourism data averaged for most recent four years.

**Figure 3E-8  
Relationship of Annual Flagstaff Tourism to U.S. Unemployment Rate**



As seen in Figure 3E-8, Flagstaff tourism volume generally tended upward during a period of a decreasing U.S. unemployment rate (1997 to 2000), while tourism volume declined during a period of an increasing U.S. unemployment rate (2000 to 2003).<sup>167</sup> In conclusion, the macro economy has far more impact on Flagstaff tourism than do weather events.

Finally, the potential correlation between Snowbowl skier visitation and the Bed, Board and Booze tax was assessed. The BBB tax is a two percent tax collected on all purchases at local restaurants, lounges, hotels and campgrounds in Flagstaff. The Snowbowl does not collect the BBB tax, as it is not located in Flagstaff. However, Snowbowl’s visitors have a direct impact on the tax by purchasing lodging and food & drink in Flagstaff as part of their trip to the Snowbowl. Day Visitors make stops at Flagstaff restaurants and lounges on their way to and from the Snowbowl, while Destination Visitors eat meals at Flagstaff restaurants, drink at lounges and use lodging facilities.

Given these expenditure patterns, Snowbowl visitors directly generate BBB tax revenues within Flagstaff. The current level of BBB annual tax generation by Snowbowl visitors has been estimated as follows:<sup>168</sup>

1. Estimate total expenditures made by Snowbowl visitors outside the resort as described above. These expenditures are in four categories – Eating-Drinking-Entertainment, Retail, Hotel-Lodging and Services. This total is currently estimated to be \$5.63 million.

<sup>167</sup> The coefficient of determination for the two variables is 0.700 – showing a positive relationship.

<sup>168</sup> Estimates are for winter visitors to the Snowbowl only.

2. Adjust for spending categories relevant to the BBB tax. Two categories are relevant to the tax - Eating-Drinking-Entertainment and Hotel-Lodging. Current expenditures in these categories are estimated at \$2.63 million annually.
3. Adjust for the percentage of these expenditures that are made in Flagstaff. Flagstaff is the urban center in the region and contains the great majority of the region’s commercial establishments. Further, major travel routes to and from Snowbowl go through Flagstaff. It has been conservatively estimated that 75 percent of the relevant expenditures are completed in Flagstaff. These expenditures currently total \$1.97 million.
4. Calculate the tax generated by Snowbowl visitors by multiplying relevant Flagstaff expenditures by the two percent tax rate. On this basis, it is estimated that Snowbowl visitors currently generate \$39,460 in BBB tax on an annual basis.<sup>169</sup>

The calculations indicate that Snowbowl visitors make a positive contribution to BBB tax collections. Because this is an economy of significant size, BBB tax generated by Snowbowl visitors constitutes a small portion of total tax collections. This is shown in the table below.

**Table 3E-29**  
**BBB Tax Collections Generated by Snowbowl Visitors**  
**as a Percentage of Total BBB Tax Collections**

	Annual	Winter (Dec - April)
Total BBB Tax	\$3,771,646	\$1,347,104
BBB Tax Generated by Snowbowl Visitors	\$39,460	\$39,460
Percentage of Total Tax Generated by Snowbowl Visitors	1.05%	2.93%

These findings are consistent with previous statements that the Snowbowl is a positive generator of economic activity, providing jobs and wages, but is not a major driver of the Flagstaff area economy.

Given the small segment of the BBB tax generated by Snowbowl visitors, it is unlikely that overall BBB tax collections would have a significant correlation with business activity at the Snowbowl; Snowbowl related collections constitute too small a percentage of total collections. Statistical tests assessing the relationship of Snowbowl visitation

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<sup>169</sup> This is an average figure and varies substantially from year-to-year in direct proportion to skier visits at the Snowbowl.

with BBB tax collections showed no significant relationship between the two variables.<sup>170</sup> While the tests show no significant relationship, it remains significant that Snowbowl visitors generate BBB tax. Increases in ski area visitation would result in additional visitor expenditures in Flagstaff and increase BBB tax collections.

Based on the economic data, and meaningful economic indicators available for comparison, the analysis presented here discloses the anticipated impacts of the project proposal to the greater Coconino County/Flagstaff area at a macro scale. This has the effect of understating the value and contributions of the Snowbowl to specific segments of the Flagstaff economy. Clearly if the analysis were able to isolate the value of the ski area as an attractant to economic activity for individual market segments such as hotels, restaurants, and winter sports related retail stores, the contribution of the ski area would be far more pronounced.

### **Alternative 1 – No Action**

Under Alternative 1-No Action the Snowbowl would continue to have a role as a positive contributor to the Flagstaff area economy by virtue of job maintenance, expenditures by visitors at area businesses, the ski area's recreational/social functions and tax payments made at Federal, state and local levels. However, the Snowbowl's current business situation is tenuous, as financial losses have been experienced in a number of recent years. Continuation of the current operation as a for-profit business may not be sustainable; the ski area would likely decrease expenditures on maintenance and non-essential services leading to an overall reduction in the quality of the services offered. In either event, the Snowbowl's contribution to the area economy would be reduced.

Under this alternative, winter tourism as a segment of the Flagstaff area economy would not change and the relationship between snowfall, skier visits and total winter tourism would remain at a minimal level. Total tourism volume in the area would continue to respond primarily to macro economic events. The alternative could result in additional BBB tax generation of approximately \$4,500 annually, but would not significantly alter the current relationship between the BBB tax and Snowbowl visitation.

### **Alternative 2 – The Proposed Action**

Under Alternative 2-The Proposed Action, the Snowbowl's role as a positive contributor to the Flagstaff area economy would be enhanced. The alternative would result in new jobs being created both directly and indirectly, would generate additional visitor dollars at area businesses, would enhance and solidify the ski area's recreational/social functions and would increase tax payments at Federal, state and local levels. These additional tax payments would provide additional support for programs and services.

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<sup>170</sup> Linear correlation analysis was used to assess three potential relationships using data from 1990 forward to the most recent year: 1) Annual skier visit totals with annual BBB collections; 2) Annual skier visit totals with ski season (December through April) BBB collections and; 3) Monthly skier visits with corresponding month BBB collections. The coefficient of determination statistic in each instance showed minimal relationships between the two variables. In addition, a test was completed to see if variations from skier visit monthly medians have a relationship with variations from the median for BBB collections. Again, no significant relationship was shown.

Under this alternative, winter tourism as a segment of the Flagstaff area economy would increase, as the additional activity at the Snowbowl would generate additional winter tourism dollars. The current strong relationship of snowfall to Snowbowl visitation would decrease in significance, as the Snowbowl would be able to offer quality skiing and snowtubing with or without snowfall – as a result of the inclusion of a snowmaking system. Total winter tourism would increase in response to more visits at the Snowbowl. However, total tourism volume in the area would continue to respond primarily to macro economic events. The alternative would result in additional BBB tax generation of approximately \$59,000 annually, thus strengthening the relationship between Snowbowl visitation and the BBB. However, the BBB would continue to respond primarily to broader tourism and economic events.

### **Alternative 3**

As noted, the prudent owner/investor would likely not undertake all of the ski area improvements included in Alternative 3 in an expedited manner. As such, the effects of this alternative would be similar to those summarized above for Alternative 1-No Action. Any improvements completed under this alternative would be minor and would not significantly affect existing weather, visitation, and tourism and BBB tax relationships.

In the unlikely event that the alternative's improvements were to be fully completed, it is likely that the Snowbowl's current positive economic contribution would be lost, as it is likely that the ski area would cease business activity within several years.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

For the purpose of this cumulative assessment, it is assumed that Social and Economic Resource effects within the greater Flagstaff and Coconino County areas began with the original development of ski area facilities in the late 1930s, increased with approval and implementation of projects analyzed in the 1979 EIS, continue to the present day, and will extend into the foreseeable future.

#### **Spatial Bounds**

The affected environment relevant to a discussion of cumulative effects for Social and Economic Resources includes the greater Flagstaff and Coconino County area.

### **Past, Present, and Reasonably Foreseeable Future Actions**

Past, present, and reasonably foreseeable projects with potential to cumulatively affect Social and Economic Resources include:

1. Residential and Summer Home Development in Hart Prairie
2. Snowbowl Wireless Telephone Communications Site
3. San Francisco Mountain Mineral Withdrawal

4. Transwestern Lateral Pipeline Project
5. Miscellaneous/ongoing Recreational Uses

All of these projects are within the spatial extent of the cumulative impact area, but are not of an extent or development scale sufficient to have significant cumulative effects. Appendix C includes the full list of past, present and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

### **Alternative 1 - No Action**

Past and present development of home sites has occurred independently of specific ski area development. While an intuitive correlation between specific ski area development activities and ongoing development in Hart Prairie may exist, there is no meaningful method of identifying a direct relationship between the two.

The extent to which the San Francisco Mountain Mineral Withdrawal will affect Social and Economic Resources in the area is speculative, in that entities which would have potentially been interested in pursuing mining activities are unknown. There are no known or suspected deposits of precious ore within the withdrawn area. However, a pumice mining operation recently ceased in the vicinity.

From a cumulative effects perspective, the construction and operation of the pipeline is considered negligible.

The general pursuit of recreation activities contributes to the overall Flagstaff economy. However, as detailed within this Social and Economic Resources analysis, the Flagstaff and Coconino County area is generally large enough that recreation activities are only a minor contributor to the overall economy. Cumulatively, the addition of past, present and foreseeable non-skiing recreation activities is anticipated to have an immeasurably minor effect on the area economy.

None of the identified past, present or reasonably foreseeable activities would combine with the effects anticipated under the No Action Alternative to create any significant cumulative social or economic resource impacts.

### **Alternative 2 – The Proposed Action**

None of the identified past, present or reasonably foreseeable activities would combine with the effects anticipated under the Proposed Action to create any significant cumulative social or economic resource impacts.

### **Alternative 3**

None of the identified past, present or reasonably foreseeable activities would combine with the effects anticipated under Alternative 3 to create any significant cumulative social or economic resource impacts.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Because all projects analyzed in the analysis of socioeconomic resources are proponent-driven and financed, no irreversible or irretrievable commitments of economic resources were identified.

## 3F. RECREATION

### SCOPE OF THE ANALYSIS

The scope of this recreation analysis is limited to the San Francisco Peaks and, in particular, to the Arizona Snowbowl SUP area.

### EXISTING CONDITIONS

#### COMFORTABLE CARRYING CAPACITY

The 1979 Environmental Statement approved a CCC<sup>171</sup> of 2,825 skiers. While Snowbowl regularly exceeds this figure on good snow days, weekends, and holidays, CCC at Snowbowl is currently limited by an uphill (i.e., lift) capacity of 1,880 guests and is ultimately limited by overall parking capacity. Snowbowl frequently experiences peak demand days, which exceed the CCC of the existing facilities and infrastructure. Over the past 10 seasons, average peak day (i.e., holidays and good snow days) attendance has been approximately 3,434 guests.

#### WINTER RECREATION

##### Annual Visitation

With a current population of approximately 5.5 million, Arizona was the second fastest growing state in the nation throughout the 1990s. The greater Phoenix area<sup>172</sup> accounts for nearly two-thirds of Arizona's population.<sup>173</sup> Located approximately 150 miles due north of metropolitan Phoenix, Flagstaff is just over two hours driving time from a population base of roughly 3.3 million people. The greater Phoenix area is projected to grow at more than twice the national rate for the next several decades. By 2009, the greater Phoenix area population is projected to grow to 3.6 million (a 2.1 percent change); by 2025, it is projected to grow to approximately five million.<sup>174</sup>

In 2001/02, Snowbowl sold approximately 1,250 season passes. Eighty-four percent (1,050) of these passes were sold to Flagstaff area residents. The 2002/03 season saw roughly the same percentage of season passes sold, with 1,662 sold to Flagstaff residents and 214 sold to out-of-town residents (89 and 11 percent, respectively).

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<sup>171</sup> As indicated in Chapter 1, CCC is defined as the number of guests that can be comfortably accommodated by a ski area at any point in time. It provides for a pleasant recreational experience by not overburdening a ski area's facilities (including, but not limited to, parking, restaurant seating, restrooms, and uphill/downhill capacity). CCC is used by ski area planners and the Forest Service as a planning tool and *does not constitute a cap on visitation*. Facilities are typically designed to accommodate 125 percent of a ski area's CCC in order to preserve the guest experience on peak visitation days, which are anticipated periodically throughout the season.

<sup>172</sup> The greater Phoenix area is defined primarily as Maricopa County, which includes (but is not limited to) the following cities: Phoenix, Scottsdale, Tempe, Mesa, Peoria, Surprise, El Mirage, Glendale, Goodyear, Buckeye, Tolleson, Avondale, Gilbert and Chandler.

<sup>173</sup> Greater Phoenix Economic Council, 2003

<sup>174</sup> Id.

Because Snowbowl has no snowmaking capabilities, the ski area's operations, and therefore financial viability, are 100 percent dependent on natural snowfall, and seasonal visitation fluctuates considerably from year-to-year. Table 3F-1 compares annual snowfall with days of operation and skier visitation for the past 22 seasons at Snowbowl.

**Table 3F-1  
Comparison of Annual Snowfall, Days Open  
and Visitation at Snowbowl**

Season	Snowfall (Inches)	# of Days Open	# of Visits
1981/82	265	123	63,000
1982/83	276	135	99,626
1983/84	76	64	28,913
1984/85	266	118	114,707
1985/86	210	124	105,252
1986/87	290	112	125,026
1987/88	182	92	119,259
1988/89	170	79	120,132
1989/90	240	74	99,280
1990/91	233	112	106,000
1991/92	360	134	173,000
1992/93	460	130	181,000
1993/94	220	114	116,388
1994/95	259	122	176,778
1995/96	113	25	20,312
1996/97	270	109	153,176
1997/98	330	115	173,962
1998/99	150	60	35,205
1999/00	180	45	66,152
2000/01	272	138	162,175
2001/02	87	4	2,857
2002/03	206	96	88,000

Figure 1-2, displayed in Chapter 1, provides a graphical representation of annual skier visitation and total annual snowfall from 1981 through 2003. A statistical analysis of the 22 seasons of data clearly indicates there is strong relationship between the two variables with a correlation of 0.796, indicating that annual snowfall is a useful statistic in predicting skier visitation 79.6 percent of the time.

### **Terrain Overview**

Approximately 2,300 feet of elevation difference exists between the top terminal of the Agassiz Chairlift and Hart Prairie. Snowbowl's existing terrain network is comprised of 32 developed trails on approximately 139 acres. However, additional skiable terrain in the form of natural, non-maintained glades (i.e., tree skiing) and chutes are available within the SUP area outside of

the formal trail network. A terrain park (open to snowboarders and skiers) is located on *Sunset Boulevard* (trail #10).

The Hart Prairie area is dominated by gentle terrain that is suitable for beginner level guests. The lower mountain in the vicinity of the Sunset Chairlift and *Fort Valley Glade* is predominantly intermediate level terrain with small pockets of steeper, expert terrain and gentler beginner terrain. The upper portions of the mountain are dominated by expert terrain with areas of intermediate terrain scattered throughout. The higher elevation terrain on the northern aspect of the SUP area is steep, but becomes more gradual in the lower elevations.

Skier ability levels at Snowbowl, and the percentages of overall terrain comprising each ability level, are provided in Table 3F-2.

**Table 3F-2  
Existing Terrain Breakdown by Ability Level**

<b>Ability Level</b>	<b>Existing Acreage</b>	<b>Percent of Snowbowl's Total Skiable Terrain</b>
Beginner	0.5	0.4
Novice	43.9	31.7
Low-Intermediate	31.3	22.6
Intermediate	38.1	27.5
Advanced-Intermediate	15.4	11.1
Expert	9.4	6.8
<b>Total</b>	<b>138.6</b>	<b>100</b>

Given that Snowbowl caters heavily to the lower ability level skiers from the Phoenix market, the ski area is lacking beginner and intermediate (including low-intermediate and advanced-intermediate) terrain. It is also short on expert terrain.

**Lift Network**

Snowbowl's lift-accessed terrain is served by four aerial chairlifts and one beginner surface lift. Existing lift specifications are provided in Table 3F-3.

**Table 3F-3  
Existing Lift Network**

Lift	Slope Length (feet)	Vertical Rise (feet)	Design Capacity (persons/hour)	Daily Lift Capacity (guests)
Agassiz Mid	4,794	1,296	810	480
Agassiz Top	6,475	1,973	270	200
Hart-Prairie	3,217	658	966	550
Sunset	2,677	637	1,350	460
Aspen	1,591	242	554	170
Little Spruce	302	35	200	20
<b>Total</b>			<b>4,150</b>	<b>1,880</b>

**Terrain Density Analysis**

In order to achieve a balanced recreational experience, the uphill (lift) capacity of a ski area should be balanced with its downhill (terrain) capacity. As the difficulty of the terrain increases, the acceptable skier density (skiers per acre) decreases.

Table 3F-4 presents a terrain density analysis displaying the existing terrain at Snowbowl using an industry accepted density in terms of guests per acre. The Density Index expresses the Actual Density over the Target Density as a percentage.

**Table 3F-4  
Terrain Density Analysis (Existing)**

Lift	Daily Lift Capacity	Terrain Area (acres)	Actual Terrain Density (guest/acre)	Target Trail Density (guest/acre) <sup>a</sup>	Difference	Density Index
Agassiz Top	480	57.5	2	11	-9	18%
Agassiz Mid	200	14.8	4	7	-3	57%
Hart Prairie	550	26.4	6	18	-12	33%
Sunset	460	21.4	5	11	-6	45%
Aspen	170	18.1	4	18	-14	22%
Little Spruce	20	0.5	8	30	-22	27%
<b>Total</b>	<b>1,880</b>	<b>138.6</b>	<b>4*</b>	<b>13*</b>	<b>-9*</b>	<b>32%*</b>

<sup>a</sup> While no published industry standards exist, this is considered a norm throughout the industry as based on guest expectations.

\* Weighted average.

Extremely high or low actual terrain densities (in comparison to the target) can be evidence of improperly balanced uphill and downhill capacities. The Actual Terrain Density and Density Index columns in Table 3F-4 indicate that, *at a CCC of 1,880*, Snowbowl has very low terrain densities, and that the current lift capacity is insufficient to accommodate the existing terrain, resulting in underused terrain.<sup>175</sup> Therefore, at Snowbowl’s existing CCC of 1,880 guests, one would typically encounter relatively uncongested ski trails and at-capacity lifts.

<sup>175</sup> An inherent fault of the model used to calculate terrain densities is that it assumes a mathematical uniformity to the distribution of skiers across all available terrain which, in actuality, is not the case. This model cannot account

However, as previously mentioned, peak days frequently result in visitation well in excess of Snowbowl's existing CCC (approaching 3,400 skiers). Therefore, a terrain density analysis was conducted for peak capacity days in which crowds of 3,400 guests are experienced. This terrain density analysis indicates that increased attendance does not directly relate to increased terrain densities. While lift line waiting times currently become unacceptably long at 3,400 skiers (lines at more popular lifts such as Agassiz and Little Spruce can exceed 40 minutes) skier densities on Snowbowl's terrain increase only slightly.

### **Fall Line Analysis**

A fall line represents the path an object would take as it descends a slope under the natural influence of gravity (e.g., a ball rolling downhill). A fall line analysis is useful in ski area planning, as it indicates the natural flow of skiers as they descend through terrain to lower elevations and eventually to lift terminals and/or the base area. Thus consistent fall lines throughout a ski area provide for the best recreational experience and result in lesser ground disturbance due to a reduced need for terrain modification associated with trail construction. An analysis conducted at Snowbowl indicates that both developed and undeveloped terrain throughout the SUP area exhibits consistent fall lines that are appropriate for skiing.

### **Slope Aspect Analysis**

The results of the slope aspect analysis within the Snowbowl SUP area indicate that the majority of the developed terrain faces north/northwest, which provides for minimal sun exposure, optimal retention of snow, and therefore favorable skiing conditions. The exception is the Hart Prairie area, as it is oriented to the west, which detracts from snow conditions with late morning/early afternoon sun exposure.

### **Snowplay**

While in the past, snow on the San Francisco Peaks brought large crowds to NFS lands to snowplay (defined as sledding, tubing, saucering, or building snowmen); this activity is not permitted within the Snowbowl SUP area, nor is it now allowed along the Snowbowl Road. Prior to the 2002/03 winter season, the general public was attracted to the areas along the Snowbowl Road for dispersed snowplay activities. These activities created ongoing public safety issues including: snow sliding on non-directional equipment (sleds, saucers and trash bags) in wooded or steep areas, sometimes across heavy traffic on Snowbowl Road, pedestrian/vehicular encounters, sanitation, and refuse concerns, conflicts with Native American traditional ceremonies and gathering, and difficulties for emergency vehicles passing through congested areas. During periods of abundant snow as many as 300 vehicles per day may have been parked along the Snowbowl Road belonging to visitors engaged in dispersed snowplay activities. Beginning with the 2002/03 winter season, the Forest Service has prohibited parking along the Snowbowl Road and initiated an active enforcement program. Although signs have been posted at the bottom of the Snowbowl Road informing visitors that snowplay is not

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for areas such as major collector trails which receive extremely high use and frequently experience unacceptably high skier densities.

allowed, scores of cars continue to drive up the road in search of snowplay opportunities. The majority of these visitors reach the Snowbowl base area only to be turned back by the ski area parking staff. On a peak day with good snow conditions, the Snowbowl parking staff may turn away as many as 500 cars full of visitors seeking an opportunity to play in the snow. Unable to consistently discern skiing guests from snowplay visitors, the Snowbowl staff frequently is required to ask visitors found snowplaying in and adjacent to the parking areas and on the ski trails to leave. This creates an unfortunate and contentious situation for all involved.

The Wing Mountain Cinder Pit (approximately three miles north of Snowbowl Road on Highway 180) and the Crowley area (approximately one mile past the Flagstaff Nordic Center on Highway 180) also offer dispersed snowplay activities. However, given the relatively low elevation of these sites, they rarely offer the necessary snow conditions to provide an adequate snowplay experience, particularly early in the season when snow is only present at higher elevations.

## **Summer Recreation**

### **Summer Events**

Events such as concerts, weddings, and festivals are held throughout the summer season. These events are reviewed and approved on a case-by-case basis via Snowbowl's annual summer operating plan.

### **Hiking within the SUP Area**

Currently, demand for developed hiking trails within the SUP area far exceeds opportunity. While visitors may choose to hike both on and off roads/trails in the lower portions of the SUP area, due to the steep, loose nature of Snowbowl's terrain, no hiking trails or roads currently exist to accommodate hiking above the Agassiz Lift's mid-station. One exception is a short walking path leading from the Agassiz Lift's top terminal to an observation deck. Hiking is not allowed above the observation area to protect critical habitat for the San Francisco Peaks groundsel, fragile tundra, and important Native American religious sites. While hikers who start out at the base area may explore the entire SUP area as they choose, summer visitors riding the Agassiz Chairlift (described below) are required to ride it back down.

### **Summer Sky Ride**

The Summer Scenic Sky Ride at the Snowbowl transports guests to the top of the ski area via the Agassiz Chairlift (11,500 feet in elevation). Approximately 30,000 visitors use the summer Scenic Sky Ride annually between Memorial Day and Labor Day. From this elevation, over 70 miles of the northern Arizona landscape can be viewed, including the Grand Canyon and downtown Flagstaff. Minimal hiking opportunities are available at the top of the Agassiz Chairlift in order to protect the fragile alpine tundra and endangered plants. A short path leads to an observation deck. Guests are prohibited from hiking down to the base area due to the absence of formal hiking trails within the upper limits of the SUP area. A Forest Service interpretive specialist is typically available to answer any questions regarding the biology, tundra, Native American cultural values and uses, threatened and endangered species, and geology of the region.

## **Kachina Peaks Wilderness**

The Snowbowl SUP boundary is bordered on the north, south, and east by the Kachina Peaks Wilderness, which was designated by Congress in 1984. This 18,960-acre Wilderness encompasses most of the upper reaches of the San Francisco Peaks, including Humphreys Peak, Arizona's highest point at 12,633 feet elevation. The area is named for the Hopi spiritual beings who are said to inhabit the mountain.

Two hiking trails offer access to the Wilderness from the SUP area. The Humphreys Peaks Trail (No. 151) leads to the top of the Peaks, which form the rim of the Peaks' inner basin – a caldera which was formed during the Peaks' most recent volcanic eruption. That crater now supports a stand of white barked aspens and mixed conifers. The Kachina Trail (No. 150) offers access to the forest and meadows on the mountain's lower slopes south of the SUP area. Considering the relatively small size of this Wilderness area, its proximity to Flagstaff and large metropolitan areas, the high use of the designated wilderness for most types of non-motorized recreation activities, and the fact that the ski area is surrounded on three sides by Wilderness, the Forest Service faces considerable management challenges for both the Wilderness and the ski area for their intended values and objectives. Additionally, the Humphreys Peak Trail, originating from the SUP area, but located almost entirely within the Wilderness, is the highest use Forest Service system trail in the Flagstaff area, often receiving up to 400 hikers per day on holidays such as July 4<sup>th</sup>, and up to one hundred hikers per day on a typical summer mid-week day. Because Snowbowl's SUP area pre-dates the establishment of the Wilderness, the Forest Service manages the ski area in a way that allows activities typically permitted at other ski areas, but with as much consideration for impacts upon wilderness as is reasonable. Examples include events that may create noise levels that could affect wilderness users or wildlife habitat depending on the season and specific circumstances.

Camping is not allowed above timberline at 11,000 feet in elevation or within the Inner Basin. Hikers are also urged to stay in designated trails at this elevation. These restrictions are in place to help protect the fragile tundra, the threatened San Francisco Peaks groundsel (*Senecio Franciscanus*), Native American religious sites and concerns, and the City of Flagstaff's municipal water supply within the Inner Basin.<sup>176</sup>

## **Wilderness Trailhead Access**

Trailhead parking and access to the Kachina Peaks Wilderness is available in the ski area's lower parking lots; day and over night parking is available for the Humphreys Trail in lots 8 and 9, and for the Kachina Trail in lot 6. Parking for Wilderness users in the Snowbowl's parking lots is available all summer and on weekdays during the winter. Backcountry and/or dispersed recreationists can use these parking lots during the summer and ski season weekdays for free or ski season weekends for a fee. Parking on the Snowbowl Road is prohibited.

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<sup>176</sup> The Peaks' caldera, known as the Inner Basin, contains an aquifer that supplies part of the municipal water for the City of Flagstaff, the largest city on the Colorado Plateau. Water is piped southward to the city from a series of wells tapping the basin's aquifer, which is recharged by seasonal snowmelt.

## Winter Wilderness Permits and Use

In 1998, the Forest Service instituted a winter permit system for access to the Wilderness from the SUP area. Individual permits are free, and are required to be carried when a person enters the Wilderness from the SUP area; permit holders are required to register each time the Wilderness is accessed through the ski area. The purpose of the permit system is to promote safety, education, and awareness of the hazards and responsibilities necessary for backcountry travel, not to restrict access. This is a result of numerous search and rescue efforts in recent years for poorly prepared people leaving the SUP area, and the resultant searches, injuries and fatalities from avalanches and cold weather. All backcountry travelers are held accountable for search and rescue efforts should they become necessary. Violators of this permit system are cited and fined.

Registration boxes are located within the SUP area at the Hart Prairie Lodge ticket windows and at the top of the Agassiz Chairlift.<sup>177</sup> Persons accessing the Wilderness overnight or for a period of time exceeding Snowbowl's operating hours are required to leave a copy of their permit in the windshield of their vehicle. Approximately 80 percent of visitors are assumed to register at the Wilderness registration boxes.

Forest Service-issued annual permits for winter-time access to the Kachina Peaks Wilderness during the last five seasons are provided in Table 3F-5.

**Table 3F-5  
Kachina Peaks Wilderness Permits**

<b>Year</b>	<b>Number of Permits Issued</b>
1998/99	119
1999/00	138
2000/01	219
2001/02	44 <sup>a</sup>
2002/03	384

<sup>a</sup>The CNF was closed to entry due to extreme fire hazard during a portion of this period.  
Source: USDA Forest Service, 2002a.

Trail visitor numbers are calculated from trail registration boxes at each trail. Winter Wilderness use (between January and March) is approximately 10 percent of summer visitation. The information contained in Table 3F-6 was gathered from May 1998 to December 2000.

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<sup>177</sup> Wilderness users are allowed to exit the ski area boundary atop the Agassiz Chairlift during winter months only.

**Table 3F-6  
Kachina Peaks Wilderness Use**

<b>Humphreys Trail</b>	
2003	13,242 visitors
2002	8,686 visitors (0 recorded June)
2001	11,560 visitors (0 recorded January, February, or March)
2000	8,172 visitors (0 recorded in November or December)
1999	13,495 visitors (0 recorded January or February)
1998	13,735 visitors (0 recorded in January, February, March, April, May, or November)
<b>Kachina Trail</b>	
2003	5,512 visitors
2002	3,902 visitors (0 recorded in January, February, March, April, or June)
2001	5,090 visitors (0 recorded in November or December)
2000	4,813 visitors (0 recorded in March)
1999	5,062 visitors (0 recorded in January, February, March, or April)
1998	4,474 visitors (0 recorded in January, February, March, April, November, December)
<b>Weatherford Trail</b>	
2003	1,732 visitors
2002	687 visitors (0 recorded between January and April, or June)
2001	1,842 visitors (0 recorded February, March, November, or December)
2000	1,272 visitors
1999	1,198 visitors (0 recorded between January and April)
1998	1,129 visitors (0 recorded between January and April, November, and December)
<b>Bear Jaw/Abineau Trail</b>	
2003	1,837 visitors
2002	805 visitors (0 recorded February, March, or September)
2001	2,022 visitors (0 recorded in February, November, or December)
2000	2,296 visitors (0 recorded in November or December)
1999	1,325 visitors (0 recorded between January and April)
1998	1,126 visitors (0 recorded between January and May, November, or December)
<b>Total Annual Use of Kachina Peaks Wilderness Trails</b>	
2003	22,323
2002	14,080 <sup>a</sup>
2001	20,514
2000	16,553 <sup>a</sup>
1999	21,080
1998	20,464

<sup>a</sup>The CNF was closed to entry due to extreme fire hazard during a portion of this year.  
Source: USDA Forest Service, 2003a.

# ENVIRONMENTAL CONSEQUENCES

## DIRECT AND INDIRECT EFFECTS

### Recreational Opportunities

*The effects of the Proposed Action on the quality, distribution, and opportunity for winter and summer recreational experiences within the SUP area.*

Indicator:

Comparison of Historic Annual Winter and Summer Recreation Visitation Versus Those Anticipated Under Various Alternatives.

#### **Alternative 1 – No Action**

Under Alternative 1, Snowbowl's CCC would remain at 1,880 guests. No improvements to ski area infrastructure or terrain would be approved under this alternative, and therefore the summer and winter recreational experience would be expected to remain unchanged under this alternative.

As Snowbowl's recent climatic history exhibits (reference Table 3F-1 – Visitation and Snowfall), visitation trends at the ski area would continue to be defined by natural snowfall under the No Action Alternative. Average *peak day* attendance would be anticipated to resemble historic trends - approximately 3,400 guests on a handful holidays and good snow days each year. Generally speaking, future annual visitation levels under the No Action Alternative would be expected to resemble historic visitation, with slight increases attributable to regional population growth.

In making visitation projections under the No Action Alternative, it is essential to note that major fluctuations would be expected from year-to-year. The historic record of the past 24 seasons shows that year-to-year totals vary as much as -97 percent to +71 percent from the median. Annual visitation could be expected to fluctuate from roughly 98,000 to 110,000 between year 0 (the first year following implementation of the No Action Alternative if it were selected) and year 11.<sup>178</sup> The summer Ski Ride program would be expected to continue to draw approximately 30,000 visitors each year under the No Action Alternative.

#### **Alternative 2 – The Proposed Action**

By increasing guest capacities at the day lodges, chairlifts, terrain, and other ski area infrastructure, the CCC of the Snowbowl would increase to 2,825 guests-at-one-time, without substantially increasing the current capacity of skier parking. While this increase would not constitute a change in peak day attendance, it would allow the ski area to better accommodate current use levels. With the increased CCC, busy holiday and snow day crowds that currently overburden the ski area's infrastructure would be more comfortably accommodated resulting in an improved visitor experience.

While average peak day attendance levels are not anticipated to increase under the Proposed Action, the frequency of these peak days is anticipated to increase across the course of the winter

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<sup>178</sup> Barring any unforeseen climatic or economic conditions that would inordinately effect visitation.

season. Therefore, total annual visitation associated with skiing would be projected to increase considerably under the Proposed Action, as attributable to a more consistent snow pack due to the installation of snowmaking, increased lift capacity, increased skiable terrain, and a small increase in parking. Year-to-year variability in visitation under the Proposed Action would be expected to be much less under the Proposed Action, approximately +/- 15 percent. If the Proposed Action were implemented, annual visitation levels could be expected to increase from roughly 98,000 in year 0 to around 215,000 by year 11.

The snowtubing facility would be expected to attract a new market for wintertime recreation, helping meet existing demand, as well as provide an additional amenity for Snowbowl's existing clientele. The snowtubing facility has been designed with a CCC of 600 tubers-at-one-time; this figure, along with an accompanying parking area, is independent of Snowbowl's proposed on-mountain CCC of 2,825. However, it is assumed that the snowtubing facility would only approach full capacity on weekends and during holiday periods. The snowtubing facility's annual contribution to additional wintertime attendance at Snowbowl has been projected to fluctuate from roughly 34,000 and 42,000 between year 0 and year 12. Peak day tubing usage could approach as many as 1,680 guests.<sup>179</sup>

The installation of a hiking trail linking Agassiz Lodge with the top of the Agassiz Chairlift, thereby enabling guests to hike between the top of the Agassiz Chairlift and the base area, is not anticipated to substantially increase summertime guest attendance. This hiking trail is intended to accommodate existing demand for hiking opportunities within the SUP area, and is not anticipated to substantially increase summer visitation. This trail may serve the purpose of providing an alternate hiking experience for people who would have hiked the crowded Humphreys Peak Trail, thereby removing some of the heavy pressure on that trail. Additionally, a slight increase in non-Sky Ride related hiking use of the new FS system trail may result. Summertime attendance on the Sky Ride could reasonably be expected to increase slightly as a result of this new hiking opportunity as people take advantage of riding uphill and associated hiking downhill. Overall use, however, would not be expected to increase substantially, and would likely hover in the neighborhood of 30,000 visitors annually.

### **Alternative 3**

As detailed within the Social and Economic Resources section (Section E), the certainty of the development of the facilities included within Alternative 3 is financially unclear. Given the wide variability in visitation as a function of natural snowfall, the owners of the Snowbowl may not be able or willing to invest the funds necessary to capitalize the Alternative 3 improvements. Likely, a portion of the Alternative 3 improvements - those requiring smaller investments - would be developed. For the purposes of comparison, this section provides estimated changes in annual visitation assuming *all* of the Alternative 3 improvements would be implemented.

Under Alternative 3, wintertime attendance is anticipated to increase slightly above the No Action Alternative, but below that of the Proposed Action. Alternative 3 does not include snowmaking or installation of the snowtubing facility - the two components of the Proposed Action that would be expected to generate the bulk of additional wintertime visitation. Therefore, projected annual visitation would be constrained by continued unreliability of snow

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<sup>179</sup> Assuming four, two-hour sessions per day at a 70 percent use rate.

cover and expectations regarding days open per season. However, the small increases in projected annual visitation in Alternative 3 are attributable to regional population growth (as in the No Action Alternative), construction of the Humphreys Pod (additional lift capacity and terrain), small additions to parking, as well as trail grading projects that exceed those prescribed in the Proposed Action. More intense trail grading in strategic areas are designed to allow Snowbowl to open trails under reduced natural snow conditions, and thereby would be expected to contribute to incremental increases in annual visitation (assuming adequate natural snowfall) as compared to the No Action Alternative.

Essentially the same year-to-year fluctuations in visitation as presented in the No Action Alternative remain for Alternative 3. Alternative 3 could be expected to produce annual skier visitation levels between 98,000 and 118,000 between year 0 and year 11.

Indicator:

Narrative Description of the Quality of Winter and Summer Recreational Opportunities Under All Alternatives.

**Alternative 1 – No Action**

Under the No Action Alternative, no operational or infrastructural changes/additions would occur within Snowbowl's SUP that would improve the recreational experience. Generally speaking, the quality of wintertime recreation opportunities under the No Action Alternative would continue to be dictated by the amount of natural snowfall throughout each season. As indicated in Table 3F-1, natural snowfall is widely variable, meaning that Snowbowl would continue to offer an undependable winter recreational experience.

In lieu of updating guest service facilities at Snowbowl, selection of the No Action Alternative would translate to a continuation of crowded, and sometimes undesirable guest experiences in many areas, such as in the lodges and on the chairlifts. As mentioned previously, Snowbowl would be expected to continue to experience peak demand days under the No Action Alternative, which considerably exceed the current CCC of the existing facilities, lifts, and terrain. The public's demand for beginner and intermediate terrain would continue to exceed supply on peak days, resulting in high terrain densities and higher potential for safety concerns. Table 3F-7 compares total terrain and allocation according to ability level across all three alternatives.

**Table 3F-7  
Total Skiable Acreage Under Alternatives 1, 2 and 3**

<b>Ability Level</b>	<b>Alternative 1 (acres)</b>	<b>Percentage of Skiable Terrain</b>	<b>Alternative 2 (acres)</b>	<b>Percentage of Skiable Terrain</b>	<b>Alternative 3 (acres)</b>	<b>Percentage of Skiable Terrain</b>
Beginner	0.5	0.4	2.0	1.0	2.0	1.0
Novice	43.9	31.7	44.0	21.5	42.5	21.0
Low Intermediate	31.3	22.6	34.5	16.9	34.5	17.0
Intermediate	38.1	27.5	51.0	25.0	51.0	25.2
Advanced Intermediate	15.4	11.1	40.9	20.0	40.9	20.2
Expert	9.4	6.8	31.8	15.6	31.8	15.7
<b>Total</b>	<b>138.6</b>	<b>100</b>	<b>204.2</b>	<b>100</b>	<b>202.7</b>	<b>100</b>

As described within the Existing Conditions section, a demonstrated demand exists for dispersed snowplay activities. Under the No Action Alternative, the Snowbowl Road would remain closed to parking – and therefore snowplay activities along the road. Despite efforts to inform the public of the parking and snowplay prohibitions, it is anticipated that numerous visitors would continue to drive up the Snowbowl Road only to be turned away by the parking staff.

As detailed within the Social and Economic Resources section (Section E), the Snowbowl operates in a capital-intensive business, where capital expenditures are required on a regular basis to maintain the quality of the recreational product, offer an adequate level of guest service, and to maintain a reasonable level of competitiveness with other ski areas. Over the past eleven operating years, the Snowbowl has invested a cumulative total of \$4.42 million in capital expenditures, all of which has been oriented toward ski area maintenance.<sup>180</sup> Within the ski industry, it is generally assumed that at least six percent of gross revenues should be allocated for maintenance capital – capital expenditures sufficient to maintain a ski area at an acceptable level of quality, but not to make major improvements to the facility. The Snowbowl’s capital investment over the past eleven years has equaled 8.87 percent of gross revenues.<sup>181</sup> However, this level of expenditure has required the ski area owners to infuse additional capital as these expenditures have exceeded net revenues. Under the No Action Alternative, it is probable that the owners of the Snowbowl would be unable or unwilling to continue to infuse the recurring capital necessary to maintain the quality and service level currently offered.

While no changes would occur to the recreational experience under the No Action Alternative, it is probable that Snowbowl’s existing and potential clientele would be effected in terms of the forgone recreational opportunities derived from improved (or at least minimally maintained) facilities, and increased snowpack consistency that are associated with the Proposed Action.

<sup>180</sup> The Snowbowl’s capital expenditures have been oriented toward maintenance of the current level of quality, including items such as restrooms, snow grooming equipment, reconstructed or new ski runs, water trucks, and background infrastructure. Capital investment has not been sufficient to add improvements that would be evident to the skier, such as new lifts, lodge space, and terrain.

<sup>181</sup> 11 year Gross Revenues = \$49.78 million. 11 Year Capital Expenditures = \$4.42 million (8.8 percent of Gross Revenues).

## **Alternative 2 – The Proposed Action**

Under the Proposed Action, all effects to the quality of the recreational opportunities within the SUP (summer and winter) would be positive in nature.

### *Winter Recreation*

#### *Lifts and Terrain*

Under the Proposed Action, the only aerial lift at Snowbowl that would remain unchanged is Agassiz. The remaining three lifts in the existing lift network would be realigned and/or upgraded. Two of the upgraded lifts (Sunset and Hart Prairie) would use high-speed, detachable-chair technology. The upgraded lift network would also be complimented by the installation of the Humphreys Chairlift (likely using the Sunset Chairlift after its replacement). Three beginner surface lifts would be added to improve Snowbowl's teaching opportunities in the Hart Prairie area. In addition, the proposed terrain park would specifically be serviced by a surface lift. Combined, the upgrades and additions to Snowbowl's surface and aerial lift network would improve the recreational experience for guests of all levels by improving the balance between uphill and downhill capacities.

As indicated, Snowbowl lacks beginner and intermediate terrain. With selection of the Proposed Action, Snowbowl's developed terrain network would increase from approximately 139 acres to 204.2 acres (a 47 percent increase). The nature of the developed terrain additions would primarily benefit Snowbowl's intermediate guests, with approximately 41 acres of additional intermediate (including low intermediate, intermediate, and advanced intermediate) terrain proposed. Due to the nature of the natural terrain in the SUP area, beginner and novice guests would gain a modest amount of new terrain (1.6 acres), and advanced skiers would gain roughly 22 acres of developed terrain. The additional 47 acres of improved glades would enhance the skiing experience for Snowbowl's advanced and expert clientele. In total, the quality of the recreational experience at Snowbowl would improve as lifts are improved and skiers are better distributed across more terrain. The reader is referred to Table 3F-7 for specific terrain allocations. (Note: the 47 acres of improved glades are not reflected in Table 3F-7.)

#### *Consistent Snowpack*

The public scoping period (which included mailings, public meetings, and media coverage) produced approximately 1,020 responses, of which approximately 65 percent were in favor of the Proposed Action as presented. While the Forest Service NEPA process is clearly not intended to be a "voting" process, this indicates considerable support for the primary component of the Proposed Action – snowmaking. It is apparent that Snowbowl's clientele considers snowmaking to be integral to the betterment of the ski area's recreational experience.

While the proposed snowmaking system would not rule out all natural variables (i.e., snowmaking technology is highly dependent on ambient air temperatures to be successful), it is designed to provide a consistent snowpack each season from roughly mid/late November through late March/early April. A consistent snowpack from season-to-season would help redefine the Snowbowl as a permanent and reliable winter sports facility in Northern Arizona's recreational setting. It is probable that this redefinition would reduce Arizonans traveling beyond the state (into the Four Corners area) in search of better, more consistent snow conditions.

### Terrain Density Analysis

As a component of this analysis, a terrain density analysis was performed for the proposed additions and increased CCC of 2,825.

**Table 3F-8  
Terrain Density Analysis (Proposed Action)**

Lift	Daily Lift Capacity	Terrain Area (acres)	Actual Terrain Density (guest/acre)	Target Trail Density (guest/acre)	Difference	Density Index
Agassiz/C-3	650	43.5	5	8	-3	63%
Hart-Prairie/DC-4 (New)	660	31.0	10	17	-7	59%
Sunset/DC-4 (New)	690	82.7	3	10	-7	30%
Aspen/C-2	160	16.2	3	18	-15	17%
Humphreys/C-3 (New)	470	27.2	5	6	-1	83%
Carpet 1	80	1.0	19	18	1	106%
Carpet 2	80	1.0	19	18	1	106%
Half Pipe	35	1.5	7	12	-5	59%
<b>Totals</b>	<b>2,825</b>	<b>204.2</b>	<b>6*</b>	<b>11*</b>	<b>-5*</b>	<b>56%*</b>

\* Weighted Average.

As compared to Table 3F-4, Table 3F-8 indicates that the uphill (i.e., lift) and downhill (i.e., trail) capacities are better balanced under the Proposed Action than under the existing condition. Even with a higher CCC, the additional terrain made available under the Proposed Action better disperses guests across the SUP area. Therefore the terrain/infrastructural upgrades and increased CCC under the Proposed Action would improve the Snowbowl's ability to accommodate the existing levels of visitation. Skier densities would remain within the industry norm while lift line waiting periods would decrease. Decreased skiers densities would result in improved skiers circulation and safety.

### Slope Aspect Analysis

The results of the slope aspect analysis conducted for existing terrain within the SUP area are provided in the Existing Conditions section. The majority of the proposed terrain additions are aligned in north/northwest aspects (which provide for optimal retention of snow). However, the terrain additions related to the development of the Humphreys Chairlift are not. A detailed slope aspect analysis was completed specific to the approximately 31 acres of skiing trails proposed within the Humphreys pod. The aspect of these trails averages 238.9 degrees azimuth, which would be characterized as a southwest-west slope aspect. The majority of the terrain (93.4 percent) lies southwest (180 to 270 degrees azimuth) with the remainder (6.6 percent) facing west to northwest (270 to 337 degrees azimuth).

While the Humphreys pod does not offer an optimal slope aspect, operations at other western ski areas – at similar elevations – has demonstrated that this can be effectively overcome through the installation of snowmaking infrastructure and through a concerted effort in maintaining adequate coverage in this pod. Additionally, the ski trails have been specifically designed in a mosaic of open spaces with the intent of maximizing the shading potential of the existing tree canopy.

Through a combination of snowmaking, natural shading, and effective snow management, it is anticipated that the skiing terrain within the Humphreys area would provide an acceptable skiing product throughout the majority of Snowbowl's operating season.

### *Snowplay*

The proposed lift-served, developed snowplay area in Hart Prairie would help fulfill the ongoing demand for alternative winter recreation activities on the CNF. As detailed within the Existing Conditions section, the areas along the Snowbowl Road were recently closed to parking in an effort to manage ongoing issues stemming from dispersed snowplay activities. The proposed snowplay facility would offer an additional attraction for non-skiers who normally would not use or visit the ski area or perhaps lack the physical abilities to ski. In addition, the snowplay facility would benefit Snowbowl's existing clientele, as another option for recreation while using the ski area's facilities. The professionally designed/maintained snowtubing area would provide a safe and organized alternative to dispersed snowplay activities that currently occur on NFS lands along the Snowbowl Road and elsewhere on the CNF.

### *Half Pipe*

The half pipe, proposed for construction near the Sunset Lift, would add a currently unavailable but needed element to Snowbowl's alternative terrain features. The half pipe would benefit snowboarders and skiers alike, and would be specifically served by a surface lift. With much of Snowbowl's use coming from snowboarders, and considering the popularity of such terrain features, this would be an attractive addition to the ski area.

### *Upgraded Guest Services*

Upgrading the ski area's uphill capacity (and therefore CCC) would necessitate making commensurate improvements to ski area-wide infrastructure and guest service facilities.<sup>182</sup> By increasing and updating Snowbowl's guest service facilities at Agassiz Lodge and Hart Prairie Lodge, a Native American cultural and education center, and new ski team buildings, the overall recreational experience would be improved (e.g., food service seating would be increased eliminating the need for guests to sit on the floor).

In addition to the capital investments necessary to develop the proposed facilities, the Proposed Action would allow the business to continue to invest the recurring maintenance capital necessary to maintain the quality and level of service offered to the guest.

### *Summertime Recreation*

#### *Hiking*

The proposed hiking trail from Agassiz Lodge to the top of the Agassiz Chairlift would add a new element to Snowbowl's summertime recreational offerings. The trail would enable guests to hike down to the base area after using the Sky Ride program. Approximately 30 percent of guests participating in the summer Sky Ride express an interest in being allowed to hike off the

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<sup>182</sup> Infrastructure, utilities and guest services are further detailed in Section G.

mountain rather than ride the lift down. Additionally, the opportunity to hike from the bottom of the ski area to the top of Agassiz Chairlift is expected to be highly valued.

### **Alternative 3**

From a recreational perspective, Alternative 3 does not include the primary elements associated with the Proposed Action which would most affect the overall recreational experience. Without snowmaking and snowtubing, the overall recreation experience at Snowbowl would be less desirable than the Proposed Action, particularly on busy days, and would continue to deteriorate as skiers and snowboarders seek more favorable, out-of-state opportunities. The ski area's reputation in Northern Arizona's recreational environment would continue to be defined by climatic conditions with a continued dependency on natural precipitation. While difficult to measure, skier export to neighboring states would be expected to continue, as warranted by snowfall and climatic trends.

As additionally detailed within the Social and Economic Resources section, operations under Alternative 3 would continue to be heavily dependant upon natural snowfall. Correspondingly, skier visitation levels, and therefore revenues, are not anticipated to stabilize. As such, it is probable that the owners of the Snowbowl would be unable or unwilling to continue to infuse the recurring capital necessary to maintain the quality and service level currently offered. Likely, a portion of the Alternative 3 improvements - those requiring smaller investments – would be developed. Dependant upon which facilities are ultimately implemented, the actual effects to the quality of winter recreation would realistically be a blending of those effects described under the No Action Alternative and those detailed under Alternative 3.

For the purposes of comparison, this section assesses the quality of winter and summer recreation opportunities assuming that *all* of the Alternative 3 improvements would be implemented.

#### *Winter Recreation*

##### *Lifts and Terrain*

Under Alternative 3, the aerial lift system and terrain development would be identical to that described under the Proposed Action.

##### *Consistent Snowpack*

The Snowbowl's reliance upon natural snowfall and variability in skier visitation would continue under Alternative 3. While it is probable that a series of infrastructural improvements may be made to the facility under Alternative 3, consistency of skiing conditions and predictability of operations would remain unchanged. It is probable that Arizonans would continue traveling beyond the state (into the Four Corners area) in search of better, more consistent snow conditions.

### *Terrain Density Analysis*

Under Alternative 3, the terrain density anticipated under Alternative 3 would be essentially identical to that evaluated under the Proposed Action.<sup>183</sup>

### *Slope Aspect Analysis*

The results of the slope aspect analysis conducted for existing terrain within the SUP area are provided in the Existing Conditions section. The majority of the proposed terrain additions are aligned in north/northwest aspects (which provide for optimal retention of snow); however, the terrain additions related to the development of the Humphreys Chairlift are not. A detailed slope aspect analysis was completed specific to the approximately 31 acres of skiing trails proposed within the Humphreys pod. The aspect of these trails averages 238.9 degrees azimuth, which would be characterized as southwest-west. The majority of the terrain (93.4 percent) lies southwest (180 to 270 degrees azimuth) with the remainder (6.6 percent) facing west to northwest (270 to 337 degrees azimuth).

The Humphreys pod does not offer an optimal slope aspect in terms of season-long snow retention. Although the ski trails have been specifically designed in a mosaic of open spaces with the intent of maximizing the shading potential of the existing tree canopy, it is anticipated that the aspect of these trails would cause them to melt-off periodically between storm cycles. Through a combination of natural shading and effective snow management, it is anticipated that under Alternative 3, the skiing terrain within the Humphreys area would provide an acceptable skiing product for roughly half of the Snowbowl's operating season.

### *Snowplay*

Because construction and maintenance of the proposed snowplay facility would be dependent on a reliable source of snow (i.e., snowmaking), this facility would not be developed under Alternative 3. Thus, no additional recreational opportunities would be available to non-skiers within the SUP area during the winter. As described within the Existing Conditions section, a demonstrated demand exists for developed and dispersed snowplay activities. Under Alternative 3, the Snowbowl Road would remain closed to parking – and therefore snowplay activities would not be allowed along the Snowbowl Road. Despite efforts to inform the public of the parking and snowplay prohibitions, it is anticipated that numerous visitors would continue to drive up the Snowbowl Road only to be turned away by the parking staff.

### *Half Pipe*

The half pipe, proposed to be constructed near the Sunset Lift, would add a currently unavailable element to Snowbowl's alternative terrain features. Similar to the Proposed Action, the proposed half pipe would be partially constructed of dirt, which would allow it to be operational without snowmaking coverage. However, the overall size and quality of the half pipe would be reduced as compared to the Proposed Action due to the inability to augment its construction with machine-produced snow.

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<sup>183</sup> Negligible differences in terrain density are attributable to the Proposed Action's realignment of the Aspen Chairlift and use of some of the Hart Prairie terrain for the snowtubing areas.

### *Upgraded Guest Services*

Upgrading the ski area's uphill capacity (and therefore CCC) would necessitate making commensurate improvements to ski area-wide infrastructure<sup>184</sup> and guest service facilities. By increasing and updating Snowbowl's guest service facilities, the overall recreational experience would be improved (e.g., food service seating would be increased eliminating the need for guests to sit on the floor).

### Summertime Recreation

#### *Hiking*

Under Alternative 3, the proposed hiking trail from Agassiz Lodge to the top of the Agassiz Chairlift would be developed as described under the Proposed Action.

### **Wilderness Values**

*Implementation of the Proposed Action may affect the experience of wilderness users within the surrounding Kachina Peaks Wilderness.*

Indicators:

Quantitative Description of Seasonal Wilderness Use and Visitation.

Narrative Discussion of the Anticipated Effects of the Proposed Action to Wilderness Users

The discussion within this section combines a description of the two identified indicators.

### **Alternative 1 – No Action**

Selection of the No Action Alternative is not expected to directly or indirectly impact the Kachina Peaks Wilderness. Under this alternative summer and winter access, use and enjoyment of the Wilderness would not change. Annual Wilderness use would be expected to follow historic trends, as provided in Table 3F-6.

### **Alternative 2 and 3**

Similar to the No Action Alternative, neither of the action alternatives would directly or indirectly impact summer or winter access, use or enjoyment of the adjacent Kachina Peaks Wilderness. All projects likely to occur under either of the action alternatives would be confined to the established Snowbowl SUP area, and no additional access to, or use of, the Wilderness is anticipated. Therefore, it is not anticipated that any of the changes occurring within the ski area would affect any Wilderness values or users. Annual Wilderness use would be expected to follow historic trends, as provided in Table 3F-6.

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<sup>184</sup> Power, water, and sewer upgrades are detailed in the Infrastructure and Utilities section of this chapter.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

The temporal bounds of the cumulative effects analysis for recreation resources extends from the conception of Snowbowl as a developed winter recreational venue into the foreseeable future for which these opportunities can be expected to continue at the Snowbowl.

#### **Spatial Bounds**

The physical extent of this cumulative effects analysis comprises the Snowbowl SUP area and approximately 5,000 acres of the surrounding Kachina Peaks Wilderness (approximately one quarter of the total Wilderness acreage).

### **Past, Present, and Reasonably Foreseeable Future Actions**

1. Wilderness designation
2. Miscellaneous facilities and trail construction within Snowbowl's SUP area
3. Summer events held at Snowbowl
4. San Francisco Mountain Mineral Withdrawal
5. Peaks segment of the Arizona Trail
6. Private land development
7. Miscellaneous/ongoing recreational uses
8. Snowbowl Road Parking Restrictions Snowbowl Road Paving

Appendix C includes the full list of past, present and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

### **Alternative 1 – No Action**

The Snowbowl has existed on the San Francisco Peaks since 1938, and its developed character has necessarily grown over the decades in proportion to greater demand and use. The Kachina Peaks Wilderness was not designated by Congress until 1984 – well after the establishment of the majority of Snowbowl's existing facilities and trail systems. While it is acknowledged that the ski area and Wilderness represent different, and in some cases, conflicting, management emphases,<sup>185</sup> Snowbowl's operations and development have been, and continue to be, entirely confined to the SUP area and have been conducted in accordance with the terms of its SUP and Forest Plan management direction.

Many of the past, present, or reasonably foreseeable future actions identified above are positive in nature when considered in a recreational context. For example, withdrawal of the Peaks and surrounding area from mineral entry (completed in 2000) has maintained the visual and recreational character and opportunities of the analysis area. The Peaks segment of the Arizona

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<sup>185</sup> For example, portions of the lift and trail network can be seen from within the Wilderness. Noise is not considered an issue, as the Wilderness receives the majority of its use during the non-winter months when Snowbowl operations area minimal.

trail (a decision which is currently under litigation) will provide additional hiking and interpretive opportunities in the cumulative effects analysis area.

Recent parking restrictions on the Snowbowl Road have had the effect of shifting dispersed winter snowplay to other areas of the Forest as well as private land. This has improved access to the Snowbowl by reducing congestion on the road. In addition, paving of the Snowbowl Road has improved use and access to the Snowbowl.

It is difficult to assess the effects of past, present, and future private land development in Hart Prairie on recreational resources. Cumulatively, with development of the Snowbowl, this has brought more people, facilities, traffic, and activity within close proximity to the Wilderness and will continue with future development. This may lead to increased use of the Wilderness in the future. Miscellaneous/ongoing recreational uses of the area – both on and off-Forest, have increased over the years and will likely increase with or without selection of the No Action Alternative.

Summer events will continue to occur within the SUP area, as reviewed and approved on a case-by-case basis.

### **Alternative 2 – The Proposed Action**

While the Proposed Action represents the greatest potential for effects to recreational opportunities in the cumulative effects analysis area, cumulative effects of implementation of the Proposed Action are anticipated to be largely the same as those described under Alternative 1, with the following exceptions:

Installation of snowmaking capabilities within the SUP area would provide an improved, more reliable snowpack within the SUP area, thereby, in all likelihood, deterring some dispersed winter use beyond the SUP area under less-than-favorable snow conditions.

By providing a developed snowplay facility within the SUP area, dispersed snowplay elsewhere on NFS and private lands would be reduced. This would alleviate some of the safety, sanitation, and vehicular/pedestrian congestion in the vicinity.

The establishment of the proposed hiking trail from the Agassiz Lodge to the top of the Agassiz Chairlift could offset some use of the Wilderness by reducing pressure on the Humphreys Peak Trail, and thus lessen impacts on Wilderness during the summer.

### **Alternative 3**

Cumulative impacts associated with selection of Alternative 3 would be largely the same as those disclosed under Alternative 1.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

All projects elements have been designed to enhance the summer and winter recreational experience within Snowbowl's SUP area. No irreversible or irretrievable commitments of recreational resources were identified.

# 3G. INFRASTRUCTURE AND UTILITIES

## INTRODUCTION

Neither public nor agency scoping identified potential effects to infrastructure and utilities as a major issue for this proposal; however, changes would occur to both infrastructure and utilities under the two action alternatives. As a result, domestic water, wastewater, power, and fuel storage at Snowbowl are described and analyzed herein.

## SCOPE OF THE ANALYSIS

The scope of analysis for the infrastructure and utilities section of this EIS focuses on the Snowbowl SUP area (NFS lands) and the length of the corridor from the City of Flagstaff to the ski area in which the reclaimed water would be piped from the Rio de Flag wastewater treatment facility to Snowbowl for use in the proposed snowmaking system and as a source of reclaimed water for the ski area.

## EXISTING CONDITIONS

### WATER AND WASTEWATER

Because Snowbowl is located on a volcanic mountain in an arid landscape, a potable water source does not exist at the ski area. Therefore, all potable water is trucked to the ski area from the Bonito fill station in Flagstaff via a 3,200 gallon capacity tender truck. In a typical year, Snowbowl hauls approximately 1.5 million gallons of potable water. This equates to approximately 470 trips each year. During the ski season, Snowbowl hauls approximately 10,000 gallons of water per night on the weekends and 5,000-7,000 gallons of water per night mid-week. During the summer, the ski area uses approximately 10,000 gallons of water per week.

Potable water is held in aboveground storage tanks adjacent to each base area facility. The Agassiz Lodge, Hart Prairie Lodge, and maintenance facility have tanks of 10,000, 20,000, and 2,500 gallons, respectively. In addition to potable water for drinking, Snowbowl also has one 10,000 gallon water storage tank located across the road from the Hart Prairie Lodge for fire suppression as required by state and local laws.

Of the approximately 1.5 million gallons of water hauled to the ski area annually, approximately 60 percent (900,000 gallons) is consumed in restroom facilities. Each of the three main base area facilities at Snowbowl has an on-site, self-contained septic system and leachfield. The Agassiz Lodge, Hart Prairie Lodge, and maintenance shop have systems capable of treating 10,000, 10,000, and 1,200 gallons of wastewater per day, respectively. The septic systems are pumped annually, or as needed, to avoid overflow. Snowbowl's septic systems are adequately sized to meet current needs.

## POWER

Electric power is provided to Snowbowl by Arizona Public Service (APS). A main line runs from Flagstaff to the ski area via an existing, overhead utility corridor, located south of the maintenance facility (refer to either figure 2-6 or 2-9). From here, an electric power line runs through the access road to the maintenance facility and to the Hart Prairie Lodge. Spurs from the Hart Prairie Lodge connect to the bottom of the Aspen Chairlift, the Hart Prairie Chairlift bottom and top terminals, the Agassiz Lodge, and the Agassiz Chairlift bottom terminal. The lifts at Snowbowl are individually powered by electric motors; the electrical requirements for each lift are detailed in the Table 3G-1. In the event of an electrical power outage, however, each lift has an auxiliary power unit (APU) powered by either gasoline or diesel fuel. This enables operation of the lifts in the event of a power outage. On average, APUs at each lift run fewer than 25 hours per year.

**Table 3G-1**  
**Electrical Requirements for Existing Lifts**

Lift	Electrical Requirement (hp)
Agassiz	400
Hart Prairie	150
Sunset	150
Aspen	110

All facilities use electricity for lighting. Propane is the source of energy for heat and cooking. The main propane storage tanks are located in the base area, with one 1,000-gallon tank at the Agassiz Lodge, one at Hart Prairie (6,000 gallons), and one 1,000-gallon tank at the maintenance facility. Each lift shack has its own portable propane tank, which is transported to the bottle dock at the maintenance shop to be refilled as necessary. The large base area tanks are serviced and filled as needed.

## FUEL STORAGE

Fuel is stored in an above ground tank at the maintenance facility, located approximately on-half of a mile south of the Hart Prairie Lodge. The tank holds 2,000 gallons of gasoline and 6,000 of diesel fuel. Additionally, each lift has a small fuel tank associated with its APU. These tanks contain enough fuel for approximately eight hours of operation.

## COMMUNICATIONS

Communication services are provided to Snowbowl by Qwest. All communication lines at Snowbowl connect to the main line in the existing utility corridor (shared with power), south of the maintenance facility. From this connection with the main line, a phone line runs through the access road to the maintenance facility and to the Hart Prairie Lodge. Spurs from the Hart Prairie Lodge connect to the bottom of the Aspen Chairlift, the Hart Prairie Chairlift bottom and top terminals, the Agassiz Lodge, and the Agassiz Chairlift bottom terminal. While the existing network of communication lines throughout the SUP area are adequate to meet Snowbowl's existing operational needs, the system is currently maxed out and cannot be augmented without

upgrading the main line. Refer to either Figure 2-6 or 2-9 for locations of exiting communication lines.

A two-way radio repeater is situated at 11,500 feet adjacent to the top patrol area. Mountain personnel, such as ski patrol, use line of sight radios for instantaneous communication while outdoors.

## **GUEST SERVICES**

Existing on-mountain visitor services are provided in two buildings: the 18,425 square foot Hart Prairie Lodge (at the base of the Hart Prairie and Sunset chairlifts) and the 5,080 square foot Agassiz Lodge at the base of the Agassiz Chairlift. In total, these two buildings comprise approximately 23,505 square feet of guest service and administrative space.

There are presently a total of 614 indoor, cafeteria style seats and 648 outdoor seats available between the two buildings, for a total of 1,262 seats. Based on an average daily seating turnover rate of 4.0,<sup>186</sup> Snowbowl has indoor seating for approximately 2,450 guests. For Snowbowl's CCC of 1,880, this number of indoor seats is ample. However, because peak daily visitation has averaged 3,400 skiers in the past, it is apparent that current guest seating falls considerably short of what is actually needed to provide an adequate experience.

The kitchen/scramble<sup>187</sup> area in the Hart Prairie Lodge falls short of meeting Snowbowl's needs, or guests expectations, for quality services and facilities. On any day in which Snowbowl's attendance reaches 2,000 guests, the Hart Prairie Lodge experiences long food and cashier lines (sometimes extending out the door onto the deck), inadequate seating (resulting in guests sitting on the floor or standing while they eat) and general congestion throughout the building.<sup>188</sup> Restrooms are, however, considered adequate at the Hart Prairie Lodge.

Similar to the Hart Prairie Lodge, the Agassiz Lodge lacks adequate seating on even moderately busy days, which means that guests are forced to sit on the floor or stand while they eat or warm up. Due to outdated (1961) and undersized kitchen/scramble facilities, menu options are extremely limited and lines are unacceptably long. Restroom capacities are insufficient resulting in long waits.

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<sup>186</sup> A turnover rate of three to five times is the standard range used in determining restaurant capacity. Sit-down dining at ski areas typically results in a turnover rate of three, while cafeteria style dining is characterized by a higher turnover rate. Furthermore, weather has an influence on turnover rates at ski areas, as on snowy days skiers will spend more time indoors than on sunny days.

<sup>187</sup> The "scramble" area refers to the self-service and cashier line portions of cafeteria-style food service areas.

<sup>188</sup> This is especially true on days in which outdoor seating is undesirable due to weather conditions.

## ENVIRONMENTAL CONSEQUENCES

### DIRECT AND INDIRECT EFFECTS

*Effects on ski area infrastructure and supporting utilities within and beyond the SUP area.*

Indicator:

Disclosure of Current Versus Anticipated Requirements for Guest Seating; Power, Domestic Water Supply and Wastewater Treatment.

Effects to infrastructure and utilities are primarily related to public safety, demand/consumption, efficiency, and reliability. Domestic water includes availability and quality of potable water for on-mountain consumption at restaurants and the proposed snowplay facility, as well as non-potable uses such as capacity, availability, and code compliance for fire suppression facilities (sprinkler systems), and restroom facilities. Sewer facilities include capacity, availability, and code compliance of restroom and restaurant wastewater facilities. Power (electrical distribution) facilities on the mountain are related to availability, reliability, and contingency planning. Fuel storage issues at Snowbowl are typically confined to public safety issues.

In addition to the narrative discussion of existing and proposed utilities provided here, refer to Table 2-5, Summary of Environmental Consequences, which quantifies both permanent and temporary ground disturbances associated with the installation of the described infrastructure under each alternative.

#### **Alternative 1 – No Action**

With selection Alternative 1, Snowbowl's CCC would remain at 1,880, and daily visitation (including peak visitation) would remain similar to that of the recent past – subject to weather conditions.

#### Water and Wastewater

Under Alternative 1, Snowbowl would continue to haul all of its domestic water from the City of Flagstaff. There would be no additional storage capacity and demand would be anticipated to remain the same.

Wastewater facilities currently meet the demands of the ski area, even on peak days. Snowbowl would continue to use approximately 60 percent of the water it hauls from Flagstaff to accommodate non-potable (i.e., toilet) services.

#### Power

Because the existing electrical service is adequate to meet Snowbowl's needs current needs, upgrades to power supply and distribution are not necessary under Alternative 1. However, the existing overhead power line experiences occasional outages when trees fall across it. The line may be placed underground in the future within the right-of-way for the Snowbowl road.

### Fuel Storage

There is an adequate supply of gasoline, diesel, and propane storage at the ski area to meet existing demands.

### Communications

Under the No Action Alternative service would continue to be provided by Qwest. No new or additional lines would be installed. However, if the power line is buried in the right-of-way, the communication line would be buried with it.

### Guest Services

No changes would occur to guest service facilities under the No Action Alternative. Guest seating and restrooms would continue to be inadequate on even moderately busy days. Existing buildings would not be brought into compliance with the Americans with Disabilities Act (ADA) under the No Action Alternative.

## **Alternative 2 – the Proposed Action**

The utilities and infrastructure discussed below are depicted on Figure 2-6.

In order to better accommodate existing demand, the Proposed Action would increase Snowbowl's CCC from 1,880 to 2,825. As stated, it is typical for ski areas to size infrastructure and guest services to accommodate as much as 125 percent of CCC. Under the Proposed Action guest service facilities and related infrastructure have been sized to accommodate approximately 3,000 guests. However, as was also stated, parking is, and will continue to be, a constraint to daily attendance, even with minor increases in parking areas.<sup>189</sup>

### Water and Wastewater

Under Alternative 2, Snowbowl would continue to transport 100 percent of its potable water via truck from Flagstaff. While daily skier visitation is not anticipated to increase substantially, the occurrence of peak days is expected to increase in frequency and implementation of the proposed snowplay facility would increase demand for potable water at the Snowbowl. However, with construction of the reclaimed water pipeline from Flagstaff, it would no longer be necessary for the Snowbowl to use valuable potable water for non-potable services. Therefore, under the Proposed Action, 100 percent of trucked in potable water would be available for culinary uses; subsequently the frequency in which potable water is delivered to the ski area would decrease.

Snowbowl proposes to construct (and bury) one additional 10,000-gallon potable water storage tank at the snowplay area to accommodate guests' needs there. In addition, water stored in the main snowmaking impoundment would be routed to the maintenance shop, the Agassiz Lodge, the Hart Prairie Lodge, and the snowplay facility for non-potable needs and for emergency fire suppression. Three additional buried 10,000-gallon (non-potable) water storage tanks would be constructed - one each at the Agassiz and Hart Prairie lodges, and one at the snowplay facility.

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<sup>189</sup> Estimated at 2.5 guests per vehicle, Snowbowl's 10.6 acres of parking would continue to have a capacity of approximately 3,000 guests.

In order to accommodate the additional guest service facilities (specifically restrooms and food service operations), the on-site septic system for the Agassiz Lodge would be upgraded with an additional drainfield proposed to be located under the parking lot south of the Lodge (refer to Figure 2-6).

The septic system for the snowtubing area would be sized to accommodate peak day use of the facility. This would equate to approximately 1,680 snowtubers using five gallons of water per day (capacity of 8,500 gpd). Ground disturbance for this system has been accounted for in the proposed grading for construction of the snowtubing area.

While the existing septic system at the Hart Prairie Lodge would not need to be enlarged, under the Proposed Action, the drainfield may be disturbed during conduction activities in the Hart Prairie area and therefore may warrant repair.

The reader is referred to figures 2-5 and 2-6 for locations of exiting/proposed leachfields in relation to proposed grading activities.

### Snowmaking

Installation of a snowmaking system would require trenching for air, power, and water lines, as well as construction of a 10 million gallon on-mountain water impoundment. In the winter this storage pond would be used as a source of water for the proposed snowmaking system (and, to a lesser degree, for non-potable water needs at the ski area). In the summer, the water in the impoundment would be available for wildland firefighting operations as a high elevation water source. The storage pond would be easily accessible by helicopters, making it a valuable time conserving resource.

The Proposed Action includes installing fire hydrants along the pipeline corridor from Flagstaff. Strategically located, these hydrants, located on Observatory Mesa and in the Fort Valley residential community, would help protect these areas by providing expedited access to a readily available source of water for fire suppression in case of an emergency.

With very few exceptions, snowmaking is proposed on all existing and new trails under Alternative 2. A network of snowmaking water, power, and air lines would be buried on the south side of each trail to accommodate the proposed snowmaking under Alternative 2. Refer to Figure 2-3 for the proposed snowmaking air/water line configuration.

### Power

Under the Proposed Action, the Hart Prairie, Sunset, and Aspen chairlifts would be upgraded and/or realigned; each would have a top drive terminal and would have various electrical power requirements as described in Table 3G-2. Each chairlift would also be outfitted with a diesel APU with fuel storage sufficient for one day of operation.

The new Humphreys Chairlift would have a bottom drive terminal requiring a 200 horsepower motor. Power to this lift would be supplied via a short spur off the proposed snowmaking water, power, and air line corridor that would run along the western edge of the proposed Humphreys

Pod. The proposed lift would also have a diesel APU with aboveground fuel storage for one operating day.

**Table 3G-2  
Electrical Requirements for Proposed Lifts**

<b>Lift</b>	<b>Electrical Requirement (hp)</b>
Agassiz	435
Humphreys	200
Hart Prairie	250
Sunset	600
Aspen	75

With the addition of snowmaking infrastructure, new/upgraded lifts and other projects, Snowbowl’s existing power supply is inadequate and would need to be upgraded. The increased demand for electricity associated with the upgraded Agassiz and Hart Prairie lodges, snowmaking system and upgraded lift network would be met by additional supply and infrastructure through APS. This could be achieved under two scenarios:<sup>190</sup> 1) by replacing and upgrading overhead power lines that currently enter the SUP area in its southwestern corner; or 2) by dismantling the exiting overhead power lines/infrastructure and installing a new, upgraded power line in the same trench as the reclaimed water line along the Snowbowl Road corridor. The proposed snowplay facility would be accommodated by a spur off of the upgraded infrastructure, under either scenario. The two existing lodges have an adequate supply of propane to meet the increased demand for heat in the upgraded facilities. The snowplay facility would require an additional propane tank for heating purposes.

*Fuel Storage*

Under the Proposed Action, an additional propane tank would be installed at the snowplay facility. No other changes/additions to fuels storage would be warranted.

*Communications*

Under the Proposed Action, the main telephone line servicing Snowbowl would need to be upgraded. Since this line currently shares the overhead corridor with power, the ultimate location of an upgraded line would depend on future discussion with APS and Qwest, because this line could easily be buried along with power and reclaimed water in the Snowbowl Road corridor. An additional line would be a buried from the maintenance facility to the proposed snowmaking primary pumphouse located adjacent to the water impoundment.

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<sup>190</sup> Additional discussions with APS are pending final project engineering which is contingent upon project approval.

### Guest Services

Proposed improvements to the Hart Prairie and Agassiz day lodges would help achieve a better balance between guest services and attendance levels. The Proposed Action would increase guest service square footage from approximately 23,500 square feet to approximately 47,000 square feet (including the enlarged Hart Prairie and Agassiz lodges, the snowplay facility, and the Native American Cultural and Education Center). Creating more guest service space (seating, restrooms, food service, and kitchen/scramble) would allow Snowbowl to better meet guests' needs on average and peak visitation days, when attendance could be expected to meet or exceed 3,400 guests. This would allow Snowbowl to respond to existing issues with inadequate guest service by providing facilities to accommodate 125 percent of the increased CCC. Under the Proposed Action, existing buildings would be brought into compliance with the ADA.

### **Alternative 3**

The utilities and infrastructure discussed below are depicted on Figure 2-9.

As with the Proposed Action, Alternative 3 would size guest service facilities and related infrastructure to accommodate approximately 3,000 guests – approaching 125 percent of CCC. However, parking capacity would continue to be a constraint to daily attendance, even with minor increases in parking areas. As with the Proposed Action, in order to better accommodate existing demand, Alternative 3 would have a CCC of 2,825.

### Water

Without the snowmaking impoundment for non-potable water storage, Snowbowl would continue to use approximately 60 percent of the potable water it trucks to the ski area to accommodate its non-potable water needs. However, under Alternative 3 Snowbowl would construct an additional buried 10,000-gallon water storage tank at the Agassiz Lodge to help accommodate existing demands for potable water. As a result, the amount of water hauled and the cost associated with transportation would be slightly reduced, but would not drastically differ from the existing conditions.

As with the Proposed Action, in order to accommodate additional guest service facilities (specifically, increased toilets), the on-site septic systems for the three existing buildings may need to be upgraded in size under Alternative 3. Additional septic capacity for the Hart Prairie and Agassiz lodges would be the same as described under the Proposed Action. Final size and design (and need) for these systems would be directly related to the size of the proposed buildings, number of additional toilets and the number of people to be accommodated by each facility.

### Power

Because Alternative 3 excludes snowmaking, Snowbowl's existing power supply is adequate to accommodate the anticipated demand under Alternative 3. However, several short spurs would be required to provide electric power to the new Humphreys Chairlift, the new surface lifts, and the proposed realigned Sunset and Hart Prairie chairlifts. Each of these lifts would have a top drive terminal and would have various electrical power requirements as described in Table 3G-2.

One additional line would be buried within a mix of existing and proposed trails to the top of the Agassiz Chairlift.

As with the Proposed Action, the new Humphreys Chairlift would have a bottom drive terminal requiring an approximate 200 horsepower motor. Power to this lift would be supplied via a spur from the Agassiz Chairlift. The proposed lift would also have a diesel APU with aboveground fuel storage for one operating day.

As with Alternative 1, the power line will eventually be placed underground within the Snowbowl Road right-of-way.

### Fuel Storage

There is an adequate supply of gasoline, diesel, and propane storage at the ski area to meet demands under Alternative 3.

### Communications

Alternative 3 would not necessitate any changes to the existing communications network at Snowbowl. If and when the power is buried then the communications would likely also be buried.

### Guest Services

Aside from the omission of the Native American Cultural and Education Center, Alternative 3 improvements to guest services would be identical to the Proposed Action.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

The temporal bounds of this cumulative effects analysis extend from when Snowbowl was established in 1938 through the foreseeable future in which Snowbowl can be expected to operate.

#### **Spatial Bounds**

The spatial bounds of this cumulative effects analysis are limited to the Snowbowl SUP area and the proposed pipeline corridor between the permit area and the Rio De Flag Water Reclamation Plant.

### **Past, Present, and Reasonably Foreseeable Future Projects**

The only reasonably foreseeable future action that has been identified in relation to utilities and infrastructure is the Snowbowl wireless telephone communications site. No other specific past, present, or reasonably foreseeable future projects with potential to cumulatively affect infrastructure and utilities were identified as having occurred or likely to occur within the spatial and temporal bounds of this analysis.

Appendix C includes the full list of past, present and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

### **Alternatives 1, 2, and 3**

While approved for construction at Snowbowl's maintenance area, the wireless telephone communications site would not cumulatively affect infrastructure or utilities, other than potentially eliminating the need for the continuation of phone land lines at Snowbowl.

APS has indicated that sufficient power is available in the grid to meet Snowbowl's power needs under the Proposed Action. This could be achieved without affecting other APS customers.

The reader is referred to the cumulative effects analysis contained in Section H – Watershed Resources for information on cumulative impacts associated with private septic systems in Hart Prairie.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

There would be no irreversible or irretrievable commitments of resources as a result of either action alternative. As has been stated before, all infrastructure and facilities that are installed could be removed at a later date.

## 3H. WATERSHED RESOURCES

### SCOPE OF THE ANALYSIS

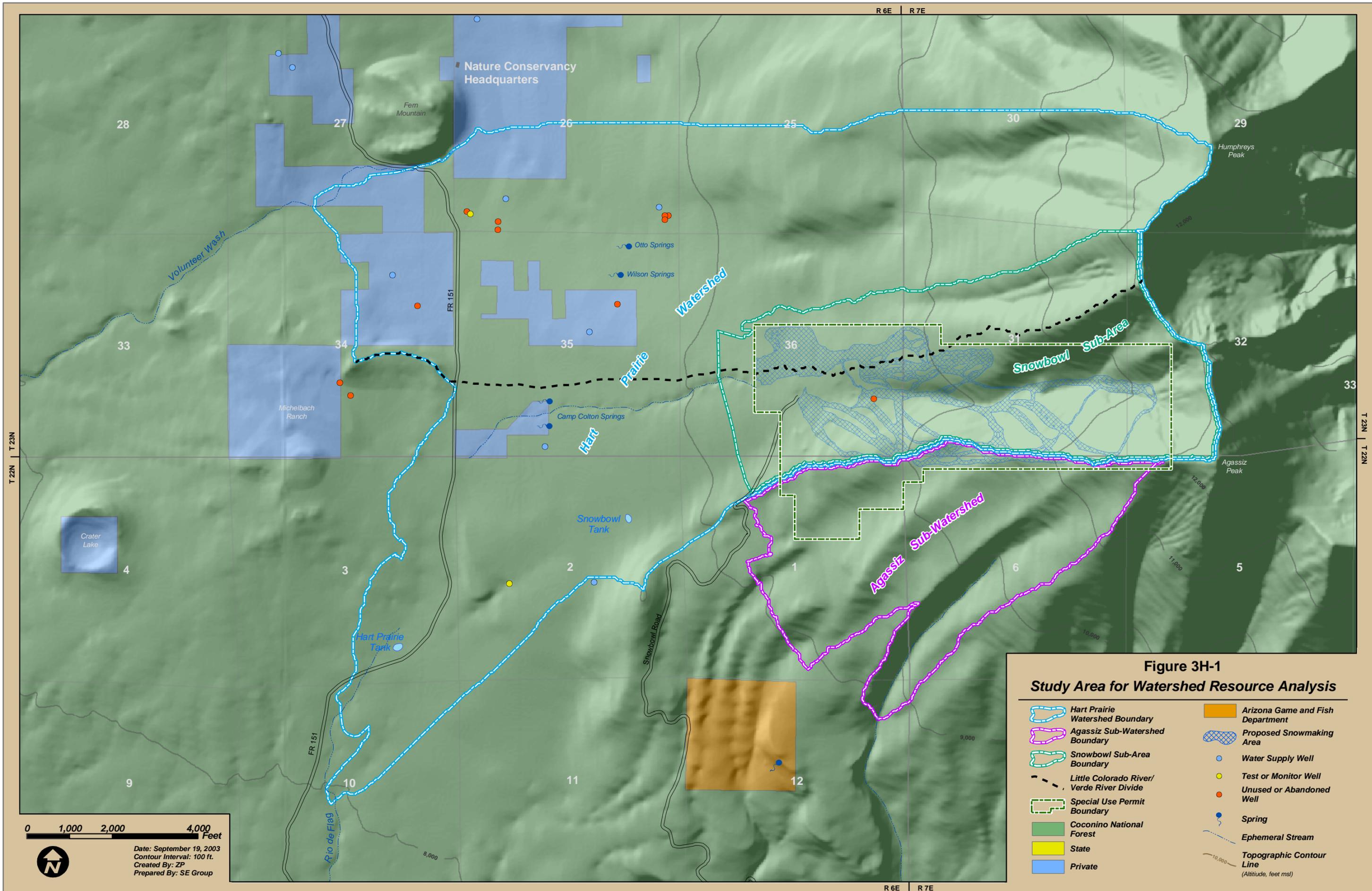
The focus of this analysis is the potential impacts to watershed resources from implementation of the Proposed Action; specifically, proposed snowmaking operations which would utilize reclaimed water as the source for snowmaking.

The study area for this watershed analysis is depicted in Figure 3H-1. As opposed to the eight subwatersheds that compose the study area in the Soils and Geology analysis, the study area for the Watershed Analysis is comprised of two primary areas: the Hart Prairie Watershed and Agassiz Subwatershed. These areas were differentiated by the drainage divide along the ridge that runs west from Agassiz Peak. Within the Hart Prairie watershed the "Snowbowl Sub-area" further delineates the area of direct impact from the proposed snowmaking activities. The Snowbowl sub-area includes slightly over 1,000 acres of land encompassing the majority of the Snowbowl SUP area. The Snowbowl Sub-area consists of four subwatersheds, as defined in the Soils and Geology analysis - Snowbowl, Sunset, Hart Prairie, and Humphreys; each includes snowmaking coverage. The larger Hart Prairie Watershed (which would include inputs from the Snowbowl Sub-area) is used for indirect impacts to down-gradient shallow groundwater discharges/users.

A portion of the snowmaking is proposed to occur in terrain within the upper portion of the Agassiz Sub-watershed. The Agassiz Sub-watershed includes a small part of Snowbowl's southernmost terrain and proposed improvements that occur south from the drainage divide between the Snowbowl sub-area and the Agassiz sub-watershed. Four of the subwatersheds identified in the Soils and Geology analysis (Meadows and Lower, Middle, and Upper Agassiz Ridge) were lumped into the Agassiz Sub-watershed to analyze the direct impact of snowmaking. Indirect impacts were evaluated for the potential groundwater underflow from the Agassiz Subwatershed to shallow groundwater discharging in downgradient springs on the southwest flank of Agassiz Peak.

Cumulative groundwater quantity and quality effects of the proposed snowmaking were considered in relation to: 1) bacterial contamination from past, present, and future land use activities in Hart Prairie, 2) potential long-term effects on the regional aquifer from diversions of reclaimed water for snowmaking, and 3) other past, present, and reasonably foreseeable future projects identified by the Forest Service ID Team.

A portion of the indicators that were decided upon for conducting this analysis (see Chapter 1) are most appropriately discussed in the Existing Conditions section, and are labeled as such.

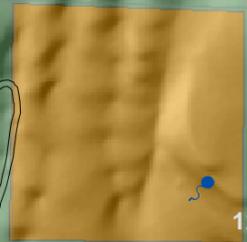


**Figure 3H-1**  
**Study Area for Watershed Resource Analysis**

Hart Prairie Watershed Boundary	Arizona Game and Fish Department
Agassiz Sub-Watershed Boundary	Proposed Snowmaking Area
Snowbowl Sub-Area Boundary	Water Supply Well
Little Colorado River/Verde River Divide	Test or Monitor Well
Special Use Permit Boundary	Unused or Abandoned Well
Coconino National Forest	Spring
State	Ephemeral Stream
Private	Topographic Contour Line (Altitude, feet msl)

0 1,000 2,000 4,000 Feet

Date: September 19, 2003  
 Contour Interval: 100 ft.  
 Created By: ZP  
 Prepared By: SE Group



## STUDY METHODOLOGY

This analysis of potential impacts to watershed resources is excerpted from a technical report prepared in conjunction with this EIS entitled *Analysis of Watershed Resource Issues for the Arizona Snowbowl Facilities Improvement Environmental Impact Statement*.<sup>191</sup> The technical report, in its entirety, is part of the official project record and is available for review at the Peaks Ranger District office.

This analysis was conducted by reviewing pertinent records, permits, and required permit reporting provided by the City of Flagstaff and the Arizona Department of Environmental Quality (ADEQ) for the treatment and monitoring of the Rio de Flag water reclamation facility (WRF) influent and effluent. In addition, Federal and State requirements and standard industry practices, in Arizona and other states for the reuse and recharge of reclaimed wastewater, were reviewed.

Interviews were conducted with personnel responsible for the management, operation, and maintenance of the WRF and the reuse distribution system. Finally, water rights and the ability to reuse the effluent for the proposed snowmaking were evaluated by reviewing pertinent water case law and precedents set by Arizona municipalities.

Anticipated volumes of reclaimed water required for proposed snowmaking operations during dry, average, and wet climatic conditions were generated by Sno.Matic Controls and Engineering, Inc.<sup>192</sup> As detailed in the Soils and Geology section of this chapter, Resource Engineering, Inc.,<sup>193</sup> provided analyses for the following parameters for dry, average, and wet climatic conditions in the study area: precipitation; water loss to evaporation, transpiration, and sublimation; and the resulting water available for groundwater recharge or surface water runoff.<sup>194</sup>

Potential direct and indirect effects of proposed snowmaking were analyzed by the following means:

1. compiling and reviewing previous investigations that characterized the regional and local hydrogeologic and climatic conditions and watersheds in the San Francisco Mountain region
2. defining the sub-watersheds that comprise the study area, based on hydrogeologic conditions and modeling
3. compiling and analyzing data and reports for wells and springs in the study area
4. identifying downgradient users of groundwater or spring water
5. conducting a field reconnaissance of the study area

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<sup>191</sup> Errol L. Montgomery & Associates, Inc., 2003

<sup>192</sup> Sno.Matic Controls and Engineering, Inc., 2003

<sup>193</sup> REI conducted the Soils and Geology analysis contained in Section I.

<sup>194</sup> Resource Engineering, Inc., 2003

6. evaluating the volumes of groundwater recharge available in the watersheds from natural precipitation and proposed snowmaking operations
7. calculating relative dilution of the applied effluent in groundwater recharge for varying climatic conditions

## EXISTING CONDITIONS

### HYDROGEOLOGIC SETTING

The Snowbowl is located on San Francisco Mountain in the Plateau Uplands Hydrogeologic Province of Arizona, a high desert plateau region where landforms are dominated by deeply incised canyons, high isolated mesas and buttes, and volcanic peaks.<sup>195</sup> The regional aquifers are relatively deep (generally more than 1,000 feet) and occur in sandstone and limestone units that are generally flat-lying. Groundwater movement in these aquifers occurs chiefly via fracture zones. The land surface over much of the San Francisco Mountain region consists of permeable volcanic deposits and fractured limestone, which provide for rapid infiltration of precipitation and results in meager surface water runoff.<sup>196</sup>

Although this region is often described as a "water-short area", groundwater is, in fact, truly abundant. However, depth to the most favorable aquifers is great, resulting in high costs for groundwater exploration and development programs. These high costs and lack of understanding of the groundwater systems, particularly for geologic conditions that control locations of prolific groundwater-yielding zones in the aquifers, have prevented more extensive development.<sup>197</sup>

Most of the annual precipitation in Arizona occurs in late summer and mid-winter. Although the late summer monsoons provide intense rainstorms, these storms are of relatively short duration and are believed to provide limited groundwater recharge due to high rates of evapotranspiration during the summer. It is the longer duration winter rains, snowfall, and subsequent snowmelt, which provide most of the groundwater recharge to the aquifers in the Flagstaff region. On a long-term average basis, approximately 70 percent of the precipitation on San Francisco Mountain is winter snowfall from Pacific Ocean storm systems, and 30 percent is from annual monsoon storm systems originating in the southern Pacific Ocean and the Gulf of Mexico.<sup>198</sup> Groundwater level measurements reported for wells in the interior valley of San Francisco Mountain suggest that recharge occurs chiefly from winter precipitation.<sup>199</sup> Extensive research conducted in both the Fern Mountain Botanical Area of the Coconino National Forest and the Homestead at Hart Prairie of The Nature Conservancy by NAU students and faculty, including Dr. Abe Springer<sup>200</sup> confirm that most groundwater recharge occurs during the spring snowmelt and that both discharge from springs and shallow groundwater levels in Hart Prairie progressively decline each summer as the effects of the snowmelt diminish. The NAU data, which are for the part of the Hart Prairie watershed that drains surface water to the Verde River

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<sup>195</sup> Cooley, 1963; Montgomery & Harshbarger, 1989

<sup>196</sup> Montgomery & Harshbarger, 1989

<sup>197</sup> Montgomery et al., 2000

<sup>198</sup> Jones, 1993

<sup>199</sup> Higgins, 1998

<sup>200</sup> Gavin, 1988; Amentt, 2002; and DeWald et al., 2004

basin, demonstrate the effects of the prolonged ongoing drought on the decline of these shallow water resources.

Losses of rainfall and snow to evapotranspiration and sublimation are high in the region. Work conducted by Northern Arizona University<sup>201</sup> has provided new insight to the magnitude of evapo-sublimation losses on the San Francisco Plateau. The results of this work are incorporated into the estimates for groundwater recharge used in this report. The climate for the Hart Prairie watershed and San Francisco Mountain region, together with citations of sublimation studies, is detailed in the Soils and Geology analysis of this chapter prepared by Resource Engineering Inc.,<sup>202</sup> which conducted watershed modeling for the EIS to provide projections of volumes of water available for groundwater recharge from precipitation and proposed snowmaking at the Arizona Snowbowl Ski Area. Model projections generated by Resource Engineering, Inc. are an important basis for analyses given herein of potential impacts from the EIS Alternatives..

San Francisco Mountain is a predominantly andesitic composite volcano; the existing individual peaks are erosional remnants of the composite volcano.<sup>203</sup> The eruptions of the central volcano and peripheral vents resulted in complex interfingering and interlayering of various types of volcanic deposits. As a consequence, these deposits are highly heterogeneous both vertically and laterally, and comprise a complex system exhibiting a wide range of fracture development and permeability. The Snowbowl is located in a prominent valley on the western slopes of San Francisco Mountain. The hydrogeologic features of the Snowbowl watershed and downgradient Hart Prairie watershed control, to a large extent, the movement and fate of snowmelt, stormwater runoff, groundwater recharge, and groundwater in the underlying perched aquifers and the regional aquifer system. Figure 3H-2 is a conceptual diagram showing hydrogeologic features in the Hart Prairie watershed.

The uppermost hydrogeologic unit underlying Hart Prairie consists chiefly of unconsolidated, coarse-grained, unsorted debris-avalanche deposits, lahars, and colluvium, which form a broad debris fan down slope from Snowbowl Canyon.<sup>204</sup> These surficial deposits include rocks of the Sinagua Formation as named by Updike and Péwé.<sup>205</sup> The extent and compositional variations of the Sinagua Formation indicate that it was deposited primarily by viscous volcanic mud flows, autoclastic breccia flows, alpine debris flows, and alluvial fans.<sup>206</sup>

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<sup>201</sup> Avery et. al, 1993

<sup>202</sup> Resource Engineering, 2003 (as amended)

<sup>203</sup> Holm, 1986

<sup>204</sup> Holm, 1988

<sup>205</sup> Updike and Péwé, 1970

<sup>206</sup> Updike and Péwé, 1974

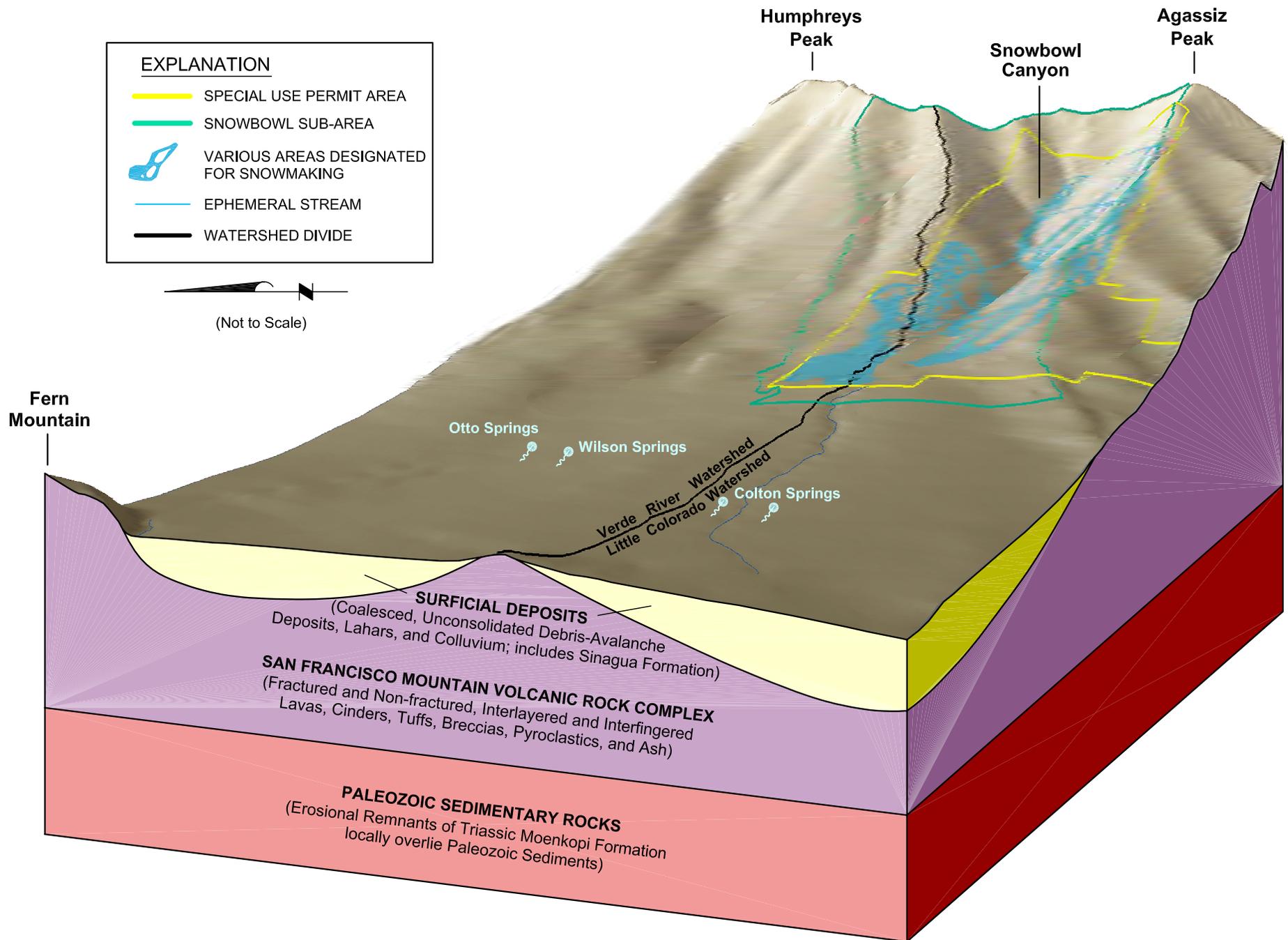


FIGURE 3H-2. CONCEPTUAL BLOCK DIAGRAM FOR HART PRAIRIE WATERSHED

1148.01\3-d block diagram\18Oct2004



ERROL L. MONTGOMERY & ASSOCIATES, INC.

The volcanic cinders and debris, fractured lavas and breccias, pyroclastic rocks, and colluvial materials at land surface in the Hart Prairie watershed enhance rapid infiltration and downward percolation of snowmelt and surface water runoff. The permeability and storage capacity of the underlying sediments are sufficiently high to absorb available snowmelt.<sup>207</sup> Groundwater moves vertically downward into laterally discontinuous perched groundwater zones in the surficial deposits and underlying volcanic rocks (refer to Figure 3H-2). Due to the complex interfingering and interlayering of the debris flows of the surficial deposits and the various types of volcanic deposits, the pattern of groundwater movement in the perched aquifers is complex.

The most important hydrogeologic units in the Hart Prairie watershed are the surficial deposits, which include the Sinagua Formation, and the adjacent and underlying volcanic rocks. Thickness of the surficial deposits is about 200 to 250 feet, where penetrated by wells in Hart Prairie.<sup>208</sup> The surficial deposits contain zones of silt and clay that retard, but do not stop, downward movement of groundwater and support transitory perched groundwater zones during rainy seasons and spring snowmelt. The perched zones occur at different depths in the surficial deposits, and are thin and laterally discontinuous. Springs and seeps occur where groundwater perched on these silt and clay zones intersects the land surface, and flow rate is strongly dependent on seasonal precipitation.<sup>209</sup> After snowmelt, perched groundwater in the base of the surficial deposits slowly percolates to deeper perched zones in the volcanics or to the regional aquifer, and the perched water table declines steadily until the surficial deposits are drained or until another recharge event occurs.<sup>210</sup>

Due to the complex coalescing of the surficial deposits and the interfingering and interlayering of various types of underlying volcanic deposits, it is believed that:

- the patterns of groundwater movement in the perched aquifers are complex;
- the divides for groundwater movement in these perched systems do not necessarily coincide with the topographic divides for surface water flow; and
- the divides for groundwater movement are complex and likely change in response to annual variations in the amount and distribution of snowmelt in the Hart Prairie watershed.

Due to the complex movement of groundwater through the surficial deposits and underlying volcanic deposits in this area, it is not presently possible to precisely project where snowmelt infiltrated from upslope areas flows in the downgradient Hart Prairie watershed. The analyses of hydrogeologic units and groundwater levels suggest that much of the upslope snowmelt infiltrates downward below the surficial level of the springs and seeps that are found more than 3,500 feet downgradient from the Hart Prairie base area (refer to Figure 3H-1). In addition, available data regarding the rates and variability of discharge to springs from shallow groundwater zones in the Hart Prairie area indicate that recharge within relatively small catchments proximal to the springs could be the primary sources for the springs.

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<sup>207</sup> Halfpenny, 1971; W.S. Gookin & Associates, 1974

<sup>208</sup> Halfpenny, 1972

<sup>209</sup> Harshbarger, 1972

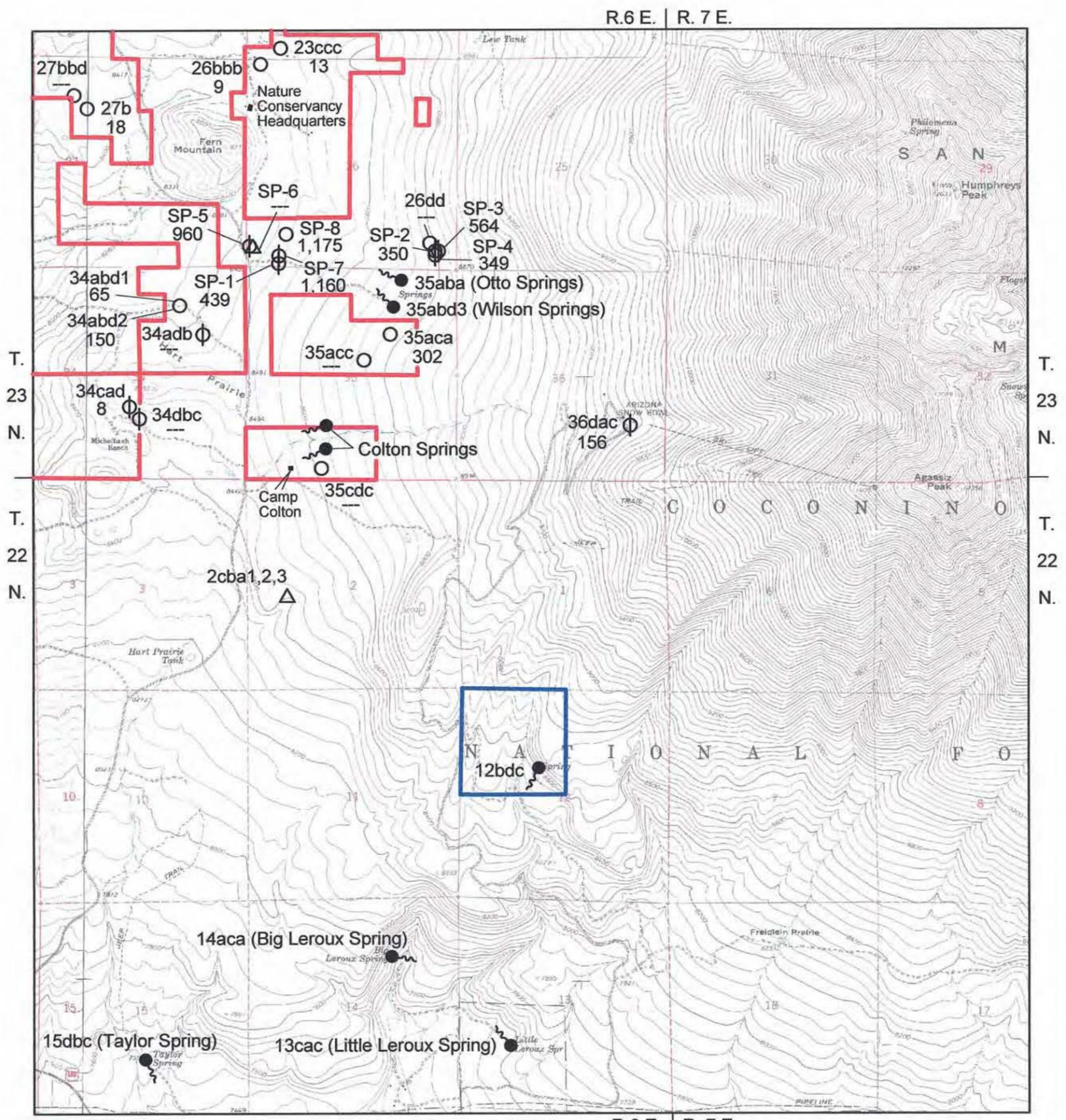
<sup>210</sup> Halfpenny, 1971

An inventory of records available for wells and springs in the Hart Prairie watershed area is contained in the technical report from which this analysis is excerpted. Locations for these wells and springs are shown on figures 3H-1 and 3H-3. The location of private and state land is depicted on Figure 3H-3. Records are available for 43 wells and eight springs in the approximate 25-square-mile area. Seventeen of these wells are not shown because they are shallow monitoring or exploration wells installed to depths of four feet or less for purposes of research associated with the Fern Mountain Botanical Area of the Coconino National Forest and the Homestead at Hart Prairie of The Nature Conservancy.<sup>211</sup> Although important data have been obtained from these 17 shallow wells for purposes of the Bebb willow community, these wells do not provide information for the deeper perched groundwater systems in the Hart Prairie watershed and, therefore, are not discussed in detail here or shown on the figure. Of the 26 wells shown, nine wells are reported to be used for domestic purposes, one well is used for both domestic and livestock purposes, 11 wells are unused or abandoned, and three wells piezometer/monitor wells. The type of use is not reported for two of the wells shown. Detailed drilling data, such as depth drilled and a log of the sediments penetrated, is not available for many of the wells.

Eight spring areas are depicted on Figure 3H-3. All these springs are important for supporting local wildlife and plant communities; the following information concerns reported use by humans. Otto, Wilson, and Colton springs are located in the Hart Prairie watershed (figures 3H-1 and 3H-3). Wilson and Colton springs are used for domestic water supply. The unnamed spring on state land, Big Leroux, Little Leroux, and Taylor spring are located in the larger Rio de Flag watershed and are all owned by the Forest Service. Big and Little Leroux springs are reported to be used for domestic and fire control purposes. The unnamed spring and Taylor Spring are reported to be unused by humans.

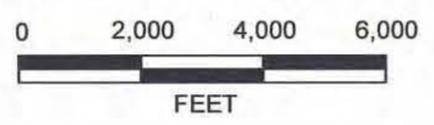
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<sup>211</sup> Gavin, 1988; Amentt, 2002; and DeWald et al., 2004



**EXPLANATION**

- 35aca — Water supply well and identifier  
302 — Well depth, in feet  
--- indicates well reported by ADWR, but no data exists for well
- ∅ Unused or abandoned well
- △ Test or monitor well
- Spring
- Private property
- State property



UNITED STATES FOREST SERVICE  
 COCONINO NATIONAL FOREST  
 PEAKS RANGER DISTRICT

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**WELL AND SPRING  
 LOCATION MAP**

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ERROL L. MONTGOMERY & ASSOCIATES, INC. 2003  
 CONSULTANTS IN HYDROGEOLOGY  
 TUCSON, ARIZONA

FIGURE 3H-3

Chemical quality of groundwater in the study area has been characterized by analysis of water samples obtained from: Wilson Springs; the unnamed spring on state land; the Camp Colton water system; wells SP-1, SP-4, SP-7, and SP-8, which were drilled in the north half of Hart Prairie to depths ranging from 349 to 1,175 feet; and two shallow wells that were drilled to depths of nine and 13 feet north from the Homestead at Hart Prairie of The Nature Conservancy. Results of available laboratory chemical analyses for inorganic chemical constituents indicate that water quality is somewhat variable across the different sources, but is generally “very good” and meets all Federal primary and secondary drinking water standards. Concentrations of dissolved solids are generally somewhat larger for the deeper wells than for the springs and shallower wells, suggesting more significant geochemical interaction associated with deeper percolation and longer residence time of recharge water reaching the deeper wells. Water quality concerns are limited to potential impacts to perched aquifers from leaching of untreated wastewater from septic systems in the Hart Prairie area. Based on laboratory chemical analyses, water type for the shallow perched groundwater system in Hart Prairie is predominantly calcium bicarbonate.

### **Regional Hydrogeologic Units**

Detailed descriptions of the individual rock formations and aquifers in the San Francisco and Coconino plateaus region are provided elsewhere,<sup>212</sup> and are therefore not repeated in this analysis, which focuses on local conditions in the Hart Prairie watershed. In the Flagstaff region, the most important geologic strata that control groundwater movement and storage, in descending order, are: unconsolidated sediments (alluvium, colluvium, and volcanic debris); volcanic rocks; Moenkopi Formation; Kaibab Formation; Toroweap Formation; Coconino Sandstone; Hermit Shale; Schnebly Hill Formation; Supai Group; Redwall Limestone and Muav Limestone; Bright Angel Shale; and Tapeats Sandstone.<sup>213</sup> A generalized stratigraphic column for geologic units in the Flagstaff region is shown on Figure 3H-4.

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<sup>212</sup> Harshbarger & Associates and John Carollo Engineers, 1972-1974; Harshbarger & Associates, 1976; Montgomery & DeWitt, 1974-75 and 1982; Errol L. Montgomery & Associates, Inc., 1985, 1992-93, 1996, and 1998; Montgomery et al., 2000; and Bills et al., 2000

<sup>213</sup> Montgomery et al., 2000

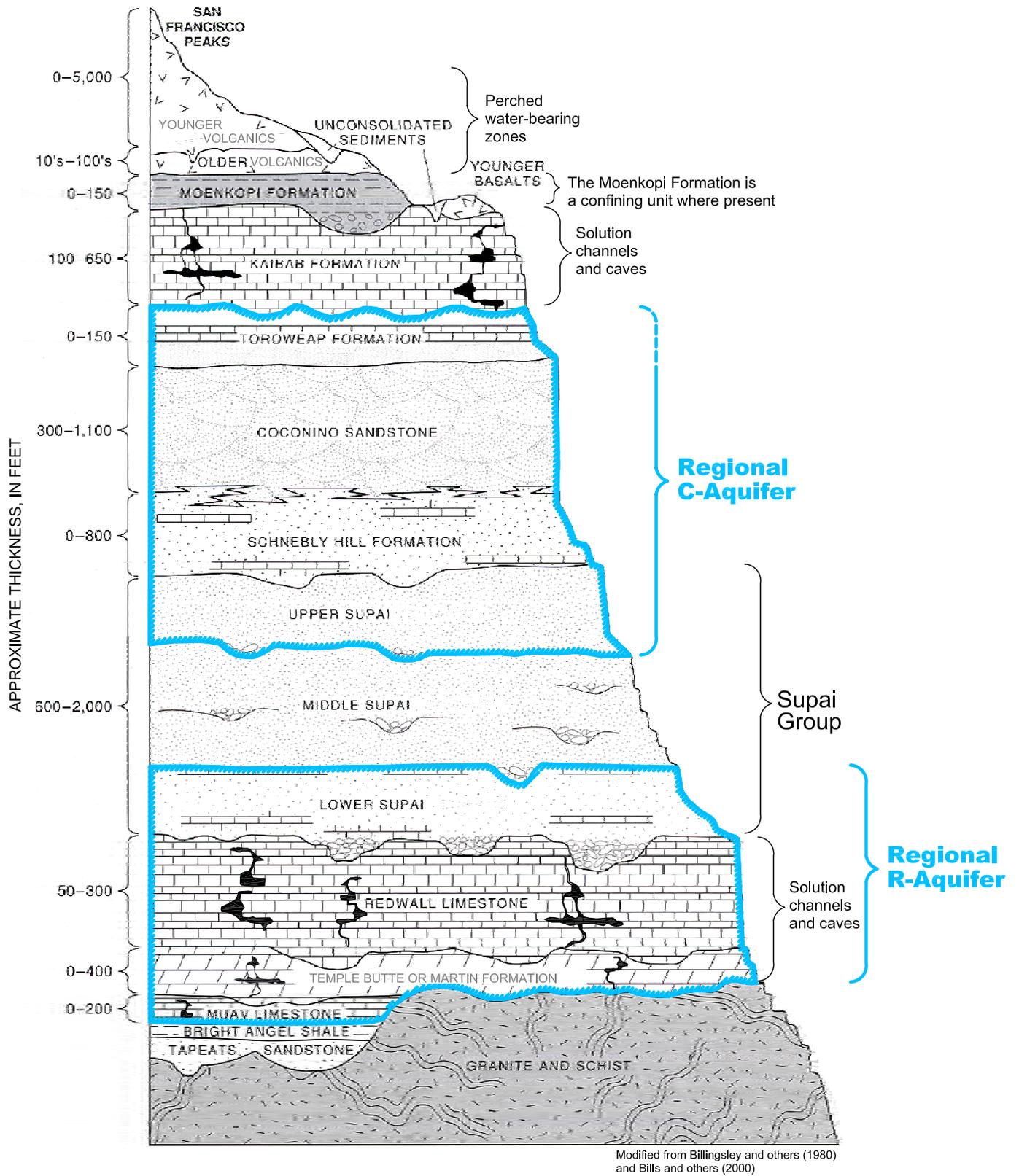


FIGURE 3H-4. GENERALIZED STRATIGRAPHIC COLUMN, FLAGSTAFF REGION, ARIZONA

1148.01/general stratigraphic section\18Oct2004



The most important aquifer systems for the Coconino and San Francisco plateaus are the C-aquifer system and the R-aquifer system. Both are described as regional aquifer systems; however, the R-aquifer system is by far the most important for groundwater transmission and storage, and is truly regional. Perched aquifers also occur at places above the C- and R-aquifers and contain and transmit small amounts of groundwater. These perched aquifers are thin and discontinuous<sup>214</sup> and commonly depend on annual recharge to sustain yield to wells and springs.

The C-aquifer includes the Coconino Sandstone and adjacent water-bearing strata including at some places in the sub-basins, the Toroweap Formation, Kaibab Formation, Schnebly Hill Formation, and the upper part of the Supai Group. The R-aquifer includes the carbonate rocks of the Redwall Limestone and adjacent water-bearing strata, such as the Muav Limestone and Martin or Temple Butte Formation, and in some cases the brittle rocks in the lower part of the Supai Group (refer to Figure 3H-4).

### **Regional Groundwater Circulation and Storage**

Groundwater beneath the Coconino and San Francisco plateaus originates as recharge from infiltration of rainfall and snowmelt. Because the use of groundwater on these plateaus is as yet relatively small, long-term average annual recharge may be assumed to be approximately equal to the long-term average annual groundwater discharge of more than 260,000 acre-feet per year (AF/yr) from major regional aquifer springs along the margins of the plateaus.<sup>215</sup> This rate of recharge is in the magnitude of four percent of total average annual precipitation on the plateaus. A reasonable estimate for groundwater storage may be in the magnitude of five million AF, and is obtained as the product of approximately 10,000 square miles, average saturated thickness of 800 feet, and average specific yield or drainable porosity of 0.1 percent.<sup>216</sup>

The total discharge rate from major regional aquifer springs is relatively stable due to the attenuation of seasonal variations in recharge by the large storage capacity and areal extent of the regional aquifer. Therefore, the estimate of long-term average annual recharge is reasonable, even though short-term trends in recharge may vary substantially from this long-term average. Long-term climatic changes may eventually affect the amount of groundwater in storage and the base flow from the major springs; however, assessment of the potential for this effect is beyond the scope of this EIS. As for any estimates of regional aquifer recharge and groundwater storage, there is inherent uncertainty due to limitations in our ability to measure these parameters. However, the amount of groundwater discharge from the major regional aquifer springs is based on flow measurements and represents an unusual level of certainty for a parameter that is rarely known to such a degree on a regional scale.

In the Flagstaff area, downward-moving recharge water ultimately passes all upper perching horizons and reaches the C-aquifer, where large amounts of groundwater storage occur over limited areas. In the Flagstaff Woody Mountain and Lake Mary wellfield areas, located along the Oak Creek and Anderson Mesa Faults, respectively, all rock units from the C-aquifer downward are saturated.<sup>217</sup> Groundwater in the saturated zone of the C-aquifer moves laterally

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<sup>214</sup> Montgomery et al., 2000

<sup>215</sup> Id.

<sup>216</sup> Id.

<sup>217</sup> Id.

and downward, very slowly in areas of non-fractured rock, and less slowly in areas where abundant fractures occur. Rapid water level rise has been measured in C-aquifer wells located near sinkholes and fracture systems during or soon after large surface water runoff events, such as Navajo Army Depot well NAD-1<sup>218</sup> and near the Bottomless Pits.<sup>219</sup> At distances of a few miles to a few tens of miles from the Lake Mary and Woody Mountain wellfield areas, saturated thickness in the C-aquifer diminishes to zero or near zero due to full drainage of the groundwater downward to the R-aquifer system. After groundwater passes downward to the R-aquifer, it provides groundwater storage in the regional system, and moves slowly toward the Colorado and Verde river drains, chiefly along arterial fractured rock aquifer zones related to regional geological structures.<sup>220</sup>

### **Discharge from the Regional Aquifers**

The amount of groundwater that moves through the C- and R-aquifers can be estimated by summing the flow from large springs that occur on the margins of the plateaus, where groundwater discharges to tributaries of the Colorado and Verde rivers. A long-term average annual volume of more than 260,000 AF of groundwater discharges from the margins of the Coconino and San Francisco plateaus each year.<sup>221</sup> Of this amount, about two-thirds discharges to the Colorado River from the R-aquifer system at Blue Springs and Havasu Springs. About one-third of the natural groundwater discharge is to the Verde River, and occurs from both the C- and R-aquifers.<sup>222</sup> Other smaller springs, including Garden and Hermit Springs, and small perched aquifer springs and seeps, discharge groundwater to the Colorado River from the plateaus, but are not important for present purposes of summing total amount of groundwater discharge from the plateaus. Although the amount of groundwater that issues from these springs is small, the springs have environmental importance. Additional groundwater discharges from the plateaus to the Colorado River at locations where rocks of the R-aquifer crop out at river level. These outcrop areas are chiefly near the confluence of Havasu Creek with the Colorado River, but also occur in the lower reaches of Marble Canyon above the confluence of the Little Colorado River with the main stem of the Colorado River. These amounts of groundwater discharge are unknown.<sup>223</sup>

Total groundwater discharge to the Verde River from the Coconino and San Francisco plateaus is estimated at 95,000 AF/yr.<sup>224</sup> Of this amount, roughly 10,000 AF/yr issues from the C-aquifer and about 85,000 AF/yr issues from the R-aquifer. Groundwater discharge from the R-aquifer system to the upper reaches of the Verde River, in the vicinity of Summer's Spring, located in the Sycamore Canyon drainage, is about 45,000 AF/yr. This groundwater is derived from the southern part of the Coconino Plateau.<sup>225</sup> About 10,000 AF/yr of groundwater discharge from the C-aquifer occurs from Sterling Spring, in the upper reaches of Oak Creek, and from gains in base flow of the creek to roughly the location of Indian Garden. About 40,000 AF/yr issues from

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<sup>218</sup> Wilkerson, 2000

<sup>219</sup> Bills, 2004

<sup>220</sup> Montgomery et al., 2000

<sup>221</sup> Id.

<sup>222</sup> Id.

<sup>223</sup> Id.

<sup>224</sup> Id.

<sup>225</sup> Id.

the R-aquifer system to the lower part of Oak Creek below Sedona; much of this discharge occurs at Page Spring. This groundwater originates on the southern part of the San Francisco Plateau.<sup>226</sup> Groundwater movement in the Oak Creek Canyon area is strongly influenced by fractured rock zones along the Oak Creek fault system and related faults in the Sedona area.

### **City of Flagstaff Groundwater Use**

The Flagstaff municipal water supply system obtains groundwater from three principal wellfields and surface water from Upper Lake Mary – a man-made reservoir.<sup>227</sup> In drier periods when surface water is less abundant, Flagstaff relies heavily on groundwater from municipal wellfields. In 2002, only roughly 196 AF, or about two percent, of water used was obtained from Upper Lake Mary, and roughly 8,573 AF, or 98 percent, was groundwater pumped from municipal wellfields.<sup>228</sup> From 1993 to 2002, about 75 percent of the water used by Flagstaff has been groundwater. During years of drought, such as 1989, 1990, and 2002, Upper Lake Mary may be nearly dry, and a much larger fraction of water used is obtained from groundwater.

The earliest Flagstaff municipal water supply was from springs located in the Inner Basin of the San Francisco Peaks. The pipeline from the springs to Flagstaff was completed in 1899.<sup>229</sup> Beginning in 1966, the Inner Basin groundwater supply was further developed by construction of production water wells. Groundwater supply from the Inner Basin is vulnerable to drought; when drought conditions threaten the water supply from Upper Lake Mary, water yield from Inner Basin springs and wells is also diminished.<sup>230</sup> Groundwater in the Inner Basin is stored in a perched aquifer system that lies far above the regional C-aquifer, which is used for Flagstaff's other municipal wellfields. In 2002, about 25 AF of groundwater was obtained from the Inner Basin by the City.<sup>231</sup>

In 1956, Flagstaff began development of a wellfield in the regional C-aquifer near Woody Mountain, which now consists of 10 production water wells. In 2002, a total of about 4,780 AF of groundwater were yielded to the Flagstaff municipal system from these wells.<sup>232</sup> After the Woody Mountain wellfield was established, deep wells were also constructed in the C-aquifer in the Lower Lake Mary area, and these successful wells established the Flagstaff Lake Mary wellfield. In 2002, a total of about 3,335 AF of groundwater were yielded from seven wells in the Lake Mary wellfield.<sup>233</sup>

Recently, additional groundwater supply has been obtained from deep wells in the C-aquifer constructed along the Rio de Flag drainage on the east side of the city. These wells include the Continental-2 well, Fox Glen-1 well, Shop well, and Interchange well. In 2003, a total of about

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<sup>226</sup> Id.

<sup>227</sup> Montgomery and DeWitt, 1982

<sup>228</sup> City of Flagstaff, 2003

<sup>229</sup> Montgomery et al., 2000

<sup>230</sup> Montgomery and DeWitt, 1982

<sup>231</sup> City of Flagstaff, 2003

<sup>232</sup> Id.

<sup>233</sup> Id.

544 AF of groundwater were yielded from these wells.<sup>234</sup> The most recent well constructed in this area, the Rio well, is expected to be brought into production in the near future.

### **Other Groundwater Use**

Other wells are completed in the C-aquifer in the Flagstaff area and chiefly supply local water companies and individual developments. Total amount of groundwater use from these other wells is unknown, but is estimated to be small compared to City of Flagstaff use.<sup>235</sup> Although most of the water used on the Coconino and San Francisco plateaus occurs at Flagstaff, substantial amounts have been developed, and are used by Sedona, Williams, Tusayan, and Grand Canyon Village. One of the principals of groundwater hydrology is that, over the short-term, groundwater pumped from wells is obtained solely from groundwater storage in aquifers. Over the long-term, the source of groundwater begins to be accounted for as reduction of natural discharge. For the Coconino and San Francisco plateaus, reduction of natural discharge must be accounted for chiefly by reduction in groundwater discharge to springs along the Colorado and Verde river drains. Total groundwater used on the plateaus, including Sedona, was about 8,000 AF/yr in 2000.<sup>236</sup> This total use represents about three percent or less of discharge to springs along the Colorado and Verde rivers, and about 0.2 percent of estimated groundwater in storage.

An important, but small, supply of groundwater proximate to the study area is obtained from wells completed in thin, discontinuous perched groundwater zones in the alluvium, colluvium, and volcanic rocks above the Moenkopi Formation in Fort Valley. Records for more than 240 wells are reported for Fort Valley,<sup>237</sup> which is located along the Rio de Flag drainage, about three miles south of the study area. These perched groundwater zones occur in permeable sediments on top of silt and clay lenses in the alluvial and colluvial deposits, in permeable cinders and fractured volcanic deposits on top of interflow clay layers or non-fractured lavas in the volcanic rock sequence, and in fractures in the upper part of the Moenkopi Formation. Depth to water in wells has been reported to range from two to 250 feet.<sup>238</sup> Recently, a well was completed in the lower part of the C-aquifer in the Fort Valley area and is reported to yield several tens of gallons per minute for domestic supply.

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<sup>234</sup> City of Flagstaff, 2004

<sup>235</sup> Bills et al., 2000

<sup>236</sup> Montgomery et al., 2000

<sup>237</sup> Allen, 1995

<sup>238</sup> Id.

## **WASTEWATER TREATMENT AND REUSE**

Prior to treatment, municipal wastewater contains many chemicals and microorganisms that, if released to the environment untreated, could cause adverse ecological effects, or may present known or potential health risks to humans, if ingested.<sup>239</sup> Concentrations of constituents potentially harmful to public health or the environment are required to be reduced or eliminated prior to reuse. The amount of required reduction or removal depends on the planned reuse.

The U.S. Environmental Protection Agency (EPA) regulates most aspects of wastewater treatment and treatment plant discharges under the Clean Water Act (CWA). The CWA requires all discharges to waters of the United States to obtain a National Pollutant Discharge Elimination System (NPDES) Permit. Although the intent of the CWA and NPDES Permit program is to regulate discharges to surface water, the program provides a broad framework of command and control for municipal wastewater treatment so as to reduce or eliminate concentrations of constituents potentially harmful to public health or the environment. In particular, the NPDES Permit requires pretreatment to control the discharge of industrial pollutants to sewers and mandates that the discharge comply with specified technology-based effluent limitations and monitoring and reporting requirements. The CWA also compels federal and state governments to promulgate specific water quality standards to protect the physical, chemical, and biological integrity of the state's surface water for designated use categories that include: drinking water source (DWS); fish consumption (FC); full-body contact (FBC); partial-body contact (PBC); and aquatic and wildlife (A&W).

In practice, States have typically adopted wastewater discharge regulations similar to the Federal NPDES program. Although the EPA delegates authority to the States for the regulation of NPDES discharge permits, few States have developed enforceable programs and criteria to specifically regulate water reuse. Among the States that have developed programs, California, Florida, and Arizona are at the forefront.<sup>240</sup> Arizona wastewater reuse regulations are discussed in subsequent sections of this chapter.

### **Wastewater Treatment**

Municipal wastewater treatment is a multi-stage process intended to remove or reduce organic matter, solids, nutrients, and disease-causing organisms that are present in raw wastewater generated from community residences, businesses, and industries. Typical untreated municipal wastewater is comprised of 99.94 percent water and 0.06 percent dissolved and suspended material.<sup>241</sup>

Conventional wastewater treatment begins with preliminary screening to remove debris and large solid material present in the waste stream that could damage or clog pumps, valves, piping, and other equipment. Mechanical bar screens, comminutors (grinding equipment analogous to large-scale kitchen sink garbage disposals), and grit chambers are used to separate solid debris from wastewater. The collected debris is commonly disposed of in a landfill. The screened wastewater is then put through primary treatment.

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<sup>239</sup> National Research Council, 1982

<sup>240</sup> National Research Council, 2003

<sup>241</sup> Water Pollution Control Federation, 1989

Primary treatment separates suspended solids in a clarification tank or sedimentation basin. Primary treatment removes slightly more than one-half of the suspended solids and one-third of the biochemical oxygen demand (BOD)<sup>242</sup> from decomposable organic matter. It also removes some nutrients, pathogens, trace elements, and potentially toxic compounds.<sup>243</sup> Solids are drawn off the bottom and skimmed off the top of the tank or basin, where they receive further treatment as sludge. The clarified wastewater flows to the next stage of treatment.

Secondary treatment is a biological process designed to remove dissolved organic matter from wastewater. Typically, microorganisms are cultivated and added in suspension (in the “activated sludge” process) or attached to media (in the “trickling filter” process) to remove biodegradable organic material. Secondary treatment processes can remove up to 95 percent of the remaining BOD and suspended solids, as well as significant amounts of heavy metals and dissolved organic compounds.<sup>244</sup>

Final treatment focuses on removal of disease-causing organisms in wastewater. Treated wastewater can be disinfected by adding oxidants, such as chlorine, by ultraviolet light radiation, or by ozonation.

Further treatment of wastewater by various advanced treatment processes is necessary in some systems to meet more stringent discharge or reuse requirements or to address particular water quality concerns associated with the source water. Advanced treatment may include biological methods, ion exchange, chemical precipitation, filtration, reverse osmosis, air stripping, carbon adsorption, electro dialysis, and other variations of these treatment processes for additional removal of suspended solids, nutrients, dissolved inorganic compounds, dissolved organic compounds, and microorganisms.<sup>245</sup> An overview of the Rio de Flag Water Reclamation Facility treatment process is given in a subsequent section of this chapter.

## Wastewater Constituents

### **Chemical Constituents**

Wastewater contains a combination of chemical constituents from a wide variety of natural or anthropogenic sources. The types and amounts of these constituents vary depending on: the source of the municipal water; the types of industrial, commercial, and household wastes discharged to the treatment plant; and the effectiveness of industrial pretreatment and source control programs. Municipal water use generally leads to an increase in mineral and organic content relative to the original water quality.<sup>246</sup> The increase in concentration of dissolved solids and organics by municipal use has an important influence on the degree to which the water can be reclaimed for reuse.

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<sup>242</sup> A measure of the pollution present in water, obtained by measuring the amount of oxygen absorbed from the water by the microorganisms present within it.

<sup>243</sup> National Research Council, 2003

<sup>244</sup> Water Pollution Control Federation, 1989

<sup>245</sup> Asano, 1998

<sup>246</sup> Snoeyink and Jenkins, 1980

Although many studies have investigated the toxicology of specific chemical constituents that may be present in wastewater, limited data is available to assess potential public health effects from concentrations and combinations of chemical constituents that occur in wastewater. Several detailed studies have examined potential human health hazards associated with drinking reclaimed water at Windhoek, South Africa, the only city in the world that has implemented direct potable reuse, and in Denver, Colorado, where direct reuse was rigorously assessed, but not adopted. Those studies suggested that no adverse health effects should be anticipated from the direct reuse of reclaimed water for drinking water purposes at these sites.<sup>247</sup> Two major studies have evaluated the health effects associated with ingestion of groundwater that has commingled with effluent in the subsurface as a result of wastewater recharge operations in California's Orange and Los Angeles counties. In these counties, recharge of secondary wastewater effluent had occurred for more than 30 years, resulting in populations being exposed to as much as 38 percent effluent in their drinking water supplies.<sup>248</sup> Results of the comprehensive epidemiologic evaluation concluded there were no adverse health effects in populations exposed to the effluent compared to unexposed populations in the area.<sup>249</sup>

The City of Flagstaff has conducted extensive monitoring of wastewater constituents in reclaimed water from the Rio de Flag WRF. Monitoring, as is discussed in subsequent sections of this chapter, is required to maintain compliance with three water permits. In addition, the City has undertaken further water quality analyses to compare the reclaimed water to Arizona surface water quality standards (SWQS) and national drinking water standards.<sup>250</sup>

A summary of all monitoring data compiled from approximately January 2000 to June 2002 for regulated parameters subject to SWQS is provided in Table 3H-1. The results in this table are color coded. Those data in blue have sufficiently low analytical detection levels to demonstrate that the effluent meets the standard. The data presented in green show that the contaminant was not detected, but the detection level was above at least one of the numerical standards for a designated use. It should be noted that ADEQ considers a result of non-detect as meeting the standard, when obtained using an appropriate licensed analytical procedure. Tables 3H-2a and 3H-2b present the results of monitoring data compiled from January 2000 to June 2002 for a variety of regulated parameters for which numeric criteria have been developed as drinking water standards. These tables list the concentrations of these substances in reclaimed water from the Rio de Flag WRF in comparison to primary and secondary drinking water standards.

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<sup>247</sup> National Resource Council, 2003

<sup>248</sup> Karimi et al., 1998

<sup>249</sup> Nellor et al., 1984; Sloss et al., 1996 and 1999

<sup>250</sup> Aquatic Consulting and Testing, Inc., 2002

**Table 3H-1  
Rio de Flag State of Arizona Numeric Water Quality Criteria (µg/L)**

Parameter	Rio de Flag WRP							A & Wc		A & Ww		A & Wedw		A & We	
	(µg/L)	DWS	FC	FBC	PBC	AgI	AgL	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic
Acenaphthene	<5	420	2,670	84,000	84,000	NNS	NNS	850	550	850	550	850	550	NNS	NNS
Acenaphthylene	<5	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Acrolein	<50	3.5	25	700	700	NNS	NNS	34	30	34	30	34	30	NNS	NNS
Acrylonitrile	<50	0.07	0.7	3	56,000	NNS	NNS	3,800	250	3,800	250	3,800	250	NNS	NNS
Alachlor	<0.1	2	NNS	14,000	14,000	NNS	NNS	2,500	170	2,500	170	2,500	170	NNS	NNS
Aldrin	<0.02 to <0.1	0.002	0.0001	0.08	42	c	c	2.0	NNS	2.0	NNS	2.0	NNS	4.5	NNS
Ammonia-N	<50	NNS	NNS	NNS	NNS	NNS	NNS	b	b	b	b	NNS	NNS	NNS	NNS
Anthracene	<5	2,100	1,000	420,000	420,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Antimony (as Sb)	<1 to <2 T	6 T	4,300 T	560 T	560 T	NNS	NNS	88 D	30 D	88 D	30 D	1,000 D	600 D	NNS	NNS
Arsenic (as As)	4.5 to 6 T	50 T	1,450 T	50 T	50 T	2,000 T	200 T	360 D	190 D	360 D	190 D	360 D	190 D	440 D	230 D
Asbestos	<0.2 MFL	7 MFL	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Atrazine	<0.1	3	NNS	49,000	49,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Barium (as Ba)	240 to 300 T	2,000 T	NNS	98,000 T	98,000 T	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Benzene	<0.5	5	140	93	93	NNS	NNS	2,700	180	2,700	180	8,800	560	NNS	NNS
Benzidine	<50	0.0002	0.001	0.01	4,200	0.01	0.01	1,300	89	1,300	89	1,300	89	10,000	640
Benzo (a) anthracene	<5	0.048	0.49	1.9	1.9	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Benzo (a) pyrene	<0.02 to <5	0.2	0.05	0.2	0.2	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Benzo (ghi) perylene	<10	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Benzo (k) fluoranthene	<5	0.048	0.49	1.9	1.9	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
3,4-Benzofluoranthene	<5	0.048	0.49	1.9	1.9	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Beryllium (as Be)	<1 to <2 T	4 T	1,130 T	2,800 T	2,800 T	NNS	NNS	65 D	5.3 D	65 D	5.3 D	65 D	5.3 D	NNS	NNS
Bis (2-chloroethoxy) methane	<10	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Bis (2-chloroethyl) ether	<10	0.03	1.4	1.3	1.3	NNS	NNS	120,000	6,700	120,000	6,700	120,000	6,700	NNS	NNS
Bis (2-chloroisopropyl) ether	<10	280	174,400	56,000	56,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Boron (as B)	250	630	NNS	126,000 T	126,000 T	1000 T	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Bromodichloromethane	<0.5	TTHM	46	TTHM	28,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
p-Bromodiphenyl ether	<5	NNS	NNS	NNS	NNS	NNS	NNS	180	14	180	14	180	14	NNS	NNS
Bromoform	<0.5	TTHM	360	180	28,000	NNS	NNS	15,000	10,000	15,000	10,000	15,000	10,000	NNS	NNS
Bromomethane	<0.5	9.8	4,020	2,000	2,000	NNS	NNS	5,500	360	5,500	360	5,500	360	NNS	NNS
Butyl benzyl phthalate	<5	1,400	5,200	280,000	280,000	NNS	NNS	1,700	130	1,700	130	1,700	130	NNS	NNS
Cadmium (as Cd) *	<0.5 to <2 T	5 T	84 T	700 T	700 T	50 T	50 T	6.8	3.1	6.8	3.1	6.8	3.1	103.1	NNS

**Table 3H-1  
Rio de Flag State of Arizona Numeric Water Quality Criteria (µg/L)**

Parameter	Rio de Flag WRP							A & Wc		A & Ww		A & Wedw		A & We	
	(µg/L)	DWS	FC	FBC	PBC	AgI	AgL	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic
Carbofuran	< 0.9	40	NNS	7,000	7,000	NNS	NNS	650	50	650	50	650	50	NNS	NNS
Carbon tetrachloride	< 0.5	5	4	11	980	NNS	NNS	18,000	1,100	18,000	1,100	18,000	1,100	NNS	NNS
Chlordane	< 0.1 to <0.2	2	0.002	4	700	NNS	NNS	2.4	0.004	2.4	0.21	2.4	0.21	3.2	0.45
Chlorine (total residual)	<50	700	NNS	140,000	140,000	NNS	NNS	11	5	11	5	11	5	NNS	NNS
Chlorobenzene	< 0.5	100	20,900	28,000	28,000	NNS	NNS	3,800	260	3,800	260	3,800	260	NNS	NNS
p-Chloro-m-cresol	<5	NNS	NNS	NNS	NNS	NNS	NNS	15	5	15	5	15	5	48,000	15,000
2-Chloroethyl vinyl ether	<1	NNS	NNS	NNS	NNS	NNS	NNS	180,000	9,800	180,000	9,800	180,000	9,800	NNS	NNS
Chloroform	<0.5 to 1.2	TTHM	470	230	14,000	NNS	NNS	14,000	900	14,000	900	14,000	900	NNS	NNS
Chloromethane	< 0.5	NNS	NNS	NNS	NNS	NNS	NNS	270,000	15,000	270,000	15,000	270,000	15,000	NNS	NNS
Chloronaphthalene beta	<5	560	4,300	112,000	112,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
2-Chlorophenol	<5	35	400	7,000	7,000	NNS	NNS	2,200	150	2,200	150	2,200	150	NNS	NNS
4-Chlorophenyl phenyl ether	<5	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Chromium (as Cr III) *	<1 to <10 T	10,500 T	1,010,000 T	2,100,000 T	2,100,000 T	NNS	NNS	811	106	811	106	811	106	2,723	NNS
Chromium (as Cr IV)	<1 to <10 T	21 T	2000 T	4200 T	4200 T	NNS	NNS	16 D	11 D	16 D	11 D	16 D	11 D	34 D	23 D
Chromium (as Cr)	<1 to <10 T	100 T	NNS	100 T	100 T	1,000 T	T	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Chrysene	<5	0.479	4.92	19.2	19	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Copper (as Cu) *	7.8 to 11 T	1300 T	NNS	1,300 T	1,300 T	5,000 T	500 T	20	13	20	13	20	13	24	NNS
Cyanide	< 10 T	200 T	215,000 T	28,000 T	28,000 T	NNS	200 T	22 T	5.2 T	41 T	9.7 T	41 T	9.7 T	84 T	19 T
Dibenz(ah)anthracene	<10	0.048	0.20	1.9	1.9	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Dibromochloromethane	<0.5	TTHM	34	TTHM	28,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
1,2-Dibromo-3-chloropropane (DBCP)	< 0.01	0.2	NNS	2,800	2,800	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
1,2-Dibromoethane (EDB)	< 0.01	0.05	NNS	0	0	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Dibutyl phthalate	<10	700	12,100	140,000	140,000	NNS	NNS	470	35	470	35	470	35	1,100	84
1,2-Dichlorobenzene	< 0.5 to <5	600	2,800	126,000	126,000	NNS	NNS	790	300	1,200	470	1,200	470	5,900	2,300
1,3-Dichlorobenzene	< 0.5 to <5	NNS	NNS	NNS	NNS	NNS	NNS	2,500	970	2,500	970	2,500	970	NNS	NNS
1,4-Dichlorobenzene	< 0.5 to <5	75	77,500	560,000	560,000	NNS	NNS	560	210	2,000	780	2,000	780	6,500	2,500
3,3'-Dichlorobenzidine	<50	0.08	0.08	3.1	3.1	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS

**Table 3H-1  
Rio de Flag State of Arizona Numeric Water Quality Criteria (µg/L)**

Parameter	Rio de Flag WRP							A & Wc		A & Ww		A & Wedw		A & We	
	(µg/L)	DWS	FC	FBC	PBC	AgI	AgL	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic
p,p'-Dichlorodiphenyldichloroethane (DDD)	<0.02	0.15	0.001	5.8	5.8	0.001	0.001	1.1	0.001	1.1	0.02	1.1	0.02	1.1	0.02
p,p'-Dichlorodiphenyldichloroethylene (DDE)	<0.02	0.1	0.001	4.1	4.1	0.001	0.001	1.1	0.001	1.1	0.02	1.1	0.02	1.1	0.03
p,p'-Dichlorodiphenyltrichloroethane (DDT)	<0.02	0.1	0.0006	4.1	700	0.001	0.001	1.1	0.001	1.1	0.001	1.1	0.001	1.1	0.006
1,1-Dichloroethane	< 0.5	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
1,2-Dichloroethane	< 0.5	5	100	15	280,000	NNS	NNS	59,000	41,000	59,000	41,000	59,000	41,000	NNS	NNS
1,1-Dichloroethylene	< 0.5	7	320	230	12,600	NNS	NNS	15,000	950	15,000	950	15,000	950	NNS	NNS
cis-1,2-Dichloroethylene	< 0.5	70	NNS	70	70	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
trans-1,2-Dichloroethylene	< 0.5	100	136,000	28,000	28,000	NNS	NNS	68,000	3,900	68,000	3,900	68,000	3,900	NNS	NNS
Dichloromethane	< 0.5 to <3	5	1,600	190	84,000	NNS	NNS	97,000	5,500	97,000	5,500	97,000	5,500	NNS	NNS
2,4-Dichlorophenol	<5	21	800	4,200	4,200	NNS	NNS	1,000	88	1,000	88	1,000	88	NNS	NNS
2,4-Dichlorophenoxyacetic acid (2,4-D)	< 0.1	70	NNS	14,000	14,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
1,2-Dichloropropane	< 0.5	5	236,000	126,000	126,000	NNS	NNS	26,000	9,200	26,000	9,200	26,000	9,200	NNS	NNS
1,3-Dichloropropene	<0.5	0.2	6.6	7.8	42	NNS	NNS	3,000	1,100	3,000	1,100	3,000	1,100	NNS	NNS
Dieldrin	<0.02 to < 0.1	0.002	0.0002	0.09	70	0.003	0.003	2.5	0.002	2.5	0.002	2.5	0.005	4	0.9
Diethyl phthalate	<5	5,600	0.0001	0.0001	0.0001	NNS	NNS	26,000	1,600	26,000	1,600	26,000	1,600	NNS	NNS
Di(2-ethylhexyl) phthalate	0.6 to <4	6	7.4	100	28,000	NNS	NNS	400	360	400	360	400	360	3,100	360
2,4-Dimethylphenol	<5	140	2,300	28,000	28,000	NNS	NNS	1,000	310	1,000	310	1,100	310	150,000	43,000
Dimethyl phthalate	<5	NNS	NNS	NNS	NNS	NNS	NNS	17,000	1,000	17,000	1,000	17,000	1,000	NNS	NNS
4,6-Dinitro-o-cresol	<50	28	7,800	5,600	5,600	NNS	NNS	310	24	310	24	310	24	NNS	NNS
2,4-Dinitrophenol	<50	14	14,400	2,800	2,800	NNS	NNS	110	9.2	110	9	110	9	NNS	NNS
2,4-Dinitrotoluene	<5	14	5,700	2,800	2,800	NNS	NNS	14,000	860	14,000	860	14,000	860	NNS	NNS
2,6-Dinitrotoluene	<5	0.05	NNS	2	5,600	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Di-n-octyl phthalate	<10	2,800	NNS	560,000	560,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
1,2-Diphenylhydrazine	<10	0.04	0.5	1.8	1.8	NNS	NNS	130	11	130	11	130	11	NNS	NNS
Endosulfan sulfate	<0.02	NNS	NNS	NNS	NNS	NNS	NNS	0.22	0.06	0.22	0.06	0.22	0.06	3.0	1.5
Endosulfan (Total)	<0.02	42	240	8,400	8,400	NNS	NNS	0.22	0.06	0.22	0.06	0.22	0.06	3.0	1.5
Endrin	< 0.01	2	0.8	420	420	0.004	0.004	0.18	0.002	0.2	0.08	0.2	0.08	0.7	0.3

**Table 3H-1  
Rio de Flag State of Arizona Numeric Water Quality Criteria (µg/L)**

Parameter	Rio de Flag WRP							A & Wc		A & Ww		A & Wedw		A & We	
	(µg/L)	DWS	FC	FBC	PBC	AgI	AgL	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic
Endrin aldehyde	<0.02	NNS	NNS	NNS	NNS	NNS	NNS	0.18	0.002	0.2	0.08	0.2	0.08	0.7	0.3
Ethylbenzene	< 0.5	700	28,700	140,000	140,000	NNS	NNS	23,000	1,400	23,000	1,400	23,000	1,400	NNS	NNS
Ethyl chloride	<0.5	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Fluoranthene	<5	280	380	56,000	56,000	NNS	NNS	2,000	1,600	2,000	1,600	2,000	1,600	NNS	NNS
Fluorene	<5	280	14,400	56,000	56,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Fluoride	130 to 430	4,000	NNS	84,000	84,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Heptachlor	<0.01 to <0.04	0.4	0.0002	0.4	700	NNS	NNS	0.52	0.004	0.52	0.004	0.58	0.013	0.9	0.1
Heptachlor epoxide	<0.01 to <0.02	0.2	0.0001	0.2	18	NNS	NNS	0.52	0.004	0.52	0.004	0.58	0.013	0.9	0.1
Hexachlorobenzene	< 0.1 to <5	1	0.001	1	1120	NNS	NNS	6.0	3.7	NNS	NNS	NNS	NNS	NNS	NNS
Hexachlorobutadiene	<10	0.45	0.50	18	280	NNS	NNS	45	8.2	45	8.2	45	8.2	NNS	NNS
Hexachlorocyclohexane alpha	<0.02	0.006	0.01	0.22	11,200	NNS	NNS	1,600	130	1,600	130	1,600	130	1,600	130
Hexachlorocyclohexane beta	<0.5	0.02	0.02	0.78	840	NNS	NNS	1,600	130	1,600	130	1,600	130	1,600	130
Hexachlorocyclohexane delta	<0.02	NNS	NNS	NNS	NNS	NNS	NNS	1,600	130	1,600	130	1,600	130	1,600	130
Hexachlorocyclohexane gamma (lindane)	<0.02	0.2	25	420	420	NNS	NNS	2.0	0.08	3.4	0.28	7.6	0.61	11	0.9
Hexachlorocyclopentadiene	< 0.1 to <10	50	580	9,800	9,800	NNS	NNS	3.5	0.3	3.5	0.3	3.5	0.3	NNS	NNS
Hexachloroethane	<5	2.5	9	100	1,400	NNS	NNS	490	350	490	350	490	350	850	610
Indeno (1,2,3-cd) pyrene	<10	0.048	0.49	1.9	1.9	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Isophorone	<5	37	2,600	1,500	280,000	NNS	NNS	59,000	43,000	59,000	43,000	59,000	43,000	NNS	NNS
Lead (as Pb) *	2 to 3.1 T	15 T	NNS	15 T	15 T	10,000 T	100 T	103	4	103	4	103	4	217	NNS
Manganese (as Mn)	5.1	980 T	NNS	196,000 T	196,000 T	10,000 T	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Mercury (as Hg)	<0.2 to <0.5 T	2 T	0.6 T	420 T	420 T	NNS	10 T	2.4 D	0.01 D	2.4 D	0.01 D	2.6 D	0.2 D	5.0 D	2.7 D
Methoxychlor	< 0.1 to <0.2	40	NNS	7,000	7,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Napthalene	<5	140	20,500	28,000	28,000	NNS	NNS	1,100	210	3,200	580	3,200	580	NNS	NNS
Nickel (as Ni) *	<5 to <10 T	140 T	4,600 T	28,000 T	28,000 T	NNS	NNS	675	75	675	75	675	75	5,992	NNS
Nitrate (as N)	3120 to 5000	10,000	NNS	2,240,000	2,240,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Nitrite (as N)	<10	1,000	NNS	140,000	140,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Nitrate/Nitrite (as N)	3620	10,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Nitrobenzene	<5	3.5	1,900	700	700	NNS	NNS	1,300	850	1,300	850	1,300	850	NNS	NNS

**Table 3H-1  
Rio de Flag State of Arizona Numeric Water Quality Criteria (µg/L)**

Parameter	Rio de Flag WRP							A & Wc		A & Ww		A & Wedw		A & We	
	(µg/L)	DWS	FC	FBC	PBC	AgI	AgL	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic
o-Nitrophenol	<5	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
p-Nitrophenol	<10	NNS	NNS	NNS	NNS	NNS	NNS	4,100	3,000	4,100	3,000	4,100	3,000	NNS	NNS
n-Nitrosodimethylamine	<5	0.001	8	0.03	0.03	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
n-Nitrosodiphenylamine	<5	7.1	16	290	290	NNS	NNS	2,900	200	2,900	200	2,900	200	NNS	NNS
n-Nitrosodi-n-propylamine	<5	0.005	0.005	1.4	0.2	133,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Pentachlorophenol *	< 0.04 to <20	1	1,000	12	42,000	NNS	NNS	13.6	8.6	13.6	8.6	13.6	8.6	54.9	NNS
Phenanthrene	<5	NNS	NNS	NNS	NNS	NNS	NNS	30	6.3	30	6.3	54	6.3	NNS	NNS
Phenol	<5	4,200	1,000	840,000	840,000	NNS	NNS	5,100	730	7,000	1,000	7,000	1,000	180,000	26,000
Polychlorinatedbiphenyls(PCBs)	<0.5 to <20	0.5	0.007	28	28	0.001	0.001	2.0	0.01	2.0	0.02	2.0	0.02	11	2.5
Pyrene	<5	210	10,800	42,000	42,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Selenium (as Se)	< 2 to <5 T	50 T	9,000 T	7,000 T	7,000 T	20 T	50 T	20 T	2.0 T	20 T	2.0 T	50 T	2.0 T	33 T	2.0 T
Silver (as Ag) *	0.7 to 1.1	35 T	107,700 T	7,000 T	7,000 T	NNS	NNS	7.3	NNS	7.3	NNS	7.3	NNS	7.3	NNS
Styrene	< 0.5	100	NNS	280,000	280,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Sulfides	<100	NNS	NNS	NNS	NNS	NNS	NNS	100	NNS	100	NNS	100	NNS	100	NNS
2,3,7,8-TCDD (Dioxin)	<1.7E-06	0.0000003	4.00E-09	0.00009	1.4	NNS	NNS	0.01	0.005	0.01	0.005	0.12	0.01	0.1	0.01
1,1,2,2-Tetrachloroethane	< 0.5	0.17	11	7	56,000	NNS	NNS	4,700	3,200	4,700	3,200	4,700	3,200	NNS	NNS
Tetrachloroethylene	< 0.5	5	3,500	14,000	14,000	NNS	NNS	2,600	280	6,500	680	6,500	680	15,000	1,600
Thallium (as Tl)	< 1 T	2 T	7.2 T	112 T	112 T	NNS	NNS	700 D	150 D	700 D	150 D	700 D	150 D	NNS	NNS
Toluene	< 0.5	1,000	201,000	280,000	280,000	NNS	NNS	8,700	180	8,700	180	8,700	180	NNS	NNS
Toxaphene	<0.5 to < 1	3	0.001	1.3	1400	0.005	0.005	0.73	0.0002	0.73	0.02	0.73	0.02	11	1.5
1,2,4-Trichlorobenzene	<5	70	950	14,000	14,000	NNS	NNS	750	130	1700	300	NNS	NNS	NNS	NNS
1,1,1-Trichloroethane	< 0.5	200	NNS	200	200	1000	NNS	2,600	1,600	2,600	1,600	2,600	1,600	NNS	NNS
1,1,2-Trichloroethane	< 0.5	5	42	25	5600	NNS	NNS	18,000	12,000	18,000	12,000	18,000	12,000	NNS	NNS
Trichloroethylene	< 0.5	5	203,200	280,000	280,000	NNS	NNS	20,000	1,300	20,000	1,300	20,000	1,300	NNS	NNS
2,4,6-Trichlorophenol	<5	3.2	6.5	130	130	NNS	NNS	160	25	160	25	160	25	3,000	460
2,4,5-TP	< 0.1	50	NNS	11,200	11,200	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Trihalomethanes, Total	<0.5	100	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Uranium (as U)	Ra 226 pass	35 D	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Vinyl chloride	< 0.5	2	13	2	4200	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS

**Table 3H-1  
Rio de Flag State of Arizona Numeric Water Quality Criteria (µg/L)**

Parameter	Rio de Flag WRP							A & Wc		A & Ww		A & Wedw		A & We	
	(µg/L)	DWS	FC	FBC	PBC	AgI	AgL	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic
Xylenes (Total)	<b>&lt; 0.5</b>	10,000	NNS	2,800,000	2,800,000	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS	NNS
Zinc *	<b>50 to 67</b>	2100 T	69,000 T	420,000 T	420,000 T	10,000 T	25,000 T	169	169	169	169	169	169	1,603	NNS

Source: Aquatic Consulting and Testing, Inc. 2002.

Water quality criteria derived from Arizona Administrative Code, Title 18, Chapter 11, Appendix A (amended by final rule-making effective April 8, 2003)

<sup>a</sup> See Table for approximate ammonia values

<sup>b</sup> The standard to protect this use is 7 million fibers (longer than 10 micrometers) per liter.

<sup>c</sup> The standard to protect this use is 0.003 µg/L aldrin/dieldrin.

\* Toxicity values are based on water hardness of 154 mg/L as calcium carbonate and a pH of 7.4.

T = Total Metal

TTHM = Total Trihalomethanes

µg/L = micrograms per liter  
dependent water)

mg/L = milligrams per liter

MFL = million fibers per liter

D (or highlight) = Dissolved Metal

> = greater than

< = less than

Ra = Radium

pass = acceptable at screening level

FC = Fish Consumption

FBC = Full Body Contact

PBC = Partial Body Contact

DWS = Domestic Water Source

AgL = Agricultural Livestock Watering

WRF = water reclamation facility

A&Wc = Aquatic and Wildlife (cold water)

A&Ww = Aquatic and Wildlife (warm water)

A&Wedw = Aquatic and Wildlife (effluent)

A&We = Aquatic and Wildlife (ephemeral)

AgI = Agricultural Irrigation

NNS = No Numeric Standard

Reported Value Explanation:

[Below all numeric standards](#)

[Not detected; analytical detection limit cannot measure to level of one or more numeric criteria](#)

[Detected above one or more numeric criteria](#)

**Table 3H-2a  
National Primary Drinking Water Standards**

<b>Parameter - Inorganic Chemicals</b>	<b>Units</b>	<b>Rio de Flag WRP Effluent</b>	<b>MCL</b>
Antimony (as Sb)	µg/L	<1 to <2	6
Arsenic (as As)	µg/L	4.5-6	50
Asbestos (fiber >10 micrometers)	MFL	< 0.2	7
Barium (as Ba)	µg/L	240-300	2,000
Beryllium (as Be)	µg/L	< 1 to <2	4
Cadmium (as Cd) <sup>1</sup>	µg/L	<0.5 to <2	5
Chromium (Total)	µg/L	<1 to <10	100
Copper (as Cu) <sup>1</sup>	µg/L	7.8 to 11	TT <sup>2</sup> , Action Level=1,300
Cyanide (as free cyanide)	µg/L	< 10	200
Fluoride	µg/L	130 to 430	4000
Lead (as Pb) <sup>1</sup>	µg/L	2 to 3.1	TT <sup>2</sup> , Action Level=15
Mercury (inorganic)	µg/L	<0.2 to <0.5	2
Nitrate (measured as Nitrogen)	mg/L	3.1 to 5.0	10
Nitrite (measured as Nitrogen)	mg/L	<10	1
Selenium (as Se)	µg/L	< 2 to <5	50
Thallium (as Tl)		< 1	2
<b>Parameter - Organic Chemicals</b>			
Acrylamide		NA	TT <sup>3</sup>
Alachlor	µg/L	< 0.1	2
Atrazine	µg/L	< 0.1	3
Benzene	µg/L	< 0.5	5
Benzo (a) pyrene (PAHs)	µg/L	< 0.02 to <5	0.2
Carbofuran	µg/L	< 0.9	40
Carbon tetrachloride	µg/L	< 0.5	5
Chlordane	µg/L	< 0.1 to <0.2	2
Chlorobenzene	µg/L	< 0.5	10
Dalapon	µg/L	NA	200
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	< 0.01	0.2
o-Dichlorobenzene	µg/L	< 0.5 to <5	600
p-Dichlorobenzene	µg/L	< 0.5 to <5	75
1,2-Dichloroethane	µg/L	< 0.5	5
1,1-Dichloroethylene	µg/L	< 0.5	7
cis-1,2-Dichloroethylene	µg/L	< 0.5	70
trans-1,2-Dichloroethylene	µg/L	< 0.5	100
Dichloromethane	µg/L	< 0.5 to <3	5
2,4-Dichlorophenoxyacetic acid (2,4-D)	µg/L	< 0.1	70
1,2-Dichloropropane	µg/L	< 0.5	5
Di(2-ethylhexyl) adipate	µg/L	NA	400
Di(2-ethylhexyl) phthalate	µg/L	0.6 to <4	6
Dinoseb	µg/L	NA	7
2,3,7,8-TCDD (Dioxin)	µg/L	<1.7E-06	0.00003
Diquat	µg/L	NA	20
Endothall	µg/L	NA	100
Endrin	µg/L	< 0.01	2
Epichlorohydrin	µg/L	NA	TT <sup>3</sup>

**Table 3H-2a  
National Primary Drinking Water Standards**

<b>Parameter - Inorganic Chemicals</b>	<b>Units</b>	<b>Rio de Flag WRP Effluent</b>	<b>MCL</b>
Ethylbenzene	µg/L	< 0.5	700
Ethylene dibromide	µg/L	NA	0.05
Heptachlor	µg/L	<0.01 to < 0.04	0.4
Heptachlor epoxide	µg/L	<0.01 to < 0.02	0.2
Hexachlorobenzene	µg/L	< 0.1 to <5	1
Hexachlorocyclopentadiene	µg/L	< 0.1 to <10	50
Lindane	µg/L	NA	0.2
Methoxychlor	µg/L	< 0.1 to <0.2	40
Oxamyl (Vydate)	µg/L	NA	200
Pentachlorophenol <sup>1</sup>	µg/L	< 0.04 to <20	1
Polychlorinatedbiphenyls(PCBs)	µg/L	<0.5 to <20	0.5
Picloram	µg/L	NA	500
Simazine	µg/L	NA	4
Styrene	µg/L	< 0.5	100
Tetrachloroethylene	µg/L	< 0.5	5
Toluene	µg/L	< 0.5	1,000
2,4,5-TP (Silvex)	µg/L	< 0.1	50
1,2,4-Trichlorobenzene	µg/L	<5	70
1,1,1-Trichloroethane	µg/L	< 0.5	200
1,1,2-Trichloroethane	µg/L	< 0.5	5
Trichloroethylene	µg/L	< 0.5	5
Vinyl chloride	µg/L	< 0.5	2
Xylenes (Total)	µg/L	< 0.5	10,000
Zinc	µg/L	<10 to 67	5000

Source for MCLs: U.S. Environmental Protection Agency, July 2002

Notes:

<sup>1</sup> = Toxicity values based on water hardness of 154 mg/L as calcium carbonate and a pH of 7.4, all metal concentrations are dissolved unless otherwise indicated

<sup>2</sup> = Lead and Copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L

<sup>3</sup> = Each water system must certify, in writing, to the state (using third-party or manufacturer's certification) that when acrylamide and epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows:

Acrylamide = 0.05% dosed at 1 mg/L (or equivalent)

Epichlorohydrin = 0.01% dosed at 20 mg/L (or equivalent)

MCL = maximum contaminant level

MFL = million fibers per liter

NA = not analyzed

T = total metal

TT = treatment technique

SU = standard units

WRF = water reclamation facility

µg/L = micrograms per liter

mg/L = milligrams per liter

NNS = no numeric standard

TTHM = total trihalomethanes

< = less than

> = greater than

Reported Value Explanation:

Below all numeric standards

Not detected; analytical detection limit cannot measure to level of one or more numeric criteria

Detected above one or more numeric criteria

**Table 3H-2b  
National Secondary Drinking Water Standards**

<b>Parameter</b>	<b>Units</b>	<b>Rio de Flag WRP Effluent</b>	<b>Secondary Standard</b>
Aluminum	µg/L	NA	50 to 200
Chloride	mg/L	59 to 74	250
Color		NA	15 (color units)
Copper	µg/L	7.8 to 11	1,000
Corrosivity		NA	Non-corrosive
Fluoride	µg/L	130 to 500	2,000
Foaming Agents	µg/L	NA	500
Iron	µg/L	40 to 80	300
Manganese (as Mn)	µg/L	<10 to 11	50
Odor		NA	3 threshold odor number
pH	SU	7.01 to 7.96	6.5-8.5
Silver (as Ag)	µg/L	0.7 to 1.1	100
Sulfate	mg/L	21 to 31	250
Total Dissolved Solids	mg/L	321 to 360	500
Zinc	µg/L	<10 to 67	5000

Source: U.S. Environmental Protection Agency, July 2002

Notes:

<sup>1</sup> = Toxicity values based on water hardness of 154 mg/L as calcium carbonate and a pH of 7.4, all metal concentrations are dissolved unless otherwise indicated

<sup>2</sup> = Lead and Copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L

<sup>3</sup> = Each water system must certify, in writing, to the state (using third-party or manufacturer's certification) that when acrylamide and epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows:

- Acrylamide = 0.05% dosed at 1 mg/L (or equivalent)
- Epichlorohydrin = 0.01% dosed at 20 mg/L (or equivalent)

MCL = maximum contaminant level	µg/L = micrograms per liter
MFL = million fibers per liter	mg/L = milligrams per liter
NA = not analyzed	NNS = no numeric standard
T = total metal	TTHM = total trihalomethanes
TT = treatment technique	< = less than
SU = standard units	> = greater than
WRF = water reclamation facility	

Reported Value Explanation:  
Below all numeric standards

As can be seen in the results of these data tables, reclaimed water from the Rio de Flag WRF is below the numeric criteria established for Arizona SWQS and national drinking water standards for those regulated parameters tested. Further discussion of the source of inorganic and organic constituents and disinfection by-products in wastewater is as follows.

### **Inorganic Constituents**

Inorganic chemical elements and compounds generally occur in wastewater as a result of naturally-occurring minerals and inorganic salts present in the parent water supplies. Inorganic constituents are also contributed to wastewater from industrial, commercial, and other human activities, and from chemicals added during water and wastewater treatment and distribution.

Naturally-occurring minerals, such as sodium, calcium, sulfate, and chloride, are commonly found in municipal water supplies at concentrations ranging from one to several hundred milligrams per liter (mg/L). The concentrations of these constituents, and of nitrogen-containing compounds and other inorganic salts, increase as water is used and then collected as wastewater.<sup>251</sup> Except for nitrogen contributed from human bodily wastes, water quality concerns for these common inorganic ions and salts are generally limited to effects on taste, odor, and aesthetics. The presence of naturally-occurring trace metals and ions, such as arsenic, chromium, copper, boron, and fluoride, could pose potential human health and environmental hazards.

Industrial, commercial, and household discharges can contribute inorganic constituents, such as antimony, cyanide, mercury, chromium, cadmium, lead, zinc, selenium, silver, and sulfides, to wastewater which may inhibit the effectiveness of wastewater treatment or may pass through the process without treatment or removal. Proper characterization of wastewater discharges to a treatment plant and appropriate pretreatment and source control at the significant points of industrial discharge can assure the physical, chemical, and biological integrity of the wastewater treatment process and receiving waters.<sup>252</sup>

Human bodily wastes contribute high levels of nitrogen, phosphorous, and ammonia to wastewater that may cause adverse ecological effects to receiving waters if untreated. Phosphorous can be removed efficiently from wastewater by chemical precipitation or various biological processes. Ammonia and nitrogen can be removed by biological nitrification and denitrification.<sup>253</sup>

### **Organic Constituents**

Organic constituents of concern principally include a number of conventional solvents, pesticides, polycyclic aromatic hydrocarbons, polychlorinated biphenyls (PCBs), and dioxin. Toxic substances used in homes, including motor oil, paint, household cleaners, and pesticides, may be found in municipal wastewater. Control of organic constituents in surface waters is necessary to limit impacts to health of downstream users and preserve sensitive aquatic environments. Recent studies of many rivers and waterways downstream from industrial and

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<sup>251</sup> National Research Council, 2003

<sup>252</sup> Asano, 1998

<sup>253</sup> National Research Center, 2003

municipal discharges have identified elevated levels of toxic pollutants in water, sediments, and fish tissues.<sup>254</sup> Some of the organic constituents are persistent in the environment and can accumulate in animal tissues. Compounds, such as PCBs and pesticides, that bioaccumulate can pose a greater hazard to animals high in the food chain and may pose human health risks.

Through substantial research, extensive monitoring, and applied studies, EPA identified a number of organic chemicals as “toxic pollutants” during early implementation of the Clean Water Act.<sup>255</sup> 126 of the toxic pollutants, chiefly organic chemicals with a smaller number of metals and other substances, were assigned a high priority for development of water quality criteria and effluent limitation guidelines. The 126 “Priority Pollutants” were generally selected because they are frequently found in wastewater. EPA adopted federal water quality criteria for the Priority Pollutants to identify maximum chemical concentrations deemed protective of aquatic life and human health. These Priority Pollutants have become the basis for evaluating the chemical character of effluent from municipal wastewater treatment plants.

### **Disinfection By-products**

Disinfection by-products (DBPs) are a class of chemical compounds produced during the process of wastewater disinfection. Disinfectants, in addition to killing microorganisms, react with organic and inorganic substances present in the water to produce a variety of DBPs. During chlorine disinfection, chloroform and other trihalomethanes (THMs) and haloacetic acids are commonly formed. Disinfection with ozone may result in the formation of bromate. Nitrosodimethylamine is a by-product of disinfection with chloroamines.

A small number of DBPs are regulated or are being considered for regulation due to potential human health concerns. The EPA established a primary drinking water standard of 100 mg/L for total THMs in 1979, based on the risk of cancer reported in animal studies evaluating chloroform toxicity. Chloroform is the most common THM found in drinking water.<sup>256</sup> By 1998, new epidemiological studies had been published that reported associations between THMs and bladder and colon cancer, as well as adverse pregnancy outcomes.<sup>257</sup> In response to these findings, the drinking water standard for total THMs was revised in December 1998 to 80 mg/L. Limits of 60 mg/L for haloacetic acid and 10 mg/L for bromate were also introduced.

### **Literature Search and Narrative Description of the Potential Presence of Pharmaceuticals, Pathogens, and Hormones in Class A Reclaimed Water (Indicator)**

During the last three decades, the concern about wastewater quality has focused predominantly on conventional industrial pollutants. More recently, it has been recognized that a wide range of other synthetic organic chemicals originating from pharmaceutical drugs and personal care products may persist in the environment. These chemicals are continually released into the environment in large quantities through the manufacture, use (via excretion), and disposal of

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<sup>254</sup> U.S. Environmental Protection Agency, 2003a

<sup>255</sup> 42 U.S.C. 13101, et seq.

<sup>256</sup> U.S. Environmental Protection Agency, 1992

<sup>257</sup> Resource Engineering, Inc. et al., 2000

personal care products and drugs.<sup>258</sup> Research has shown that these chemicals enter and disperse into the environment from municipal wastewater treatment effluent, and persist to a greater extent than originally anticipated.<sup>259</sup> Studies<sup>260</sup> indicate that between 50 and 90 percent of a typical drug dosage can be excreted and introduced unchanged into the environment.

Concerns regarding pharmaceuticals and personal care products (PPCPs) have captured recent attention from governments in Europe and North America, the scientific community, the chemical industry, and public interest groups. The core issue centers on the potential harmful impact PPCPs may have on the normal function of the endocrine system<sup>261</sup> in wildlife and humans.<sup>262</sup> Endocrine-disrupting compounds can mimic, stimulate, or inhibit the production of natural hormones, thereby disrupting the endocrine system function.<sup>263</sup> Endocrine-disrupting compounds encompass a variety of chemical classes, including natural and synthetic hormones, pesticides, compounds used in the plastics industry and consumer products, and other industrial by-products and pollutants.<sup>264</sup> It is important to note that PPCPs and endocrine disrupting compounds are not synonymous. Only a small subset of PPCPs are known or suspected of being direct-acting endocrine disrupting compounds.<sup>265</sup>

Much of the concern over endocrine-disrupting compounds stems from the impact that environmentally persistent pesticides and manmade organic compounds have had on exposed wildlife populations and the environment. Colborn et al.,<sup>266</sup> have linked endocrine-disrupting compounds in the environment to aberrant sexual development and behavioral and reproductive problems in animal populations. Colborn further suggested that endocrine disruptors could be responsible for a wide range of human health problems, including declining male sperm counts, growing incidence of infertility and genital deformities, increasing rates of breast and prostate cancers, and neurological disorders in children. However, the linkage between animal studies and human health effects is controversial. Some scientists question whether the stated human health effects, such as declining sperm counts, are even occurring,<sup>267</sup> and dispute causal linkage of relatively low levels of exposure to synthetic endocrine disruptors.<sup>268</sup>

Municipal wastewater contains a variety of PPCPs that are pharmaceutically active and known to act on the endocrine system at therapeutic doses.<sup>269</sup> Although the occurrence of antibiotics and steroids has generated nearly all the controversy to date, many other classes of drugs, bioactive

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<sup>258</sup> Daughton and Ternes, 1999

<sup>259</sup> Kolpin et al., 2002; Cordy et al., 2003

<sup>260</sup> McGovern and McDonald 2003

<sup>261</sup> The endocrine system is a set of glands and hormones that control biological reproduction, growth, and development.

<sup>262</sup> World Health Organization, 2002

<sup>263</sup> McGovern and McDonald, 2003

<sup>264</sup> World Health Organization, 2002

<sup>265</sup> Daughton and Ternes, 1999

<sup>266</sup> Colborn, T. et al., 1997

<sup>267</sup> National Research Council, 1999

<sup>268</sup> Christensen, 1998; Safe, 2000

<sup>269</sup> McGovern and McDonald, 2003

metabolites and transformation products, and personal care products have yet to be examined.<sup>270</sup> Chemicals found in both non-prescription and prescription medications have been detected in municipal wastewaters and may act as endocrine disruptors.<sup>271</sup> In addition to prescribed human drugs, other PPCPs of potential concern include veterinary and illicit drugs and such common substances as caffeine, cosmetics, food supplements, sunscreen agents, solvents, insecticides, plasticizers, and detergent compounds.

The occurrence of trace concentrations of a variety of PPCPs in surface water and groundwater is becoming progressively more widely recognized. The USGS<sup>272</sup> conducted a national reconnaissance of 139 streams in 30 States and detected PPCPs in 80 percent of the streams sampled. Another study<sup>273</sup> found more than 50 PPCPs in samples of wastewater treatment effluent, surface water, and groundwater. Until recently, the significance has largely gone unnoticed because there have been few analytical methods capable of detecting these compounds at the small concentrations expected in the environment, which are generally less than a microgram per liter (part per billion).

PPCPs and their effects as endocrine disruptors are generally viewed as more of a hazard to the aquatic environment because the introduction of PPCPs into the environment occurs chiefly through aquatic systems.<sup>274</sup> Aquatic organisms are the receptors most affected by uptake of potential endocrine disruptor compounds in the environment and, therefore, are the principal focus of PPCP-related environmental studies.<sup>275</sup>

The fundamental issue related to PPCPs in municipal wastewater is whether or not PPCPs and their transformation products can cause physiological effects on biota at the low concentrations detected.<sup>276</sup> Recent research indicates that endocrine disruptors may have aquatic habitat impacts, but no human health impacts, at concentrations found in receiving waters.<sup>277</sup>

A current and definitive analysis of the issue is given in the *Global Assessment on the State-of-the Science of Endocrine Disruptors*, prepared by an expert panel on behalf of the World Health Organization, the International Labour Organization, and the United Nations Environmental Programme.<sup>278</sup> The scientific evidence, as summarized in this report, indicates that certain effects observed in wildlife can be attributed to chemicals that function as endocrine disruptors. However, in most cases, the evidence of a causal link is weak, with the majority of the effects being observed in areas where exposure to chemical contamination was high at sites of spills and industrial wastewater discharges. The expert panel concluded that most PPCPs considered endocrine disruptors present “suspect”, rather than “known”, risks because our current understanding of the effects posed by endocrine disruptors to wildlife and humans is incomplete.

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<sup>270</sup> Daughton, 2001a and 2001b

<sup>271</sup> Daughton and Ternes, 1999

<sup>272</sup> Kolpin et al., 2002

<sup>273</sup> Daughton and Ternes, 1999

<sup>274</sup> Id.

<sup>275</sup> Sattelberger, 2002

<sup>276</sup> Daughton and Ternes, 1999; Tsuchihashi et al., 2002

<sup>277</sup> Clark, 2001

<sup>278</sup> 2002

With respect to human health, the expert panel stated that the only evidence that humans are susceptible to endocrine disruptor compounds is provided by studies of high exposure levels. Generally, the panel noted that studies investigating endocrine disruption effects in humans have yielded inconsistent and inconclusive results and that more rigorous studies are recommended.

### **USGS and NAU Studies on Reclaimed Water**

The City of Flagstaff has recently funded applied research to screen for the presence of potential endocrine-disrupting compounds and other PPCPs in treated wastewater and to characterize the endocrine-disrupting potential on target vertebrate organisms.<sup>279</sup> The research was conducted in two phases. In the first phase, the USGS, in an extension of their national reconnaissance of organic wastewater contaminants, sampled and quantitatively analyzed treated wastewater samples from City of Flagstaff wastewater for 94 chemicals. The analytes include those PPCPs previously identified in the highest detection frequency and suspected as endocrine-disrupting compounds in the national survey of other water systems. In the second phase, Dr. Catherine Propper of the Northern Arizona University Department of Biological Sciences conducted in vitro (test tube) and in vivo (whole body) tests of Flagstaff wastewater effluent to evaluate vertebrate behavior and physiological effects on the endocrine system.

The results of the USGS reconnaissance screening of organic wastewater constituents in City of Flagstaff reclaimed water are provided in tables 3H-3, 3H-4, and 3H-5. These data tables present the results of screening for human drug compounds in Table 3H-3, veterinary and human antibiotics in Table 3H-4, and industrial and household wastes in Table 3H-5. Results are given for reclaimed water obtained from the Rio de Flag WRF and Wildcat Hill WWTP. Additionally, a groundwater sample from the City of Flagstaff Fox Glenn well was included. The results indicate the number of PPCPs detected and the concentrations at which they were detected is significantly lower in reclaimed water from the Rio de Flag WRF as compared to the Wildcat Hill WWTP. The Rio de Flag WRF is the source of reclaimed water proposed for snowmaking use.

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<sup>279</sup> Propper, et al., 2002

**Table 3H-3**  
**USGS Reconnaissance Screening of Organic Wastewater Constituents for Human Drug Compounds**

Station Name	Inst.Blank	Rio de Flag WRP	Fox Glenn Well	Fox Glenn Well - Blank	Wild Cat WWTP	Set Blank	Set Spike	Spike % Rec
Date & Time		05/28/2003 10:00 AM	05/29/2003 9:00 AM	05/29/2003 8:00 AM	05/28/2003 1:30 PM			
Volume (ml)		892.4	865.3	845.5	868.2	924.6	931.1	
		(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	
Metformin	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
Cotinine	< LRL	0.098	< LRL	< LRL	1.27	< LRL	0.571	106
Salbutamol	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.58	108
Cimetidine	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.0731	14
Acetaminophen	< LRL	0.122	0.0005	< LRL	0.543	< LRL	0.459	85
Ranitidine	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.101	19
1,7-dimethylxanthine	< LRL	< LRL	< LRL	< LRL	6.5	< LRL	0.38	71
Enalaprilat	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
Trimethoprim	< LRL	< LRL	< LRL	< LRL	0.025	< LRL	0.45	84
Digoxigenin	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
Diltiazem	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.277	52
Fluoxetine	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.195	36
Warfarin	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.461	86
Ibuprofen	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.306	57
Gemfibrozil	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.184	34
Paroxetine metabolite	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
Lisinopril	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
Furosemide	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
Amoxicillin	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
Caffeine	< LRL	0.057	0.0055	< LRL	5.06	< LRL	0.514	96
Sulfamethoxazole	< LRL	< LRL	< LRL	< LRL	0.159	< LRL	0.306	57
Dehydronifedipine	< LRL	0.029	< LRL	< LRL	< LRL	< LRL	0.516	96
Digoxin	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
Codeine	< LRL	< LRL	< LRL	< LRL	0.162	< LRL	0.476	89

**Table 3H-3  
USGS Reconnaissance Screening of Organic Wastewater Constituents for Human Drug Compounds**

Station Name	Inst.Blank	Rio de Flag WRP	Fox Glenn Well	Fox Glenn Well - Blank	Wild Cat WWTP	Set Blank	Set Spike	Spike % Rec
Date & Time		05/28/2003 10:00 AM	05/29/2003 9:00 AM	05/29/2003 8:00 AM	05/28/2003 1:30 PM			
Volume (ml)		892.4	865.3	845.5	868.2	924.6	931.1	
		(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	
<b>Cephalexin</b>	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
<b>Thiabendazole*</b>	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.316	59
<b>Urobilin</b>	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
<b>Diphenhydramine*</b>	< LRL	< LRL	< LRL	< LRL	0.022	< LRL	0.336	63
<b>Azithromycin*</b>	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.0557	10
<b>Erythromycin*</b>	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0.0834	16
<b>Clarithromycin*</b>	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
<b>Carbamazapine*</b>	< LRL	0.205	< LRL	< LRL	0.095	< LRL	0.54	101
<b>Miconazole*</b>	0.0036	< LRL	< LRL	< LRL	< LRL	< LRL	0.0375	7
<b>Naproxen*</b>	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0
<b>Nicotinamided4ISTD</b>	1.	1.12	1.16	1.18	1.15	1.08	1.07	100
<b>Ethyl Nicotinate-d4 Surr</b>	< LRL	1.74	1.3	1.32	1.77	1.3	1.18	110
<b>Caffeine13C</b>	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	< LRL	0

Comments:

Red = detected in blank, level < 10X blank detection

Orange = Compound deleted from method

Green => highest calibration level

Blue = < MDL, \* (MDL not determined)

MDL not determined

LRL = Laboratory Reporting Limit

All data is provisional and subject to revision

**Table 3H-4**  
**USGS Reconnaissance Screening of Organic Wastewater Constituents - Veterinary and Human Antibiotics (µg/L)**

Date & Time	5/28/03 10:00 AM	5/29/03 9:00 AM	5/29/03 8:00 AM	5/28/03 1:30 PM
Location	Rio De Flag WRP	Fox Glenn Well	Fox Glenn Well- Blank	Wild Cat WWTP
Sulfamethizole	<0.05	<0.05	<0.05	<0.05
Lincomycin	<0.01	<0.01	<0.01	<0.01
Sulfathiazole	<0.05	<0.05	<0.05	<0.05
Carbadox	<0.05	<0.05	<0.05	<0.05
Sulfamerazine	<0.02	<0.02	<0.02	<0.02
Sulfamethazine	<0.01	<0.01	<0.01	<0.01
Trimethoprim	<0.01	<0.01	<0.01	<0.01
Sulfqchlorpyradazine	<0.05	<0.05	<0.05	<0.05
Sulfamethoxazole	<0.05	<0.05	<0.05	0.27
Sulfadimethoxine	<0.01	<0.01	<0.01	<0.01
Tylosin	<0.02	<0.02	<0.02	<0.02
Virginiamycin	<0.1	<0.1	<0.1	<0.1
Erythromycin-H2O	<0.02	<0.02	<0.02	<0.02
Roxithromycin	<0.01	<0.01	<0.01	<0.01
Tetracycline	<0.02	<0.02	<0.02	<0.02
Methotrexate	<0.02	<0.02	<0.02	<0.02
Demeclocycline	<0.02	<0.02	<0.02	<0.02
Chlortetracy	<0.02	<0.02	<0.02	<0.02
Oxytetracyc	<0.05	<0.05	<0.05	<0.05
Minocycline	<0.02	<0.02	<0.02	<0.02
doxycycline	<0.05	<0.05	<0.05	<0.05
norfloxacin	<0.01	<0.01	<0.01	<0.01
ciprofloxacin	<0.01	<0.01	<0.01	<0.01
enrofloxacin	<0.01	<0.01	<0.01	<0.01
sarafloxacin	<0.01	<0.01	<0.01	<0.01

Note: All data provisional and subject to revision

**Table 3H-5**  
**USGS Reconnaissance Screening of Organic Wastewater Constituents - Industrial and Household Wastes (µg/L)**

Date & Time		05/28/2003 1:30 PM	05/28/2003 10:00 AM	05/29/2003 8:00 AM	05/29/2003 9:00 AM
Field ID	Set Blank	Wild Cat Treatment Plant	Rio De Flag Treatment Plant	Fox Glenn Well	Fox Glenn Well
tetrachloroethylene	< 0.5	E 0.056	< 0.5	E 0.082	< 0.5
bromoform	< 0.5	< 0.5	E 0.14	< 0.5	< 0.5
cumene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
phenol	E 0.03	1.1	E 0.1	< 0.5	< 0.5
1,4-dichlorobenzene	< 0.5	E 0.97	E 0.21	< 0.5	< 0.5
d-limonene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
acetophenone	E 0.031	0.61	E 0.13	< 0.5	< 0.5
para-cresol	1	1.2	1	1	1
isophorone	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
camphor	< 0.5	E 0.23	< 0.5	< 0.5	< 0.5
isoborneol	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
menthol	< 0.5	1.3	< 0.5	< 0.5	< 0.5
naphthalene	E 0.0036	< 0.5	< 0.5	< 0.5	< 0.5
methyl salicylate	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
dichlorvos	< 1	< 1	< 1	< 1	< 1
isoquinoline	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-methylnaphthalene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
indole	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
3,4-dichlorophenyl isocyanate	< 0	0.67	< 0	< 0	< 0
1-methylnaphthalene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
skatol	< 1	< 1	< 1	< 1	< 1
2,6-dimethylnaphthalene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BHA	< 5	< 5	< 5	< 5	< 5
N,N-diethyltoluamide (DEET)	< 0.5	4.6	E 0.23	< 0.5	< 0.5
5-methyl-1H-benzotriazole	< 2	E 1.6	E 0.81	< 2	< 2

**Table 3H-5**  
**USGS Reconnaissance Screening of Organic Wastewater Constituents - Industrial and Household Wastes (µg/L)**

Date & Time		05/28/2003 1:30 PM	05/28/2003 10:00 AM	05/29/2003 8:00 AM	05/29/2003 9:00 AM
Field ID	Set Blank	Wild Cat Treatment Plant	Rio De Flag Treatment Plant	Fox Glenn Well	Fox Glenn Well
diethyl phthalate	0.049	0.77	< 0	< 0	< 0
4-tert-octylphenol	E 0.025	1.1	< 1	< 1	< 1
benzophenone	< 0.5	0.52	E 0.28	< 0.5	< 0.5
tributylphosphate	< 0.5	E 0.28	E 0.16	< 0.5	< 0.5
ethyl citrate	< 0.5	E 0.43	E 0.2	< 0.5	< 0.5
cotinine	< 1	E 0.58	< 1	< 1	< 1
para-nonylphenol-total	< 4.8	E 16	< 3.3	< 4	< 3.3
prometon	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
pentachlorophenol	< 2	< 2	< 2	< 2	< 2
atrazine	< 0	< 0	< 0	< 0	< 0
tri(2-chloroethyl)phosphate	< 0.5	0.59	E 0.3	< 0.5	< 0.5
4-n-octylphenol	< 1	< 1	< 1	< 1	< 1
diazinon	< 0.5	E 0.48	< 0.5	< 0.5	< 0.5
phenanthrene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
tonalide (AHTN)	< 0.5	0.84	0.86	< 0.5	< 0.5
caffeine	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
carbazole	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
galaxolide (HHCB)	< 0.5	E 0.16	E 0.22	0.5	0.5
OPEO1	E 0.53	E 5.7	< 1	< 1	< 1
4-cumylphenol	< 1	< 1	< 1	< 1	< 1
carbaryl	< 1	< 1	< 1	< 1	< 1
metalaxyl	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
bromacil	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
metolachlor	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
chlorpyrifos	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
anthraquinone	< 0.5	< 0.5	E 0.094	< 0.5	< 0.5
NPEO1-total	0	25	0	0	0

**Table 3H-5**  
**USGS Reconnaissance Screening of Organic Wastewater Constituents - Industrial and Household Wastes (µg/L)**

Date & Time		05/28/2003 1:30 PM	05/28/2003 10:00 AM	05/29/2003 8:00 AM	05/29/2003 9:00 AM
Field ID	Set Blank	Wild Cat Treatment Plant	Rio De Flag Treatment Plant	Fox Glenn Well	Fox Glenn Well
fluoranthene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
triclosan	< 1	1.4	E 0.14	< 1	< 1
pyrene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
OPEO2	< 1	E 0.54	< 1	< 1	< 1
bisphenol A	< 1	< 1	< 1	< 1	< 1
NPEO2-total	< 5	E 25	< 5	< 5	< 5
tri(dichlorisopropyl)phosphat	< 0.5	E 0.43	E 0.36	< 0.5	< 0.5
triphenyl phosphate	< 0.5	E 0.098	E 0.098	< 0.5	E 0.057
ethanol,2-butoxy-,phosphate	< 0.5	E 26	E 0.21	< 0.5	< 0.5
PBDPE4-2	< 0	< 0	< 0	< 0	< 0
diethylhexyl phthalate	0.098	0.92	< 0	0.78	< 0
estrone	< 5	E 0.45	< 5	< 5	< 5
17B-estradiol	< 5	< 5	< 5	< 5	< 5
17-alpha-ethynyl esterdiol	< 5	< 5	< 5	< 5	< 5
equilenin	< 5	< 5	< 5	< 5	< 5
benzo(a)pyrene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
3-beta-coprostanol	< 2	8	< 2	< 2	< 2
cholesterol	< 2	11	< 2	< 2	< 2
beta-sitosterol	< 2	2.6	< 2	< 2	< 2
stigmastanol	< 2	< 2	< 2	< 2	< 2

Note: All data is provision and subject to revision.

A summary of Dr. Propper's findings appear in four abstracts given as presentations at the 2004 Annual Meeting for the Society of Integrative and Comparative Biology held January 5-9 in New Orleans, Louisiana and are summarized below.

As described in Westmoreland et al.,<sup>280</sup> testing was performed on bullfrogs to assess changes in activity levels, feeding behavior, overall condition, and endocrine status after exposure to reclaimed water for one month. The results of the experiment suggest that exposure to reclaimed water may have adversely affected the bullfrog's feeding behavior. All other measures of behavior, activity, and stress hormone levels were not statistically significant compared to a control group.

As described in Hortin et al.,<sup>281</sup> and Somley et al.,<sup>282</sup> testing was performed on female Western Mosquitofish (*Gambusia affinis*) to assess changes in anal tail fin length after exposure to reclaimed water for one month. Elongation of the mosquitofish anal tail fin is a bioindicator of endocrine disruption by compounds that mimic male sexual hormones called androgens. During the course of study a significant quantity of fish died, possibly associated with low dissolved oxygen levels or infection by microorganisms. The experiment was repeated after aerating the reclaimed water. The reclaimed water did not cause a change in mosquitofish anal fin length suggesting there is nothing overtly androgenic in the water.

As described in Phillips et al.,<sup>283</sup> testing was performed on African clawed frogs (*Xenopus laevis*) raised in reclaimed water to assess their physiological development. The rate of development and sex ratio was measured in tadpoles until metamorphosis. Tadpoles in reclaimed water underwent metamorphosis in fewer days, weighed less, and were shorter than individuals from control groups. There was no major effect on sex ratio. The findings suggest the reclaimed water is not significantly estrogenic, although exposure to reclaimed water influences endocrine-directed development in this aquatic species.

It should be noted that the studies conducted by Dr. Catherine Propper exposed test animals to 100 percent reclaimed water. As explained further in this chapter, the proposed use of reclaimed water for snowmaking at the Arizona Snowbowl will not result in comparable environmental exposure as investigated by Dr. Propper.

### **Microbial Constituents**

A wide variety of microbial pathogens may be found in wastewater, including enteric bacteria, enteric viruses, and enteric protozoan parasites.<sup>284</sup> Concerns about microbial constituents in water are nearly exclusively related to the human health hazard associated with acute illnesses and infectious disease. The hazards of waterborne disease have been reduced due to improved sanitary conditions, medical advances, and better microbiological and epidemiological methods for identifying outbreaks. Development of large population centers and advancements in civilizations have been directly associated with improvements in managing water supplies and

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<sup>280</sup> Westmoreland, K.L., et al., 2004

<sup>281</sup> Hortin, S.M., et al., 2004

<sup>282</sup> Somley, B.L., et al., 2004

<sup>283</sup> Phillips, J.D., et al., 2004

<sup>284</sup> Asano, 1998

wastewater sanitation.<sup>285</sup> Well-known waterborne diseases, although still important worldwide, have decreased substantially in the United States and other industrialized countries.<sup>286</sup> Enteric (intestinal) pathogens still occur and any potable water supply receiving human or animal wastes can be contaminated with microbial agents. Even pristine water supplies have been linked to disease outbreaks, presumably from wildlife in the watershed. Because *Giardia* is endemic in wild and domestic animals, infection can result from water supplies that have no wastewater contribution.<sup>287</sup>

Enteric microbial pathogens in wastewater are substantially removed by conventional treatment, although they are not completely eliminated even with disinfection. Fecal coliform bacteria, which are used as an indicator of microbial pathogens, are typically found at concentrations ranging from  $10^5$  to  $10^7$  colony-forming units per 100 milliliters (CFU/100 ml) in untreated wastewater. Advanced wastewater treatment may remove as much as 99.9999+ percent of the fecal coliform bacteria; however, the resulting effluent has detectable levels of enteric bacteria, viruses, and protozoa, including *Cryptosporidium* and *Giardia*.<sup>288</sup> These data suggest that wastewater discharges are contributing enteric pathogens to ambient surface waters, many of which may be used downstream for drinking purposes. It is now known that most documented outbreaks of waterborne disease in the United States are caused by protozoan and viral pathogens in waters that have met coliform standards.<sup>289</sup>

## **Wastewater Reuse**

### **Literature Search on the Use of Reclaimed Water for Various Recreational and Municipal Purposes (Indicator)**

Reuse of municipal wastewater has become increasingly important during the past several decades due to the growth in urban population, constraints on the development of new water sources, and more stringent treatment requirements to protect the quality of the receiving water for aquatic life. The use of reclaimed water for non-potable purposes can greatly reduce the demand on potable water sources in areas lacking sustainable, high-quality water supplies. Reuse is practiced extensively in the United States and around the world. California, Arizona, and Florida are at the forefront of water reuse.<sup>290</sup> In 1995, for example, the USGS<sup>291</sup> reported that more than one billion gallons per day of reclaimed water were used in the United States; reported use for California and Arizona was 334 and 180 million gallons per day, respectively. Reuse of municipal reclaimed water is presently about 4.8 billion gallons per day in the United States, or about one percent of all freshwater withdrawals.<sup>292</sup>

Reclaimed water is most commonly used for non-potable purposes, such as agriculture, landscape irrigation, power plant cooling, industrial processing, dust control, and fire

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<sup>285</sup> Bouwer, 1994

<sup>286</sup> National Research Council, 2003

<sup>287</sup> Id.

<sup>288</sup> Rose et al., 1996

<sup>289</sup> National Research Council, 2003

<sup>290</sup> Solley et al., 1998

<sup>291</sup> Id.

<sup>292</sup> U.S. Department of Energy, 2001

suppression. Other non-potable applications include recreational and environmental uses, ranging from aesthetic ponds and ornamental fountains to full-scale development of water-based recreational sites for swimming, fishing, and boating.<sup>293</sup> Non-potable reuse is a widely accepted practice that will continue to grow.<sup>294</sup>

Although most reclaimed water projects have been developed to meet non-potable water demands, a number of projects use reclaimed water indirectly for potable purposes. These projects include numerous groundwater recharge facilities that have operated successfully for many years to replenish public drinking water supplies.<sup>295</sup> Additional treatment of the reclaimed water occurs during groundwater recharge from natural filtration by the underground sediments and rock formations.<sup>296</sup> The resulting soil-aquifer treatment removes essentially all of the suspended solids and microorganisms that may be present and substantially reduces the concentration of metals, nitrogen, phosphate, ammonia, and dissolved organic compounds in the reclaimed water.<sup>297</sup> Further, although there is only limited research available, a recent study indicates that more than 90 percent of the hormonally active compounds (synthetic organic compounds that can block, mimic, stimulate, or inhibit the production of natural hormones) in wastewater are removed during soil-aquifer treatment, primarily by biodegradation.<sup>298</sup>

The use of higher levels of treatment makes reclaimed water a technically and economically feasible source of potable water.<sup>299</sup> The practice of direct potable reuse, however, is generally not practiced due to the lack of public acceptance. In the future as water supplies become scarcer and the costs for acquiring and treating new supplies increase, direct potable reuse may become more acceptable. Residents of Orange County, California have broadly embraced plans for a \$487 million “toilet-to-tap” project that promises to provide dependable, cheaper supplies to water scarce Southern California. The project, when it comes on line in 2007, will purify enough wastewater to serve 140,000 households.<sup>300</sup>

#### Discussion of Existing Water Rights and the Ability to Implement the Proposed Snowmaking With or Without Procuring Additional Water Rights (Indicator)

The City of Flagstaff has agreed to provide the Snowbowl with up to 1.5 million gallons per day (MGD) of Class A+ reclaimed water for snowmaking purposes from the beginning of November through the end of February each winter. The source of water is the Rio de Flag Water Reclamation Facility (WRF). The contract is for a period of five years with terms for renewal of three(3) additional five (5) year periods. Currently, this same water is used to irrigate City parks and school playgrounds, but is mostly unused in the winter. Treated water that is not reused is discharged to Rio de Flag drainage, where it creates a limited reach of dependent riparian habitat in the normally dry river channel. The extent of surface water downstream from the Rio de Flag

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<sup>293</sup> U.S. Environmental Protection Agency, 2003a

<sup>294</sup> Id.

<sup>295</sup> U.S. Environmental Protection Agency, 2003a

<sup>296</sup> Bouwer et al., 2002

<sup>297</sup> Bouwer et al., 2002a

<sup>298</sup> Zhang et al., 2003

<sup>299</sup> National Research Council, 2003

<sup>300</sup> Los Angeles Daily News, 2004

WRF is limited by infiltration that occurs via fractures and sink holes in the exposed Kaibab Formation terrain.

In the western United States, the right to use water has developed through a series of federal and state laws and judicial actions. A water right entitles the right-holder to use water; it is not a right of ownership but rather a right of use. The state generally retains ownership of so-called natural or public waters within its boundaries, and state statutes, regulations, and case law govern the allocation and administration of the rights of private parties and governmental entities to use such water. The main types of water rights in Arizona are surface water and groundwater rights. Each type of right is governed by different laws.

In a semi-arid state, such as Arizona, water rights are often controversial and frequently a matter of legal dispute and intervention. The right to the use of reclaimed water in Arizona is no exception, and was established by the 1989 decision of the Arizona Supreme Court in the case of *Arizona Public Service v. Long*.<sup>301</sup> In this case, the Arizona Supreme Court determined that effluent is neither surface water nor groundwater and cities can put the reclaimed water to any reasonable use they see fit, within existing legislative restrictions. In reaching this decision, reclaimed water was determined not to be subject to regulations under Arizona's surface water or groundwater code. The Court ruled that effluent discharges are subject to appropriation by downstream users, but the cities were not obligated to continue discharge of the effluent to satisfy the needs of downstream appropriators.

The case of *Arizona Public Service v. Long* clarifies the legal basis for the City of Flagstaff to sell reclaimed water for reuse. The use of reclaimed water by the Snowbowl, as well as other customers currently using reclaimed water for irrigation, is not restricted by water rights.

## **RIO DE FLAG WATER RECLAMATION FACILITY**

### **Description and Quantification of the Rio de Flag Water Reclamation Facility's Historic Seasonal Discharges (Indicator)**

The Rio de Flag WRF was constructed in 1992 following a comprehensive evaluation of the City of Flagstaff's future water and sewer needs. At that time, the city's wastewater was treated at the Wildcat Hill Wastewater Treatment Plant (WWTP) in east Flagstaff, which was nearing total design capacity. The Rio de Flag WRF was built to provide four millions gallons per day (MGD) of additional wastewater treatment capacity, with the potential for expansion to six MGD. The plant was designed to provide advanced treatment of wastewater to produce Grade A+ reclaimed water (detailed in the Water Quality of the Rio de Flag WRF section, below) for unrestricted non-potable reuse. This requires, in addition to conventional primary and secondary wastewater treatment, advanced treatment for nitrogen removal, ultraviolet disinfection, and filtration. At the time of construction, the city installed approximately 10 miles of distribution piping for the reclaimed water system, allowing for reclaimed water deliveries to major irrigation and recreation users throughout the city.

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<sup>301</sup> McGinnis, 1990

## Overview of the Rio de Flag WRF Treatment Process

The Rio de Flag WRF receives raw wastewater from the Rio de Flag interceptor sewer at a location where approximately half of the city's sewer flow can be obtained. The process uses screening, primary sedimentation, aeration, secondary sedimentation, filtration, and disinfection.

In the primary treatment stage, solids settle out as sludge in the primary clarification tanks and are sent to the Wildcat Hill WWTP via sewer pipeline for digestion. Scum and odors are also removed at the primary clarification point. Wastewater is then gravity-fed for secondary treatment through the aeration/denitrification process, where biological digestion of waste occurs. The process used for biological treatment is the Bardenpho Process, in which a two-stage anoxic/aerobic process removes nitrogen, suspended solids, and BOD from the wastewater. The secondary clarifiers remove the by-products generated by this biological process, recycle microorganisms back into the process from return activated sludge, and separate the solids from the waste system. The waste sludge is sent to the Wildcat Hill WWTP for treatment. The water for reuse then passes through the final sand and anthracite filters prior to disinfection by ultraviolet light radiation. At this point, the reclaimed water may be either pumped to a two million gallon reclaimed water tank at Buffalo Park to be gravity-fed into the reclaimed water distribution system, or discharged into the Rio de Flag. Water supplied for reuse is further treated with a hypochlorite solution to assure that residual disinfection is maintained in the reclaimed water system.

Due to the close proximity of the Rio de Flag WRF to the central part of the city of Flagstaff, the plant was designed and constructed to minimize impacts to surrounding land uses. The treatment components are fully enclosed and utilize an activated carbon system to remove odors prior to venting the clean air to the atmosphere.

### Pre-treatment Program

The national pretreatment program under the CWA controls the discharge of pollutants to municipal wastewater treatment plants by industrial users. Discharges to treatment plants are regulated primarily by the plant operator, rather than the Federal or State government.

The City of Flagstaff has developed a local pretreatment program to control industrial discharges into the city sewer system. The program has been approved by EPA and ADEQ. As part of the pretreatment program, the Industrial Waste Monitoring Division of the City of Flagstaff Utilities Department monitors various industries that discharge wastewater to the municipal sewer system and specifies local limits, as applicable, for dischargers to assist the city in achieving compliance with its AZPDES permit.

According to sewer use records from January 1999 to April 2001, industrial sources contributed approximately 20 percent of the total inflow to the Rio de Flag WRF.<sup>302</sup> Industrial discharges originate from eight significant industrial users (SIUs) to the city sewers. In a recently-completed Local Limits Study, 23 primary pollutants of concern were identified for the Wildcat Hill WWTP and Rio de Flag WRF.<sup>303</sup> The pollutants include 11 metals and inorganic

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<sup>302</sup> Pirnie, M., 2002

<sup>303</sup> Id.

compounds, eight organic compounds, nitrogen compounds (nitrate and nitrite), and levels of BOD and suspended solids. These pollutants are considered to represent the greatest risk for non-compliance with permit limitations for discharges under the City's AZPDES permit and APP. Pollutants of concern are identified by evaluating the chemicals present in waste streams from the SIUs, the background levels of the chemicals present in natural waters and non-industrial sources, the efficiency of the city wastewater treatment plants to remove the pollutants, and analysis of relevant regulatory numerical discharge limits. Lastly, although discharges of non-industrial pollutants are difficult to characterize, key non-industrial pollutants, such as pesticides, nitrogen, and volatile organic compounds that present concerns for fire and explosion hazards in the collection system, are included as pollutants of concern.

The Rio de Flag WRF has treated wastewater at an average rate of 681 million gallons per year (1.87 MGD) during the past four years. The most recent data from 2002 indicate that approximately 25 percent of the wastewater treated at the WRF was beneficially reused in the Reclaimed Water System and 75 percent was discharged as Grade A+ treated effluent to the Rio de Flag channel. The reuse is highly seasonal; two thirds of the reuse occurs from May through August, when the average demand for reclaimed water has been about one MGD. In 2003, demand for reclaimed water increased to nearly two MGD due to the opening of the Pine Canyon Golf Course. In contrast, only about 55,000 gallons per day of reclaimed water were used in the winter months of November through February, representing only four percent of the City's annual water reuse from the Rio de Flag WRF.

#### **Description and Quantification of Current Uses of Reclaimed Water Within the City of Flagstaff by Season (Indicator)**

The Rio de Flag WRF currently provides reclaimed water for turf irrigation to the Catholic Cemetery; Northern Arizona University; Pine Canyon Golf Course; Flagstaff Medical Center; the Flagstaff public school system; and the city's public parks, facilities, and cemetery. Reclaimed water from the Wildcat Hill WWTP is used for irrigation at golf courses, public parks, and the Christmas tree farm, and for dust control at various locations in east Flagstaff.

### **WATER QUALITY OF THE RIO DE FLAG WRF**

#### **Discussion of the Applicability of the Rio De Flag WRF NPDES Permit to the Proposed Snowmaking Application (Indicator)**

#### **Description of the Certification Process for Allowing Class A Water to be Used for Snowmaking (Indicator)**

The regulatory programs governing reclaimed water reuse have been developed in a risk-based framework to protect public health and minimize the hazards associated with potential exposures. ADEQ developed the Reclaimed Water Permit Program to define conditions and requirements for reuse of treated municipal wastewater. The program specifies reclaimed water standards and defines five classes of reclaimed water. Class A reclaimed water is the highest quality and is required for reuse applications where there is a relatively high risk of human exposure to treated effluent. For uses where the potential for human exposure is lower, Class B and Class C reclaimed water are acceptable. The Reclaimed Water Quality Standards include two "+" categories of reclaimed water, Class A+ and Class B+. The "+" designation indicates that treatment is used to decrease the total nitrogen concentration to less than 10 mg/L in the

reclaimed water. Wastewater treatment facilities providing reclaimed water for reuse must identify the class of reclaimed water generated by the facility.

The use of reclaimed water for snowmaking was originally studied as a means of storing effluent during winter when land application was not feasible. Studies and full-scale use of reclaimed water in snowmaking have been conducted in Colorado, Michigan, and Maine. The site studies showed that converting wastewater to snow improved its quality upon melting and subsequent discharge to surface waters. Snowmelt from reclaimed water exhibited a substantial reduction in nutrients, BOD, and suspended solids.<sup>304</sup>

According to studies conducted by the U.S. Army Corps of Engineers,<sup>305</sup> the process of freezing and repeated freeze-thaw cycles also destroy bacteria in reclaimed water. Results indicated that more than 99.9 percent of the total coliform bacteria and more than 99 percent of the fecal coliform bacteria were removed in the snowmelt from a non-chlorinated secondary wastewater effluent supply used in snowmaking. Other species of bacteria were affected less. The studies also found that many species of bacteria survived the multiple freeze-thaw cycles and reproduced in the resultant snowmelt. Furthermore, much of the snowmelt infiltrated into the ground, where additional soil-aquifer treatment and contaminant removal occurred before groundwater was discharged into streams.

The use of reclaimed water for snowmaking at commercial skiing operations is beginning to gain recognition. Reclaimed water for snowmaking has been proposed as a method of supplementing snowmaking at ski areas throughout the eastern United States<sup>306</sup> and in Australia.<sup>307</sup> Reclaimed water has been used to make snow since 1985 at the Seven Springs Mountain Resort, located southeast of Pittsburgh, Pennsylvania. Seven Springs has an extensive snowmaking system that is supplemented with up to 600,000 gallons per day of reclaimed water.<sup>308</sup> Reclaimed water used for snowmaking at Seven Springs is gray water derived from wastewater treatment lagoons. The gray water is discharged to a series of ponds, which receive water from springs and on-site stormwater runoff prior to reuse applications. Effluent is also used at the resort in the summer for golf course irrigation.

The State of Arizona allows Class A and A+ reclaimed water for direct reuse in snowmaking. Due to the relatively high risk of human exposure to potential contaminants in reclaimed water, ADEQ has developed strict and specific treatment requirements for reuse applications having higher degrees of public contact, such as skiing, that include secondary treatment, filtration, and disinfection. In meeting these requirements, the reclaimed water is considered acceptable for unrestricted recreational use.

All wastewater treatment facilities providing reclaimed water for reuse must have an Individual Aquifer Protection Permit (APP), or amend their existing APP to contain certification for a

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<sup>304</sup> Wright Water Engineers, 1988; Wright-Pierce Engineers, 1999; Maine Lagoon Task Force, 2003

<sup>305</sup> Parker et al., 2000

<sup>306</sup> U.S. Environmental Protection Agency, 1992

<sup>307</sup> Tonkovic and Jeffcoat, 2002; ABC Online, 2003

<sup>308</sup> S. Eutsey, personal communication

particular class of reclaimed water. The Rio de Flag WRF operates under a 1997 APP<sup>309</sup> that was reissued with Significant Amendment in April, 2002. The APP was amended to classify the Rio de Flag WRF for production of Class A+ reclaimed water. The amended APP allows the city to operate the Rio de Flag WRF with a maximum average monthly flow of 4.0 MGD and reuse effluent under a Reclaimed Water Individual Permit<sup>310</sup> that was issued in May 2002. The APP is valid for the life of the facility and the Reclaimed Water Permit must be renewed every five years.

### **Documentation of Compliance with State and Federal Water Quality Standards Regarding Class A Wastewater and its Uses (Indicator)**

The Rio de Flag WRF is authorized to discharge treated wastewater to the Rio de Flag under NPDES Permit<sup>311</sup> (currently referred to as an AZPDES Permit since the program has been delegated to State authority) that was issued in November 1999. Effluent limitations and monitoring requirements are specified for a wide variety of conventional wastewater treatment parameters, trace metals, organic chemicals, and priority pollutants. Additionally, the discharge is periodically monitored for chronic toxicity by prescribed whole effluent toxicity (WET) tests. The WET test replicates, to the greatest extent practicable, the actual environmental exposure of aquatic life to the aggregate toxic effects of a wastewater discharge.<sup>312</sup>

The AZPDES Permit requires that water quality of the reclaimed water meet State Surface Water Quality Standards (SWQS) for discharge to the Rio de Flag. The Arizona Department of Environmental Quality (ADEQ) has assigned designated uses of partial-body contact (PBC) and aquatic and wildlife for effluent-dependent water (A&Wedw) to the receiving waters of the Rio de Flag WRF.

More than 40 years of experience in water reuse has led to formulation of guidelines, rules, and water quality standards for a variety of reuse applications. Arizona, together with California and Florida, are among the few states that have developed enforceable programs and specific requirements for treatment, treatment reliability criteria, and water quality standards for various reuse applications to protect public health and the environment.<sup>313</sup> The level of treatment and water quality criteria are based on the expected degree of contact with reclaimed water by the public and aquatic animals and plants.

As noted in the previous sections, the Rio de Flag WRF has three water permits that govern wastewater reclamation, reuse, and facility discharges. The ADEQ administers these permits.

Monitoring data for the AZPDES Permit is submitted in monthly Discharge Monitoring Reports (DMRs) to ADEQ. Monthly DMRs for 2001 and 2002 were reviewed to document compliance with the permit terms and conditions. All regulated parameters in the reclaimed water met established numerical limits for designated uses of PBC and A&Wedw assigned to the Rio de

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<sup>309</sup> APP P-102421

<sup>310</sup> R-102421

<sup>311</sup> AZ0023639

<sup>312</sup> U.S. Environmental Protection Agency, 2003b

<sup>313</sup> National Research Council, 2003

Flag. The reclaimed water also met the numerical criteria for all protected end uses of Arizona surface water, including designated uses with much more restrictive criteria than PBC and A&Wedw.

EPA and ADEQ conduct annual inspections of the Rio de Flag WRF to assure the facility is operated and maintained in compliance with Federal and State regulations. NPDES inspection reports obtained for the past four years indicate that no deficiencies were found in the operation and maintenance of the Rio de Flag WRF.

Monitoring data for the APP and the Reclaimed Water Permit is submitted to ADEQ in quarterly Self-Monitoring Report Forms (SMRFs). Quarterly SMRFs obtained for 2001 and 2002 indicate full compliance with permit terms and conditions. All regulated parameters in the reclaimed water met established numerical limits for Aquifer Water Quality Standards, which are equivalent to EPA Primary Drinking Water Standards. Additionally, of the enteric viruses or parasites tested in reclaimed water, none have been detected.

ADEQ was interviewed to appraise the Rio de Flag WRF operations and confirm the facility compliance status. In a letter dated September 9, 2003, ADEQ stated that its review of the facility file and existing information in the wastewater compliance, enforcement, and tracking database indicates the Rio de Flag WRF is in compliance with the APP and the AZPDES Permits. Further discussions with the Northern Regional Office, Water Permits Section, and Water Quality Compliance Section of the ADEQ Water Quality Division confirmed there were no known compliance issues or operating concerns associated with the Rio de Flag WRF. ADEQ staff openly commended the exemplarily performance of the Rio de Flag WRF and City of Flagstaff Utilities Division.

## **ENVIRONMENTAL CONSEQUENCES**

### **SUMMARY OF ENVIRONMENTAL CONSEQUENCES AND CONCLUSIONS**

Major conclusions and determinations of this Watershed Resources analysis are summarized below. A more detailed analysis of the direct and indirect environmental consequences – from which this summary was derived – follows.

#### **Direct Effects**

The proposed snowmaking and facility improvements considered in Alternative 2 would have the net effect of increasing groundwater recharge and solute concentrations in groundwater in the areas where snowmaking would be implemented. Under dry year or wet year less overall groundwater recharge – attributable to the applied snowmaking – would result than those calculated for average precipitation conditions. Groundwater recharge occurring in areas of proposed snowmaking would contain larger concentrations of TDS, TOC, total nitrogen, and other dissolved constituents from the reclaimed water than groundwater recharge from natural precipitation. However, the solute concentrations would be decreased substantially from concentrations in the reclaimed water by commingling and blending with natural precipitation. For example, projected average concentrations of TDS and TOC in recharge in the Snowbowl sub-area, where more than 90 percent of the snowmaking activity would take place, are projected to be reduced by a factor of four from reclaimed water concentrations.

Although the proposed implementation of Alternative 2 would increase the amount of groundwater recharge and solute concentrations in groundwater recharge in the immediate vicinity of the Snowbowl, it would not comprise a direct impact on any groundwater users or potential receptors in the Snowbowl sub-area or Agassiz sub-watershed because there are no wells, springs, or other discharges of groundwater in these areas.

The proposed facilities improvements associated with Alternative 3 would not have any consequential direct effects on groundwater recharge or groundwater water quality in the Snowbowl sub-area or the Agassiz sub-watershed.

### **Indirect Effects**

The net effects of additional groundwater recharge and water quality changes from the use of reclaimed water for snowmaking over time may potentially comprise an indirect effect on groundwater users or potential receptors that are outside the immediate areas of proposed snowmaking in Hart Prairie. Snowmaking and associated additional groundwater recharge may potentially increase groundwater availability and the concentration of solutes in groundwater downgradient from the Snowbowl. The nearest known groundwater users and potential receptors are the private wells, springs, and stock tanks in Hart Prairie. As shown in Figure 3H-1, the wells, springs, and stock tanks are located more than 3,500 feet west and down slope from the nearest areas of proposed snowmaking at the Snowbowl.

Due to the complex movement of groundwater through the surficial deposits and underlying volcanic deposits in this area, it is difficult to specifically determine the sources of shallow groundwater for the perched aquifers in the Hart Prairie area. Therefore, the degree to which any change in groundwater availability or water quality resulting from implementation of Alternative 2 actions would impact the wells, springs, and stock tanks in this area can not be projected with certainty. Consequently, the potential contribution and effect of any additional recharge from areas of snowmaking to specific potential receptors in Hart Prairie can not be precisely projected. However, the projections of groundwater recharge and water quality impacts for the Hart Prairie watershed discussed can provide a conceptual approximation of the potential magnitude of impacts to groundwater users in this area. Based on these projections, the snowmaking proposed in Alternative 2 may contribute a minor amount of groundwater to underlying aquifers, including the perched aquifers in the Hart Prairie watershed. The additional groundwater could possibly benefit groundwater users and other potential receptors, such as wildlife and vegetation that are supported by the shallow perched groundwater system and small springs and associated seeps. The overall effect, however, is not expected to be significant due to the small incremental increase to water supply, which is on the order of five percent of the projected existing Hart Prairie groundwater recharge, in years of average precipitation.

The limited degree by which the proposed snowmaking may impact groundwater availability and water quality to potential receptors in Hart Prairie is further substantiated by research conducted by NAU faculty and students in the Fern Mountain Botanical Area and Homestead at Hart Prairie. For example, Gavin<sup>314</sup> created a predictive numerical groundwater flow model to determine what change from average precipitation conditions would be necessary to create a minimum depth to water requirement for Bebb willow germination at one spring location in the

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<sup>314</sup> Gavin, A., 1998

Fern Mountain Botanical Area. Model simulations indicate it would require a minimum of an eight percent increase in recharge from average conditions to create minimum conditions favorable to recruit and maintain new willow seedlings.

While the water quality impact to downgradient groundwater users in Hart Prairie can not be projected with any certainty, it is clear there would be substantial attenuation of solute concentrations as the reclaimed water in artificial snow combines with natural precipitation, infiltrates from the area of snowmaking, and blends with other groundwater recharge and groundwater in storage as it moves downgradient to the perched aquifers underlying Hart Prairie. It is expected that certain nutrients and dissolved organic constituents in reclaimed water would be removed through physical, chemical, and biological uptake during infiltration in surficial soils and underlying sediments. Based on calculations of blending and resulting chemical quality of water projected to be available for groundwater recharge in the Hart Prairie watershed, there may be more than an order of magnitude decrease in concentration of solutes, such as TDS and TOC, from the reclaimed water used in snowmaking to the resulting groundwater underflow to the Hart Prairie watershed. Consequently, although there could be potential increases of dissolved salts and other constituents of reclaimed water in groundwater downgradient from the areas of snowmaking, the water quality impact is likely to be limited due to the substantial extent of groundwater recharge resulting from yearly precipitation in all but the driest climatic conditions throughout Hart Prairie and the upper sub-watersheds compared to that derived from proposed snowmaking.

## **DETAILED ANALYSIS OF DIRECT AND INDIRECT EFFECTS**

### **Quantification of Anticipated Annual Water Use**

*Use of reclaimed water for snowmaking purposes between November and February of each year could affect aquifer recharge.*

Indicators:

Quantification Of Anticipated Snowmaking Water Use in Average Dry, Median, and Wet Years

Quantification of Anticipated Total Consumptive Water Losses (i.e., Evaporation, Evapotranspiration, Sublimation) Resulting from Proposed Snowmaking

Direct and indirect environmental consequences for the three alternatives were evaluated by projecting hydrologic conditions for average, dry, and wet climatic conditions based on calculations of precipitation, snowmaking water use, watershed losses, and groundwater recharge, and by making assumptions for chemical quality of reclaimed water and natural precipitation.

Direct impacts of the proposed use of reclaimed water for snowmaking were estimated by calculating and comparing the volume and chemical quality of groundwater recharge projected to occur in the immediate proximity of snowmaking areas (Snowbowl sub-area and Agassiz sub-watershed, shown on Figure 3H-1).

Indirect impacts were determined by calculating and comparing the volume and chemical quality of groundwater recharge that is assumed may potentially impact users of groundwater yielded

from wells, seeps, or springs in the watersheds that receive groundwater underflow from the snowmaking areas of the Snowbowl sub-area.

Projected hydrologic conditions under all three alternatives for the Snowbowl sub-area, Agassiz sub-watershed, and the Hart Prairie watershed are given in tables 3H-1, 3H-2, and 3H-3.

### **Alternative 1 – No Action**

Under the No Action Alternative, implementation of snowmaking infrastructure would not occur, and current conditions as presented above would be expected to persist. No machine-produced snow would be applied within the project area.

### **Alternative 2 – The Proposed Action**

Under the Proposed Action, a total of 205.2 acres of snowmaking terrain would be implemented at the Snowbowl. This terrain would be primarily implemented within the Snowbowl Sub-area, with smaller acreages implemented in other proximal watersheds.

The depth of snow that would be initially produced on existing and proposed terrain would result in an average coverage depth across all terrain types of slightly more than 25 inches of snow. Estimated operational conditions under the varying climatic scenarios are outlined as follows:<sup>315</sup>

1. Once all the trails have been covered with the specified depth of snow, resurfacing operations would typically commence to recover from any thaws and replenish snow that has become hardened through wear and temperature cycling. The amount of resurfacing required would depend on natural snowfall. In a wet year, it is estimated that only the initial application would be required. This application could be spread out over the season if there was abundant snow early in the year, or it could be concentrated at the beginning of the season if the bulk of the snow arrives after December.
2. On an average year, it is estimated that an additional half-application of machine-produced snow would be required after the initial coverage for a seasonal total of 1.5 coverages.
3. On a dry year, it is estimated one additional full application of machine-produced snow would be required after the initial coverage for a seasonal total of two coverages.

### **Snowbowl Sub-area**

The reader is referred to Table 3H-6 for this discussion of hydrologic impacts to the Snowbowl Sub-area.

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<sup>315</sup> Sno.matic, 2003

### *Average Precipitation Years*

The Proposed Action would likely have the net effect of increasing groundwater recharge in the areas where snowmaking would be implemented. In average years, the proposed snowmaking operations in Alternative 2 are estimated to contribute approximately 187 AF of additional recharge within the Snowbowl sub-area. This snowmaking contribution represents an increase of approximately 14 percent when compared to the average volume of natural groundwater recharge estimated to occur in this very limited area of San Francisco Mountain.

### *Low Precipitation Years*

In dry years, when snowmaking is increased, the available water for recharge is substantially decreased due to increased atmospheric losses from evaporation, evapotranspiration, and sublimation in the watershed; snowmaking would contribute a larger fraction of the total recharge, although less water in absolute terms. Table 3H-6 indicates that in the dry-year precipitation analysis, approximately 40 AF of additional water is estimated to be available for recharge due to snowmaking operations; this volume represents a 30-percent increase in recharge from estimated natural ground water recharge.

### *Above-Average Precipitation Years*

In wet years, when snowmaking is not as necessary, much more snowmelt is available to recharge and it contains a substantially smaller proportion of machine-produced snow than in dry and average years. Estimated water losses would comprise a smaller fraction of the available precipitation; therefore, the additional estimated recharge contributed from snowmaking is a smaller fraction of the total estimated recharge. In the wet-year case, approximately 106 AF of additional water is estimated to be available for recharge due to snowmaking operations; this volume represents a four percent increase in recharge from estimated natural ground water recharge.

**Table 3H-6  
Projected Hydrologic Conditions in the Snowbowl Sub-Area**

	Area (Acres)	Pptn (AF/yr)	Snow- making (AF/yr)	Watershed Loss (AF/yr)	Recharge (AF/yr)	Diff. in Recharge compared to Existing (AF/yr)	Projected Groundwater Concentrations			Projected Mass Loading		
							TDS (mg/L)	TOC (mg/L)	Nitrogen (mg/L)	TDS (kg/ha)	TOC (kg/ha)	Total N (kg/ha)
<b>DRY YEAR</b>												
Existing Conditions	1,060.8	1,190.2	0	1,057.5	132.6	--	26.9	0.0	4.5	10.3	0.0	1.7
Alternative 2	1,060.8	1,190.2	446	1,464.1	172.1	+39.5	901.9	20.7	19.0	445.9	10.3	9.4
Alternative 3	1,060.8	1,190.2	0	1,033.8	156.4	+23.8	22.8	0.0	3.6	10.3	0.0	1.7
<b>AVERAGE YEAR</b>												
Existing Conditions	1,060.8	2,892.0	0	1,545.6	1,346.4	--	6.4	0.0	1.1	24.9	0.0	4.2
Alternative 2	1,060.8	2,892.0	334	1,692.9	1,533.2	+186.8	79.7	1.7	2.3	351.2	7.7	9.9
Alternative 3	1,060.8	2,892.0	0	1,522.9	1,369.1	+22.7	6.3	0.0	1.1	24.9	0.0	4.2
<b>WET YEAR</b>												
Existing Conditions	1,060.8	4,408.0	0	1,604.4	2,803.6	--	4.7	0.0	0.8	38.0	0.0	6.3
Alternative 2	1,060.8	4,408.0	223	1,681.7	2,909.9	+106.3	30.6	0.6	1.2	255.8	5.1	10.2
Alternative 3	1,060.8	4,408.0	0	1,581.9	2,826.1	+22.5	4.7	0.0	0.8	38.0	0.0	6.3

Notes: Assumes reclaimed water has: 340 mg/L TDS, 8 mg/L TOC, and 6 mg/L total nitrogen  
 Assumes precipitation has: 3 mg/L TDS, 0 mg/L TOC, and 0.5 mg/L total nitrogen  
 Assumes all solute mass is conserved; therefore, solutes are concentrated as watershed losses occur

Pptn = precipitation      TDS = total dissolved solids      mg/L = milligrams per liter      AF/yr = acre feet per year      TOC = total organic carbon      kg/ha = kilograms per hectare  
 N = Nitrogen

Agassiz Sub-Watershed

For the Agassiz sub-watershed (Table 3H-7), the proposed snowmaking operations are estimated to contribute limited additional groundwater recharge in average, dry, or wet years. Compared to existing conditions, the volume of recharge for Alternative 2 is estimated to be roughly 17 AF (three percent) greater in an average year, essentially no change in a dry year, and 11 AF (one percent) greater in a wet year.

**Table 3H-7  
Projected Hydrologic Conditions in the Agassiz Sub-Watershed**

	Area (Acres)	Pptn (AF/yr)	Snow-making (AF/yr)	Watershed Loss (AF/yr)	Recharge (AF/yr)	Diff. in Recharge Over Existing (AF/yr)	Projected Groundwater Concentrations		
							TDS (mg/L)	TOC (mg/L)	Total N (mg/L)
<b>DRY YEAR</b>									
Existing Conditions	768.8	790.1	0	790.1	0.0	--	NA	NA	NA
Alternative 2	768.8	790.1	40	830.2	0.0	0	NA	NA	NA
Alternative 3	768.8	790.1	0	790.1	0.0	0	NA	NA	NA
<b>AVERAGE YEAR</b>									
Existing Conditions	768.8	1,919.9	0	1,240.1	679.9	--	8.5	0.0	1.4
Alternative 2	768.8	1,919.9	30	1,276.7	697.3	+17.4	22.9	0.4	1.6
Alternative 3	768.8	1,919.9	0	1,260.6	683.5	+3.6	8.4	0.0	1.4
<b>WET YEAR</b>									
Existing Conditions	768.8	2,926.3	0	1,283.9	1,642.4	--	5.3	0.0	0.9
Alternative 2	768.8	2,926.3	20	1,350.9	1,652.9	+10.5	9.4	0.1	1.0
Alternative 3	768.8	2,926.3	0	1,330.5	1,646.0	+3.6	5.3	0.0	0.9

Notes: Assumes precipitation has: 3 mg/L TDS, 0 mg/L TOC, and 0.5 mg/L total nitrogen  
Assumes all solute mass is conserved; therefore, solutes are concentrated as watershed losses occur

Pptn = precipitation      TDS = total dissolved solids      mg/L = milligrams per liter      AF/yr = acre feet per year  
TOC = total organic carbon      kg/ha = kilograms per hectare      N = Nitrogen

Hart Prairie Watershed

As noted, indirect effects from snowmaking activities associated with the Proposed Action may potentially impact the surrounding areas down slope from the Snowbowl SUP area, including: 1) Hart Prairie, with four small springs and associated seeps and a number of shallow wells yielding groundwater from shallow perched aquifers; and 2) along the southwest flank of Agassiz Peak, where four small springs yield groundwater from shallow perched aquifers. Hart Prairie is the primary area of indirect effects because it is in the watershed that receives infiltration from more than 90 percent of the snowmaking areas.

The nearest known groundwater users and potential receptors are the private wells, springs, and stock tanks in Hart Prairie that are more than 3,500 feet downgradient from the area of proposed snowmaking. The reader is referred to Table 3H-8. Implementation of Alternative 2 may contribute a minor amount of groundwater to underlying aquifers including the perched aquifers in the Hart Prairie watershed. Because recharge infiltrates rapidly to underlying aquifers, and the local recharge near the springs is projected to be sufficient to provide the observed discharge, it

is not known if any groundwater recharge from the areas of snowmaking reaches the shallowest perched aquifers down slope at the springs in Hart Prairie. However, to the extent it does contribute to discharge at the springs, the additional recharge from Alternative 2 would benefit groundwater users and other potential receptors, such as wildlife and vegetation that are supported by the shallow perched groundwater system and small springs and associated seeps. The overall effect, however, is not expected to be major due to the small incremental increase to water supply, which is on the order of five percent of the projected existing Hart Prairie groundwater recharge, in years of average precipitation.

#### *Average Precipitation Year*

In an average precipitation year, the proposed snowmaking activity in the Proposed Action is projected to contribute approximately 187 AF of additional groundwater recharge from the Snowbowl sub-area within the Hart Prairie watershed. This recharge contribution represents an increase of more than four percent to the volume of groundwater recharge projected to occur due to infiltration of natural precipitation in the Hart Prairie watershed in average precipitation years.

#### *Below Average Precipitation Year*

In the dry-year case, approximately 39 AF of additional groundwater recharge is attributed to Alternative 2 activities; this volume is an increase of roughly 17 percent from the projected existing conditions.

#### *Above Average Precipitation Year*

In the wet-year case, roughly 198 AF of additional recharge is projected to occur in the Hart Prairie Watershed; this volume is an increase of roughly two-percent from existing conditions.

**Table 3H-8  
Projected Hydrologic Conditions in the Hart Prairie Watershed**

	Area (Acres)	Pptn (AF/yr)	Snow- making (AF/yr)	Watershed Loss (AF/yr)	Recharge (AF/yr)	Diff. in Recharge Over Existing (AF/yr)	Projected Groundwater Concentrations		
							TDS (mg/L)	TOC (mg/L)	Total N (mg/L)
<b>DRY YEAR</b>									
Existing Conditions	4,249.9	4,353.8	0	4,125.5	228.3	--	57.2	0.0	9.5
Alternative 2	4,249.9	4,353.8	446	4,532.1	267.7	31.1	615.2	13.3	18.1
Alternative 3	4,249.9	4,353.8	0	4,101.8	252.1	23.8	50.2	0.0	8.6
<b>AVERAGE YEAR</b>									
Existing Conditions	4,249.9	10,579.1	0	6,295.4	4,283.7	--	7.4	0.0	1.2
Alternative 2	4,249.9	10,579.1	334	6,442.6	4,470.5	186.8	32.5	0.6	1.6
Alternative 3	4,249.9	10,579.1	0	6,272.7	4,306.4	22.7	7.4	0.0	1.2
<b>WET YEAR</b>									
Existing Conditions	4,249.9	16,124.5	0	6,583.5	9,540.9	--	5.1	0.0	0.8
Alternative 2	4,249.9	16,124.5	223	6,569.2	9,738.9	198.0	12.8	0.2	1.0
Alternative 3	4,249.9	16,124.5	0	6,561.0	9,563.4	22.5	5.1	0.0	0.8

Notes: Assumes precipitation has: 3 mg/L TDS, 0 mg/L TOC, and 0.5 mg/L total nitrogen  
Assumes all solute mass is conserved; therefore, solutes are concentrated as watershed losses occur

AF/yr = acre feet per year  
N = nitrogen

TDS = total dissolved solids  
mg/L = milligrams per liter

Pptn = precipitation

TOC = total organic carbon

### **Alternative 3**

Proposed vegetation and soil disturbance associated with Alternative 3 would result in a slight calculated difference in watershed losses compared to the existing conditions. In the Snowbowl sub-area, the proposed Alternative 3 improvements are projected to result in approximately one to two percent decrease in atmospheric losses and a corresponding increase in recharge in an average precipitation year. Overall, changes of this limited magnitude are not expected to have any consequential impacts on environmental or hydrologic conditions with respect to the water resource issues.

#### Snowbowl Sub-Area

Without the addition of snowmaking, Alternative 3 would contribute less additional ground water recharge than the Proposed Action in average, dry, and wet years. As indicated Table 3H-6, in the average year analysis, roughly 23 AF of additional water is estimated to be available for recharge; this volume represents a 1.7-percent increase in recharge from estimated existing conditions. Increases during dry and wet years are estimated to be about 18 percent and about one percent, respectively.

#### Aqassiz Sub-Watershed

The facilities improvements proposed without snowmaking in Alternative 3 have about the same effect as Alternative 2 on estimated volumes of groundwater recharge in dry and wet years (Table 3H-7), and provide less recharge than Alternative 2 in an average year.

## **Water quality and use of reclaimed water in the snowmaking system.**

*The application of Class A reclaimed water for snowmaking within the SUP area may affect water quality within the receiving sub-watersheds.*

### Indicators:

#### Analysis of Potential Water Quality Effects Of Using Reclaimed Water in the Snowmaking System to Downgradient Users

### **Alternative 1 – No Action**

Under the No Action Alternative, no new construction or watershed modification would occur. Present hydrogeologic conditions would effectively continue during the planning horizon of this document.

### **Alternative 2 – The Proposed Action**

Recharge estimates from simulated hydrologic conditions for average, dry, and wet years were used to project effects on water quality from snowmaking operations. Projected concentrations of total dissolved solids (TDS), total organic carbon (TOC), and total nitrogen in groundwater recharge are given in tables 3H-6 and 3H-7. Projected concentrations were calculated as the weighted average of reported concentrations of these solutes in reclaimed water from the Rio de Flag WRF and precipitation in northern Arizona. Solute concentrations in the source waters are conserved in the mixing calculation and are assumed to be completely retained in the resulting groundwater recharge. Therefore, it is assumed that, although water is lost from the source waters via evapo-sublimation, all of the solute mass in the source waters remains in the resulting recharge. Table 3H-6 also shows the projected mass loading of solutes in annual groundwater recharge within the Snowbowl Sub-area expressed as kilograms per hectare (kg/ha).

This analysis projects solute concentrations only in the water *available* for groundwater recharge. It does not project the absolute solute concentrations in groundwater *resulting from* recharge because: 1) it neglects the complex biogeochemical processes that occur and result in losses and uptake of solutes during interaction with vegetation, soils, and underlying sediments; and 2) there are no data to estimate the seasonal volumes of perched groundwater available to commingle and blend with the recharge water. It is well documented that nutrients and dissolved organic matter are assimilated to varying degrees during infiltration and percolation of water through soil and sediments. Therefore, this analysis provides a conservative, semi-quantitative assessment of potential dilution and attenuation, over large areas, of solute concentrations from reclaimed water when combined with natural precipitation in groundwater recharge and the available amounts of solutes for uptake or migration into groundwater.

TDS was evaluated as a general indicator of inorganic water chemistry and potential changes that may occur in concentrations of inorganic solutes when combined with snowmelt from artificial snow and natural precipitation in the study area watersheds. For the purpose of water quality projections, the TDS concentration in reclaimed water was assumed to be a constant 340 milligrams per liter (mg/L). Actual TDS concentrations in reclaimed water from the Rio de Flag WRF are somewhat variable depending on several factors, including the water sources used for municipal supply by the City of Flagstaff. The City provided TDS concentrations detected in laboratory chemical analyses for nine samples of reclaimed water obtained from the Rio de Flag

WRF from 1993 to 2001. The TDS concentrations ranged from 320 to 360 mg/L; average concentration was 341 mg/L. While data is insufficient to precisely assess seasonal variability, there appears a trend toward higher TDS concentrations in summer than in winter.

Reported TDS concentrations available for natural precipitation in northern Arizona are sparse, and there is no such data for the Snowbowl area. However, data for chemical quality of natural precipitation are available for snow samples obtained from the Mogollon Rim in north-central Arizona and for snow and rainfall samples obtained at the South Rim of Grand Canyon as part of the National Atmospheric Depositional Program.<sup>316</sup> Based on these data, the TDS concentration in natural precipitation at the Snowbowl was assumed to be 3 mg/L.

TOC was evaluated as a general indicator of the dissolved component of organic matter and wastewater compounds and potential changes that may occur in TOC concentrations when combined with natural precipitation. This evaluation did not consider the interaction of dissolved TOC in soils and the subsurface environment which may remove organics through complexation or other physical and chemical processes. TOC is considered in this analysis because it is becoming more common as a surrogate measure of gross organic content and as a practical indicator of the presence of many unidentified and unregulated residual organic contaminants in reclaimed water.<sup>317</sup> For the purpose of water quality projections, TOC concentration in reclaimed water was assumed to be a constant 8.0 mg/L. Actual TOC concentration in reclaimed water is variable. TOC concentrations were detected in laboratory chemical analyses for 19 samples of reclaimed water obtained from the Rio de Flag WRF from 1993 to 2001. The TOC concentrations ranged from 1.7 to 17 mg/L; average concentration was 7.8 mg/L. Data are insufficient to assess seasonal variability

Natural precipitation in Alpine environments is not expected to contain significant concentrations of TOC. Studies<sup>318</sup> indicate that small concentrations (in the magnitude of 20 micrograms per liter) of the organic ions, acetate and formate, were detected in snow throughout the Mogollon Rim and larger concentrations have been reported for snow near major population centers. For the purpose of water quality projections, the TOC concentration in precipitation in the Snowbowl area was assumed to be zero.

Total nitrogen was evaluated as a general indicator of nutrient loading from the presence of nitrogen- and phosphorous-based compounds in reclaimed water and potential changes in concentration when combined with natural precipitation. This evaluation did not consider biological uptake, bacterial decomposition, or other nitrogen removal mechanisms. For the purpose of water quality projections, total nitrogen concentration in reclaimed water was assumed to be 6.0 mg/L. Actual total nitrogen concentration in reclaimed water from the Rio de Flag WRF is measured monthly and reported in quarterly SMRFs submitted to ADEQ for APP compliance. In 2002, total nitrogen concentration ranged from 4.1 to 6.6 mg/L in samples obtained from the reclaimed water. Most of the nitrogen detected was in the form of nitrate, which ranged in concentration from 3.1 to 5.0 mg/L (as nitrogen). Smaller amounts of nitrogen are present as ammonia and other inorganic and organic nitrogen compounds.

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<sup>316</sup> NADP, 2003

<sup>317</sup> McEwen and Richardson, 1996; Crook and Sakaji, 2000

<sup>318</sup> Barbaris and Betterton, 1994

Nitrogen in the form of nitrate and ammonium ions is present at trace concentrations in natural precipitation. According to 2002 NADP precipitation data, the average nitrate and ammonium concentrations were 1.26 mg/L and 0.31 mg/L, respectively. Data collected at the NADP site at the South Rim of Grand Canyon indicates an increasing trend in nitrogen ion species since testing began in 1981. Based on the 2002 data, the total nitrogen concentration in precipitation was assumed to be 0.5 mg/L (as nitrogen).

The proposed implementation of Alternative 2 and additional groundwater recharge associated with use of reclaimed water for snowmaking would increase the concentration of solutes in groundwater. Groundwater recharge that occurs in areas of proposed snowmaking would contain larger concentrations of TDS, TOC, total nitrogen, and other dissolved constituents from the reclaimed water than groundwater recharge from natural precipitation. However, the solute concentrations would be decreased substantially from concentrations in the reclaimed water by commingling and blending with natural precipitation. For example, projected average concentrations of TDS and TOC in recharge in the Snowbowl sub-area, where more than 90 percent of the snowmaking activity is proposed to take place, would be reduced by a factor of four from reclaimed water concentrations.

The additional solute contribution from the reclaimed water used for snowmaking would increase the concentration of solutes in groundwater recharge that occurs in the Hart Prairie watershed. However, the water quality impact to downgradient groundwater users in Hart Prairie can not be projected with any certainty. As described above, it is not known if any groundwater recharge originating in the vicinity of the Snowbowl and areas of proposed snowmaking contributes to the discharge from springs in Hart Prairie; most or all of it may infiltrate to the deeper perched aquifers in Hart Prairie before it reaches the spring areas. It is expected, though neglected in the quantitative projections of impact, that certain nutrients and dissolved organic constituents in reclaimed water would be removed through physical, chemical, and biological uptake during infiltration in surficial soils and underlying sediments. It is also clear there would be substantial attenuation of solute concentrations as the reclaimed water in artificial snow combines with natural precipitation, infiltrates from the area of snowmaking, and blends with other groundwater recharge and groundwater in storage as it moves downgradient to the underlying perched aquifers. Based on calculations of blending and resulting chemical quality of water available for groundwater recharge in the Hart Prairie watershed, there may be more than an order of magnitude decrease in concentration of solutes, such as TDS and TOC, from the reclaimed water used in snowmaking to the resulting groundwater recharge in the Hart Prairie area. Consequently, although there could be potential increases of dissolved salts and other constituents of reclaimed water in groundwater downgradient from the areas of snowmaking, the water quality impact is not likely to be significant due to the substantial extent of recharge that occurs in all but the driest climatic conditions throughout Hart Prairie and the upper sub-watersheds compared to that derived from proposed snowmaking.

### Snowbowl Sub-area

Table 3H-1 gives the TDS, TOC, and total nitrogen concentrations and mass loading projected for groundwater recharge in the Snowbowl sub-area for Alternative 2. For an average precipitation year, the projected TDS concentration is about 80 mg/L, TOC concentration is 1.7 mg/L, and total nitrogen concentration (as nitrogen) is 2.3 mg/L. Average precipitation yields an

estimated mass loading of about 350 kg/ha for TDS, 8.0 kg/ha for TOC, and 10 kg/ha for total nitrogen (as nitrogen).

It is important to re-emphasize that these projections are neither absolute nor anticipated concentrations in groundwater because: 1) varying biological, chemical, and physical processes modify solute concentrations as groundwater interacts with vegetation, soils, and subsurface sediments; and 2) there are no data to estimate seasonal volumes of perched groundwater available to commingle and blend with the recharge water. The practical value of these projections is to provide a semi-quantitative assessment of the decrease in solute concentrations in reclaimed water when combined with natural precipitation for groundwater recharge. In this case, it is shown that concentrations of TDS, TOC, and total nitrogen in reclaimed water are decreased substantially by factors ranging from about two to four prior to being further diluted by groundwater in the subsurface and decreased by the other processes described above. In this manner, a proper perspective can be developed for the relative environmental impact of the use of reclaimed water for snowmaking.

For dryer-than-average years, snowmaking would be intensified and atmospheric water losses would be higher, and these conditions would have the effect of increasing solutes in the water infiltrating as recharge. Concurrently, the drier conditions would limit the volume of water available for recharge. In the case of very dry conditions, such as is assumed herein for the range of climatic conditions, precipitation would be very limited and the percolation of groundwater in the unsaturated zone downward to the perched aquifers would be impeded. In very dry climatic conditions, the mobility of dissolved solutes in the unsaturated zone would be effectively slowed until wetter climatic conditions and greater flux of infiltrated water subsequently could remobilize the accumulated solutes. In wetter-than-average conditions, the converse would be true. Increased precipitation and associated groundwater recharge would substantially decrease solute concentrations in the unsaturated zone and eventually in the perched groundwater zones. The net effect of changes in groundwater recharge from alternating dry, average, and wet climatic conditions would be to dilute and attenuate the flux of solute concentrations reaching the underlying perched aquifer system.

#### Agassiz Sub-watershed

Table 3H-7 provides projected solute concentrations in groundwater recharge in the Agassiz sub-watershed. Inspection of this table indicates that the TDS, TOC, and total nitrogen concentrations are projected to be about 23 mg/L, 0.3 mg/L, and 1.6 mg/L, respectively, in average-year precipitation conditions. Although these concentrations are larger than comparable concentrations assumed for water available for groundwater recharge from natural precipitation, the concentrations of TDS and TOC are decreased by more than an order of magnitude from concentrations in the reclaimed water.

#### Hart Prairie Watershed

Tables 3H-6 and 3H-8 provide the projected solute concentrations in the water available for groundwater recharge in the Snowbowl sub-area and Hart Prairie watershed. As demonstrated by the projected groundwater recharge, the combined area that comprises the Hart Prairie watershed contributes more natural precipitation to recharge and consequently reduces the projected solute concentrations. The groundwater from this combined area is calculated to have

a bulk concentration of about 33 mg/L TDS, 0.6 mg/L TOC and 1.6 mg/L total nitrogen, assuming groundwater recharge from the Snowbowl sub-area blends with recharge in the surrounding Hart Prairie watershed. The projected values illustrate that resulting concentrations of TDS and TOC are more than an order of magnitude smaller than those in the reclaimed water. The projected total nitrogen concentration is not decreased to the same degree due to the input of total dissolved nitrogen compounds present in natural precipitation.

Due to the distant location of the four small springs downgradient from the Agassiz sub-watershed (Figures 3H-1 and 3H-3) and limited overall change in solute concentrations (Table 3H-7), the anticipated indirect effects to water quality at these springs from Alternative 2 are considered to be negligible.

### **Alternative 3**

The facilities improvements proposed in Alternative 3 have a less significant effect on projected water quality impacts to groundwater recharge. Projected water quality resulting from Alternative 3 is very similar to that projected for existing conditions discussed with Alternative 1.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

The temporal bounds of the cumulative effects analysis for watershed resources extends from the initial development of the Snowbowl in 1938 into the foreseeable future for which this and other projects can be expected to continue within and surrounding the Snowbowl SUP area.

#### **Spatial Bounds**

The physical extent of this cumulative effects analysis comprises the three primary watersheds depicted on Figure 3H-1 (the Hart Prairie watershed, Agassiz sub-watershed, and Snowbowl sub-area) as well as portions of the surrounding Kachina Peaks Wilderness area.

### **Past, Present, and Reasonably Foreseeable Future Actions**

Past, present, and reasonably foreseeable activities having potential to cumulatively affect watershed resources include:

1. San Francisco Mountain Mineral Withdrawal
2. Bebb's Willow Restoration Project
3. Transwestern Lateral Pipeline Project
4. Inner Basin Water Pipeline Maintenance
5. Private Land Development
6. Miscellaneous Recreational Uses
7. Inner Basin Well Field

8. Use of City of Flagstaff Reclaimed Water
9. City of Flagstaff Water Well Fields

Appendix C includes the full list of past, present and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

### **Alternative 1 - No Action**

None of the identified past, present or reasonably foreseeable activities would combine with the effects anticipated under the No Action Alternative to create any major cumulative watershed resource effects. (Refer to Proposed Action discussion.)

### **Alternative 2 – The Proposed Action**

As indicated below, none of the identified past, present or reasonably foreseeable activities would combine with the effects anticipated under the Proposed Action to create any major cumulative watershed resource effects.

#### **San Francisco Mountain Mineral Withdrawal**

The Peaks and surrounding area was withdrawn from availability for mineral entry in 2000. This action precludes individuals and entities from staking a mineral claim in preface to planned extraction activities within the withdrawn area. This action has and will provide added protection for soil and watershed resources by limiting potential ground disturbing activities associated with mining.

#### **Bebbs Willow Restoration Project**

Activities have been undertaken by The Nature Conservancy, Northern Arizona University, and the Forest Service to improve ecosystem conditions of the Bebbs willow-wet meadow community located in Hart Prairie through prescribed burning and tree thinning. The objective of the restoration project is to improve the hydrologic function in the 170-acre Fern Mountain Botanical Area by increasing groundwater availability in the shallow perched aquifer and springs which support the riparian habitat. The impacts from the prescribed burning and tree thinning are not considered to be long-term or major with respect to cumulative watershed impacts when analyzed cumulatively with the alternatives addressed within this EIS.

As described in the analysis of indirect effects, the snowmaking proposed in Alternative 2 may contribute a minor amount of groundwater to underlying aquifers, including the perched aquifers in the Hart Prairie watershed. The additional groundwater recharge associated with the proposed snowmaking, which is around four percent of the volume of average groundwater recharge projected to occur, is not sufficient to recruit new willow in Hart Prairie. As mentioned previously, research conducted by NAU in the Fern Mountain Botanical Area and Homestead at Hart Prairie indicate it would require a minimum of an eight percent increase in recharge from average conditions to create minimum conditions favorable to recruit and maintain new willow seedlings.<sup>319</sup>

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<sup>319</sup> Gavin, 1998

### Transwestern Lateral Pipeline Project

This project is not within the spatial or temporal bounds of this cumulative effects analysis related to potential watershed effects; therefore, there are no cumulative effects to watershed resources associated with this project.

### Inner Basin Water Pipeline Maintenance

This project is not within the spatial or temporal bounds of this cumulative effects analysis related to potential watershed effects; therefore, there are no cumulative effects to watershed resources associated with this project.

### Private Land Development

Private land development within the watershed of the proposed Snowbowl improvements may lead to localized water resource impacts. The primary concern is associated with septic system discharges from the Snowbowl combined with those from a number of scattered private residences in lower Hart Prairie. Septic waste disposal has potential to cause local groundwater bacterial contamination, particularly where shallow groundwater may interfere with proper leach field function. In areas that are more developed, such as Fort Valley, there have been occasional, but major, impacts of enteric bacteria and other septic wastes to shallow wells.<sup>320</sup> Due to the low-density development in the Hart Prairie area, the overall concern for fecal contamination in the watershed is generally low. Private land development in the Hart Prairie watershed is presently limited and likely to remain low density due to Coconino County zoning restrictions and availability of land and water supplies. Additionally, because these homes do not have power or winter road access, they are primarily used during the summer months when wastewater discharges from the Snowbowl are at their lowest levels. Therefore, the overall effect of potential water quality degradation from area-wide septic systems is expected to be negligible. The affects of septic waste disposal may, however, result in localized impacts within the sub-watersheds.

Other land development concerns include land disturbance from road and home-building, waste products from domestic livestock, and groundwater withdrawal from private wells. Due to the low-density of existing and planned private land developments within the analysis area, impacts from such development are considered to be inconsequential with respect the cumulative watershed impacts.

### Miscellaneous Recreational Uses

Recreational use in the Hart Prairie area is moderate and will probably increase in the future. Individuals and groups use the area for recreational activities including hiking, camping, horseback riding, bicycling, and cross-country skiing. The recreational land use may cause loss of vegetative ground cover, soil compaction, and biological pollution leading to possible watershed effects. Generally, such disturbances are dispersed, localized, and insignificant with respect to their contribution to cumulative watershed impacts. Additionally, the Forest Service has developed best management practices to mitigate current and future recreational land uses.

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<sup>320</sup> Arizona Department of Environmental Quality, 1997

### Inner Basin Well Field

The Inner Basin well field for the City of Flagstaff lies outside the proposed areas of snowmaking and associated snowmelt runoff from the proposed Snowbowl operations. Due to the spatial separation of these two areas, both in distance and hydrogeologic features, activities at the Snowbowl can not impact the perched aquifers that supply groundwater within the Inner Basin to city wells.

### Use of City of Flagstaff Reclaimed Water

Reclaimed water diverted to the Snowbowl would not be available for other reuse, such as irrigation of turf and dust suppression, within the City of Flagstaff. However, City of Flagstaff Utilities Department records indicate there are only limited demands for reclaimed water during the winter months when the proposed diversion to the Snowbowl would occur. For instance, the Rio de Flag WRF produces, on average, approximately 1.9 million gallons of reclaimed water per day but diverts only around 55,000 gallons of reclaimed water per day for reuse during the period of November through February. Due to limited irrigation demands in the winter months, reuse is not projected to be significant in the future. Therefore, no major cumulative effects were identified for Snowbowl diversion of reclaimed water on water reuse in Flagstaff.

### City of Flagstaff Water Well Fields

Public comments submitted as a portion of this analysis process indicated concerns regarding the consumptive use of reclaimed water for snowmaking and the potential impact on recharge to the regional C-aquifer in Flagstaff. The primary concern expressed within the public comments is that the use of reclaimed water for snowmaking would reduce winter discharges of treated wastewater to the effluent-dependent waters of the Rio de Flag, which directly recharges the regional C-aquifer. The comments note that water reuse for snowmaking would result in substantially larger losses due to sublimation and evaporation at the Snowbowl and, therefore, substantially less water would be available for recharge to the regional aquifer.

As previously discussed, the right to the use of reclaimed water in Arizona was established by the 1989 decision of the Arizona Supreme Court in the case of *Arizona Public Service v. Long*.<sup>321</sup> In this case, the Arizona Supreme Court determined that effluent is neither surface water nor groundwater and cities can put the reclaimed water to any reasonable use they see fit, within existing legislative restrictions. Based upon this decision, the authority of the city to provide reclaimed water to the Snowbowl is not subject to decision by the Forest Service and is therefore not within the jurisdictional purview of this analysis.

Although this issue extends well beyond the scope of this EIS, data generated during the preparation of this analysis provides a quantitative basis to assess these public comments. The following discussion is provided as general information but will not be specifically considered in selecting an alternative.

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<sup>321</sup> McGinnis, 1990

As noted by Bills et al.,<sup>322</sup> some chemical constituents associated with effluent have been detected at some wells along the Rio de Flag drainage in east Flagstaff. These data, together with increases in groundwater storage in the Rio de Flag area reported by Bills et al., indicate that recharge of effluent occurs in the Rio de Flag area. However, effluent recharge has occurred in this area, particularly in the Fox Glenn area and the Country Club Golf Course reservoirs, long before the Rio de Flag WRF was built. There are presently no data available to provide conclusive estimates for the amount or rate of recharge of treated effluent from the Rio de Flag WRF. Estimates given by Schwartzman and Springer<sup>323</sup> assume that all discharged effluent that escapes evapotranspiration contributes recharge to the regional aquifer; this assumption overestimates the recharge because vadose zone processes and perched groundwater zones are likely to intercept some of the recharge, even where fractures and sinkholes occur along the Rio de Flag. This is not to say that rapid recharge does not occur along fractures in some areas, but the assumption that all of it becomes recharge is not accurate.

The potential changes in recharge to the regional aquifer, assuming effluent discharged to from the Rio de Flag WRF provided such recharge with only evapotranspiration losses, are summarized in Table 3H-9.

**Table 3H-9  
Comparative Groundwater Recharge Estimates  
Analysis of Four-Month Projected Recharge to the Regional Aquifer  
as based on Average Year Precipitation**

	Existing Conditions (AF)	Proposed Action (AF)	Change in Recharge (AF)
Treated effluent released to the Rio de Flag <sup>a</sup>	632	268	
Evapotranspiration loss from Rio de Flag <sup>b</sup>	10	4	
Projected recharge from Rio de Flag	622	264	-358
Reclaimed water use for snowmaking <sup>c</sup>	0	364	
Projected groundwater recharge from snowmaking <sup>d</sup>	0	204	204
<i>Net Change In Recharge</i>			-154

<sup>a</sup> Amount of treated effluent released to the Rio de Flag is based on 2002 monthly discharges for the four-month period from November through February reported by the City of Flagstaff Utilities Department.

<sup>b</sup> Estimated evapotranspiration losses are extrapolated from calculations for evapotranspiration in the water budget prepared by Schwartzman and Springer (2002).

<sup>c</sup> Estimates for reclaimed water requirements for snowmaking are provided for average-year precipitation conditions by Snomatic Controls and Engineering, Inc. (2003).

<sup>d</sup> Estimates of groundwater recharge are derived from modeling results (Resource Engineering, Inc., 2003) for average-year precipitation in the combined Snowbowl sub-area and Agassiz sub-watershed.

Based on data developed in this study and as noted in Table 3H-9, proposed snowmaking would result in an estimated net average reduction in groundwater recharge to the regional aquifer of 154 AF per year. This calculated reduction represents slightly less than two percent of the City of Flagstaff's total annual water production (as averaged over the 10 year period from 1992 to 2001).

<sup>322</sup> Bills, D.J., et al., 2000

<sup>323</sup> Schwartzman, P., and Springer, A., 2002

The assumed change in average potential recharge to the C-aquifer in east Flagstaff (364 AF per year or 226 gpm) is calculated to cause the equivalent of 20 to 25 feet of additional water level drawdown in the nearest future production well, the Rio well, after five years, but less than one foot at the other existing production wells in east Flagstaff. This calculation is made using the Theis equation with an average transmissivity of 3,000 gallons per day per foot (average of reported values for immediate area), storage coefficient of 0.05 and 0.1 (based on data for immediate area), and distances from the flowing reach of the effluent-dependent Rio de Flag of 0.25 mile for the Rio well and 1.9 miles for the Fox Glenn well. It is recognized that the Theis equation is based on porous media, not fractured media; however, this equation is commonly used for such analyses despite its limitations and is appropriate for this case. For perspective, the Arizona Department of Water Resources criterion for excessive water level drawdown impact on existing wells due to pumping at new wells in an Active Management Area, such as Prescott, is 10 feet of drawdown in the first five years of pumping.

Based on these analyses, the cumulative impact from Snowbowl diversion of treated effluent on the water available for recharge in the Rio de Flag drainage in the Flagstaff city limits is considered to be negligible for overall change in aquifer recharge and for C-aquifer wells more than ½ to ¾ mile from the effluent flow in the Rio de Flag. Cumulative impact is considered to be moderate for C-aquifer wells nearer to the effluent flow in the Rio de Flag. Therefore, there is negligible to moderate cumulative watershed impact identified for this issue in relation to the alternatives analyzed.

### **Alternative 3**

None of the identified past, present or reasonably foreseeable activities would combine with the effects anticipated under Alternative 3 to create any major cumulative watershed resource effects.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

No irreversible or irretrievable effects or commitments to watershed resources are anticipated as a result of implementation any of the alternatives.

# 3I. SOILS AND GEOLOGY

## SCOPE OF THE ANALYSIS

The proposed application of machine-produced snow may have the effect of increasing total water availability, potentially leading to an increase in the duration, intensity, and/or quantity of total annual snowmelt. Therefore, this analysis of soils and geology was limited to existing and proposed areas of disturbance within the Snowbowl SUP area, as well as terrain proposed to receive snowmaking coverage. Eight sub-watersheds in the vicinity of the SUP area having potential to change under the Proposed Action were analyzed in order to make an assessment of current and projected annual water balance for use in addressing the indicators in the Environmental Consequences section.

## EXISTING CONDITIONS

### CLIMATE

The climate of the San Francisco Peaks, similar to other areas in the state of Arizona, is characterized by a cyclic regime of winter precipitation, spring drought, summer precipitation, and fall drought.<sup>324</sup> Precipitation typically arrives from the northwest in the winter, while its origin is from the southeast in the summer. Winter precipitation, frequently snow at higher elevations, is associated with frontal storms moving into the region from the Pacific Northwest. Surface heating in the winter is less pronounced than in the summer, thus wintertime upslope air movement is comparatively slow. Wintertime cloud cover is common, and precipitation is frequently widespread and relatively low in intensity, promoting infiltration and groundwater recharge.

The primary source of moisture for summer rains is the Gulf of Mexico. This moisture moves into the highlands from the southeast, passes over highly heated and mountainous terrain, rises rapidly, cools, and condenses. Summer storms, primarily convectional, are often intense and local rather than widespread. As a result, summer precipitation creates much less groundwater recharge when compared to the winter season. Summer rains typically begin in early July, breaking the prolonged spring drought and provides relief from the hot weather of June and July.

Winter precipitation is more variable than summer rainfall in amount and time of occurrence from year-to-year. However, yearly variations in precipitation generally decrease with increases in elevation. Winter precipitation is generally responsible for the majority of the annual recharge produced in the region. Spring drought is often more detrimental to most plants and animals in the region than the fall drought, due to the higher temperatures and wind conditions during the beginning of the growing season.

Several weather stations are located near the Snowbowl, but no single station adequately characterizes the Snowbowl's climatic regime. In order to arrive at a site-specific set of climate variables for the purposes of modeling the annual water balance at Snowbowl, several sources were examined. Spatially-distributed precipitation estimates from the Parameter-elevation

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<sup>324</sup> Beschta et al., 1974; Campbell et al., 1982

Regressions on Independent Slopes Model (PRISM)<sup>325</sup> were used to characterize the average-year monthly distribution of precipitation for the project area. PRISM is a system that uses point data and a digital elevation model (DEM) to generate gridded estimates of climate parameters. PRISM is well-suited to mountainous regions, because the effects of terrain on climate play a central role in the model's conceptual framework. PRISM provides a robust methodology for inference of the average-year monthly climate distribution. Dry and wet year climate parameters were inferred from the average-year PRISM using modifiers computed from nearby regional SNOTEL sites.

The results of this precipitation analysis procedure are summarized as an average among all delineated sub-watersheds for the Snowbowl SUP area as a whole and are presented in Table 3I-1.

**Table 3I-1  
Monthly Precipitation  
Arizona Snowbowl Project Area**

Month	Precipitation (Inches)		
	Average Year	Dry Year	Wet Year
January	2.7	0.6	7.2
February	2.7	0.4	5.1
March	3.4	1.1	5.2
April	2.0	0.4	2.0
May	1.0	0.2	0.7
June	0.7	0.3	0.4
July	4.0	2.1	2.4
August	4.0	1.4	4.5
September	2.4	2.3	5.2
October	1.9	0.9	1.7
November	2.5	0.8	3.0
December	2.8	1.9	8.4
<b>Total</b>	<b>30.0</b>	<b>12.4</b>	<b>45.7</b>

Source: Resource Engineering, Inc., 2003

For temperature, proximal SNOTEL stations provide long-term high-elevation records, although the nearest sites, including Fry, Mormon Mountain, and White Horse Lake, are all at lower elevations. In order to derive temperature data, records from Fry, the SNOTEL site closest to the Snowbowl, were selected and elevation-adjusted via the dry adiabatic lapse rate. Inferred monthly mean, maximum, and minimum temperature trends for the Arizona Snowbowl vicinity are portrayed in Table 3I-2.

<sup>325</sup> Daly et al., 1994

**Table 3I-2  
Monthly Temperatures  
Arizona Snowbowl Project Area**

Month	Air Temperature (°F)		
	Average	Max	Min
January	13.6	31.8	1.2
February	15.7	34.1	3.1
March	20.3	39.2	6.1
April	26.9	46.1	11.2
May	34.2	54.9	15.9
June	40.9	65.0	20.7
July	45.1	73.0	29.2
August	44.7	72.1	29.3
September	39.4	67.6	22.8
October	28.2	55.4	13.5
November	19.1	38.4	6.1
December	13.3	31.3	1.5

Source: Resource Engineering, Inc., 2003

The period of record used in the PRISM model’s data averaging and interpolation process reflects composited inputs from many weather observation stations over the 1960-1990 time period, including NOAA-National Weather Service, BLM RAWS, NRCS-SNOTEL, and other climate-recording sites. It is important to note that this time period represents a relatively moist climate in comparison to long-term climatic trends. Based on tree-ring re-constructions of past climate, the last 200 years have been the wettest period within the past 2200 years within the Southwestern United States.<sup>326</sup> Furthermore, the past 20 years reflect precipitation 23 percent higher than the long-term paleoclimatic average.<sup>327</sup> The long-term tree-ring climatic record also shows that periods of much drier climate of long duration are common in the Southwest, including time periods within the late-1200’s and the mid-1600’s where five-year total precipitation was only 50 to 60 percent of average.

Nonetheless, the need exists within the context of the present study for climate information that uses a robust and high-resolution spatial interpolation mechanism to account for the climatological effects of elevation and topography. The PRISM data provides the best available spatially distributed climate data source. In addition, it is important to recognize that in order to derive the dry-year climate used within the water balance calculations for the present study, the 1960-1990 PRISM average dataset was adjusted using modifier coefficients derived from 2002 SNOTEL data, the dry year of record within the available SNOTEL datasets. Examining a 1,000 year tree-ring historical climate reconstruction specific to Arizona’s northwest climate zone, only 22 years within the past 1,000 years were as dry or dryer than 2002.<sup>328</sup> Therefore, the dry-year climate referenced in Table 3I-1 and used within this study’s water-balance calculations, does capture a dry extreme even when compared to the long-term climate record.

<sup>326</sup> Merideth 2001.

<sup>327</sup> Id.

<sup>328</sup> CLIMAS 2002.

## CLIMATE CHANGE

The reader is referred to the Air Quality section of the document, Chapter 3 Section M, for a more detailed analysis of climate change.

## WATER BALANCE

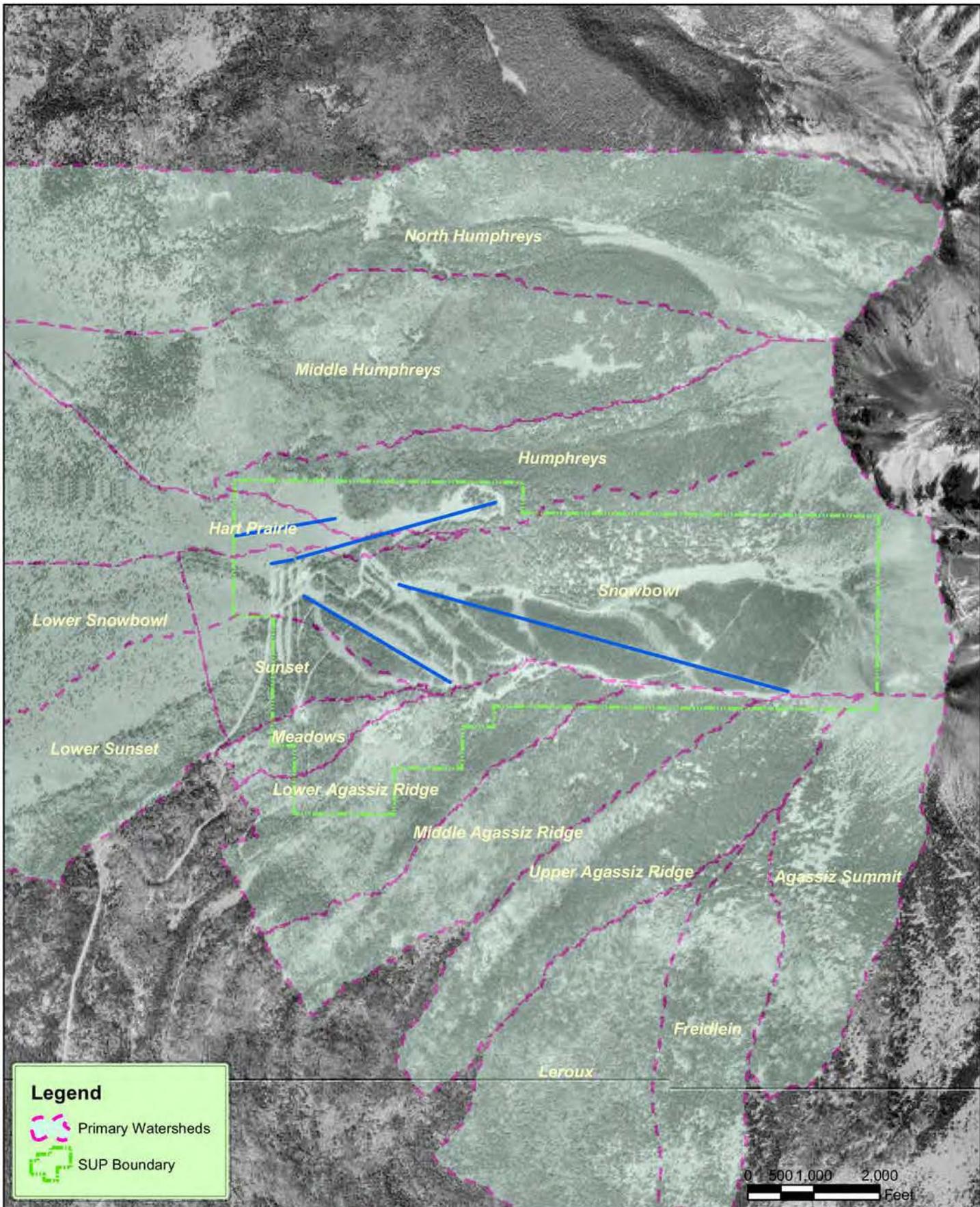
The primary watersheds within the Snowbowl SUP area were derived from available digital elevation data. The spatial extent and acres of existing ski trails within each of these watersheds is outlined in Table 3I-3. The table shows only watersheds that would experience changes under the proposal.

**Table 3I-3  
Sub-Watershed Characteristics**

<b>Watershed</b>	<b>Watershed Area (acres)</b>	<b>Acres of Developed Trails</b>
Hart Prairie	820.2	17.5
Humphreys	284.1	21.1
Lower Agassiz Ridge	232.2	5.5
Middle Agassiz Ridge	229.1	2.8
Snowbowl	648.5	86.3
Sunset	79.6	5.3
Upper Agassiz Ridge	263.2	0.3
<b>Total</b>	<b>5,692.3</b>	<b>138.8</b>

Source: Resource Engineering, Inc., 2003

The location and extent of these primary watersheds are indicated in Figure 3I-1.



**Legend**

-  Primary Watersheds
-  SUP Boundary

*Delineated Watersheds*  
Figure 3I-1



File: 994-1.0  
Date: 09/26/2003



1 inch equals 2,000 feet



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There are no continuous records available to assess the annual water balance within these small tributary watersheds. Therefore, water balance scenarios for existing conditions for average, dry, and wet years were developed using water balance techniques and snowmelt modeling as outlined in detail in two publications: An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources (WRENSS)<sup>329</sup> and the Water Management Research Project Handbook.<sup>330</sup> Within the infiltrative andesols<sup>331</sup> predominant on the slopes of the San Francisco Peaks, little to no net surface runoff is produced from the basins. Thus, the water balance may be characterized by precipitative input, atmospheric and watershed losses, and re-charge to soil and groundwater.

The present water balance for these watersheds is affected by the existing terrain network. Various land management actions can, intentionally or unintentionally, affect the water balance. For example, numerous studies have demonstrated that timber harvest or eradication, as by wildfire, tends to increase water yield and streamflow.<sup>332</sup> The creation of openings for ski trails involves timber harvest and, as a result, decreases the amount of water loss to the atmosphere. This can potentially increase the amount of water available for routing through the watershed, via either surface runoff or infiltration. The mechanisms for this include: 1) decreasing the amount of evapotranspiration (use of water by plants) through timber removal; 2) decreasing snow loss associated with interception (the trapping of snow in the forest canopy until it is sublimated or evaporated to the atmosphere); 3) accelerating runoff (more rapidly removing water from the forest thereby reducing the amount available on-site for plant use); and 4) increasing deposition in openings (reducing airborne snow particle ablation<sup>333</sup> and loss). In addition, in the case of groomed ski trails, it is theorized that snow grooming may affect water yield through modifications in snowpack density by grooming equipment and skiers.

Assessing the existing water balance requires an estimation of the amount of excess water available from forested and open areas under pre-developed conditions, and a subsequent determination of the relative change produced by the trail system and snowmaking.

To accomplish this, a water balance is computed that determines the amounts of precipitation and evapotranspiration associated with each contributing area, the remainder being water potentially available for recharge. A computer model, called the Subalpine Water Balance Simulation Model,<sup>334</sup> has been developed by the Forest Service to create such a balance.

In concept, the model takes seasonal precipitation applied to a locale that is defined in terms of vegetation, by type and density, and aspect and then subtracts the evapotranspirational demands of the vegetation to compute the amount of water potentially available for runoff or re-charge. To reflect changes in vegetation due to timber removal, the model modifies evapotranspirational demands to reflect altered vegetation density, defined as basal area or cover density.

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<sup>329</sup> Troendle, C.A., and Leaf, C.F., 1980

<sup>330</sup> Leaf, C. F., 1986, Colorado Ski Country USA, 1986

<sup>331</sup> Soils formed mainly in volcanic ash or cinders, exhibiting andic soil properties.

<sup>332</sup> Troendle, C.A. et al., 2001b; Wilm H.G. and E.G., Dunford, 1948; Satturland, D.R. and H.F. Haupt, 1967; Hoover, M.D., 1971; Gary, H.L., 1974; Troendle, C.A., 1979; Schmidt, R.A., 1991; Birkeland, K.W., 1996

<sup>333</sup> Ablation is the mechanical destruction of snow and ice particles.

<sup>334</sup> Leaf and Brink, 1973a and b

The Subalpine Water Balance Model was used to develop a procedure and a set of nomographs<sup>335</sup> to aid analysts in making non-point source pollution assessments. That procedure formed WRENSS. The numerous detailed data inputs required by the model were reduced in the WRENSS procedure by making a large number of model runs and using the results to develop the above-mentioned nomographs. This simplification and the use of evapotranspiration modifier coefficients facilitate the analysis while not significantly diminishing the value of the output.

The water balance of the WRENSS model is coupled with a snowmaking hydrology computation process developed as a result of a 1986 study, commissioned by Colorado Ski Country USA. This study assessed water consumption attributable to snowmaking uses. The study found that initial losses, those essentially occurring at the snowmaking gun, are a function of relative humidity and temperature at the time of snowmaking, and average approximately six percent.<sup>336</sup> Additional watershed losses include sublimation, evaporation, and evapotranspiration, and occur as a function of aspect, elevation, and vegetation. The sublimation loss component is of particular interest in the micro-climate of the San Francisco Peaks. The wintertime climate within the San Francisco Peaks frequently exhibits periods of dry weather with persistent sunshine, interspersed with periodic snowstorms. Meanwhile, high winds frequently occur on the Peaks due to their high elevation in relationship to the predominant elevation of the surrounding terrain. These factors can contribute to substantial snowpack loss via atmospheric sublimation.<sup>337</sup>

### **Sublimation**

Avery et al. conducted a sublimation measurement experiment over the 1990/91 and 1991/92 winter seasons at two sites in Flagstaff, one located on the NAU campus, and a second located at Pulliam Airport.<sup>338</sup> Two sublimation-measurement devices were emplaced at each site: one shielded from open sky conditions; and another exposed to ambient sky conditions. The 1990/91 season exhibited an unusually dry mid-winter period, with the result that the sublimation metering devices were dry, and no data was logged from mid-January through early March. The 1991/92 winter season exhibited above average precipitation due to the influence of El Niño conditions, and provided a more continuous record of sublimation measurements, with only a brief gap in data during early February. Over the course of the experiment the mean daily observed evapo-sublimation loss was 0.06 inch of water equivalent per day, averaged over days with no precipitation. The maximum rate was observed to be 0.31 inch of water equivalent per day, and was observed during dry, clear, and windy conditions.

Sublimation rates are highly spatially variable, and are dependent on temperature, wind speed, solar radiation, and humidity. However, in order to facilitate a reasonable analysis of the effects of snowmaking on the water balance of the project area, an estimate of the amount of snow water equivalent lost from sublimation from the snowpack is required. The results of the 1993 Avery et al. study provide sublimation observations over the course of two seasons of observation,

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<sup>335</sup> A graph consisting of curves graduated for a number of variables, establishing a relationship between multiple related values.

<sup>336</sup> Leaf, C.F., 1986

<sup>337</sup> Higgins, 1998

<sup>338</sup> Avery et al., 1993

offering the most temporally extensive dataset available. Therefore, for the average- and wet-year scenarios, Avery et al.'s mean daily rate of 0.06 inch of water equivalent sublimation loss per day was applied to the machine-produced snowpack throughout the course of the snowmaking season. As a conservative assumption, this loss rate was applied uniformly, without consideration for days with cloudy sky conditions or precipitation, during which lower or zero sublimation rates could be realized. For dry-year scenarios, the maximum observed loss rate of 0.31 inch of water equivalent per day, observed during the 1993 Avery et al. study, was applied following the same methodology.

The nomographs and evapotranspiration modifier coefficients of the WRENSS model are grouped into eight regional categories within the continental United States. The Snowbowl project area is situated within region (4): Rocky Mountain/Inland Intermountain Region (snow dominated precipitation regimes). This particular WRENSS region covers a large spatial extent, ranging from Arizona and New Mexico at its southern extreme, to Montana and Southern Idaho at its northern extreme. The WRENSS groupings reflect the experimental watershed data used to derive and calibrate the regional coefficients appropriate to that category. Experimental data from the Forest Service Beaver Creek and Thomas Creek experimental watersheds within Arizona were included in the population of data used in the original WRENSS analyses; however, the preponderance of available experimental data within region (4) was derived from watersheds situated in more northern climates.<sup>339</sup>

Because of the unique wintertime climate of the Arizona mountain regions, in which warm temperatures can influence losses from the snowpack during winter months, the region (4) evapotranspiration nomographs were examined in comparison to data from the Beaver Creek experimental watershed, in order to evaluate the potential need for site-specific adjustments to the regional WRENSS nomographs.

The Beaver Creek Experimental Watershed is located between latitudes 34° 30' and 35° north, and 111° 30' to 112° west longitude in north-central Arizona.<sup>340</sup> The watershed's center is about 50 miles south of Flagstaff, Arizona, in Coconino and Yavapai counties. Established in 1956 by the Forest Service as a center for watershed management research within the pinyon-juniper and ponderosa pine vegetation types, the site encompasses 275,000 acres on the Coconino National Forest.

Nineteen years of precipitation and runoff data (1962-1981) were obtained for sub-watershed 20 within the Beaver Creek watershed. This watershed is at the highest elevation zone within the Beaver Creek drainage, and is dominated by ponderosa pine forest. Over the course of the Beaver Creek program, sub-watershed 20 was used as a hydrologic reference or control watershed, wherein no experimental changes in treatment or management were applied. Comparison of the WRENSS model water balance using the default regional evapotranspiration-precipitation nomographs, versus observed average behavior for sub-watershed 20 provided a basis to adjust the model to more closely match site-specific conditions at Snowbowl. The WRENSS seasonal evapotranspiration nomographs were adjusted upwards by 17 percent, on

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<sup>339</sup> Leaf, C.F., 2003

<sup>340</sup> USDA Forest Service, 2001

average, to provide closer agreement with the observed water-balance data from Beaver Creek sub-watershed 20.

The water balance computed via the WRENS model, modified to reflect the contributions of snowmaking water computed via the above procedures, together provide estimates for water yield typical of sub-alpine mountain watersheds. Tables 3I-4 through 3I-6 portray the water balance characteristics for watersheds within the project area for average, dry, and wet-year conditions. Only those watersheds slated for snowmaking or terrain modification under the Proposed Action are shown.

**Table 3I-4  
Average Year Water Balance**

<b>Watershed</b>	<b>Area (acres)</b>	<b>Precipitation (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>Percent Loss</b>
Hart Prairie	820.2	1930.1	1236.9	693.1	64%
Humphreys	284.1	784.0	429.0	355.0	55%
Lower Agassiz Ridge	232.2	568.1	368.3	199.8	65%
Middle Agassiz Ridge	229.1	573.5	373.7	199.8	65%
Snowbowl	648.5	1791.3	940.8	850.5	53%
Sunset	79.6	192.7	111.6	81.1	58%
Upper Agassiz Ridge	263.2	672.4	432.8	239.7	64%
<b>Total</b>	<b>2,556.9</b>	<b>6,512.1</b>	<b>3,893.1</b>	<b>2,619.0</b>	<b>61%</b>

Source: Resource Engineering, Inc., 2003

**Table 3I-5  
Dry Year Water Balance**

<b>Watershed</b>	<b>Area (acres)</b>	<b>Precipitation (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>Percent Loss</b>
Hart Prairie	820.2	794.3	776.7	17.6	98%
Humphreys	284.1	322.6	295.6	27.0	92%
Lower Agassiz Ridge	232.2	233.8	233.8	0.0	100%
Middle Agassiz Ridge	229.1	236.0	236.0	0.0	100%
Snowbowl	648.5	737.2	637.6	99.5	86%
Sunset	79.6	79.3	74.8	4.5	94%
Upper Agassiz Ridge	263.2	276.7	276.7	0.0	100%
<b>Total</b>	<b>2,556.9</b>	<b>2,679.9</b>	<b>2,531.2</b>	<b>148.6</b>	<b>96%</b>

Source: Resource Engineering, Inc., 2003

**Table 3I-6  
Wet Year Water Balance**

<b>Watershed</b>	<b>Area (acres)</b>	<b>Precipitation (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>Percent Loss</b>
Hart Prairie	820.2	2941.8	1296.3	1645.4	44%
Humphreys	284.1	1194.9	443.4	751.5	37%
Lower Agassiz Ridge	232.2	865.9	383.6	482.3	44%
Middle Agassiz Ridge	229.1	874.1	386.0	488.0	44%
Snowbowl	648.5	2730.2	976.2	1754.0	36%
Sunset	79.6	293.8	117.4	176.3	40%
Upper Agassiz Ridge	263.2	1024.9	445.7	579.1	43%
<b>Total</b>	<b>2,556.9</b>	<b>9,925.6</b>	<b>4,048.6</b>	<b>5,876.6</b>	<b>41%</b>

Source: Resource Engineering, Inc., 2003

Area-normalized results, averaged over all watersheds, are portrayed in Table 3I-7.

**Table 3I-7  
Area-Normalized Water Balance**

<b>Climate</b>	<b>Precipitation (in)</b>	<b>Watershed Loss (in)</b>	<b>Recharge (in)</b>	<b>Percent Loss</b>
Average	31.6	18.3	13.3	58%
Dry	13.0	12.1	0.9	93%
Wet	48.2	19.0	29.3	39%

Source: Resource Engineering, Inc., 2003

The results of the water balance modeling are generally consistent with expected trends for semi-arid forested environments, where evapotranspiration rates are limited by soil moisture availability. In these conditions, dry conditions prevail during much of the growing season, and soil moisture deficits can become substantial. Prior studies of evapotranspiration rates from climatically and vegetatively similar ponderosa pine forests in northern New Mexico over a four-year period extending from 1993 through 1996 yielded an average annual evapotranspiration loss of 18.0 inches, which agrees well with the prediction of the water balance model.<sup>341</sup> The high percentage losses in dry years are related to high atmospheric moisture demand driven by lower relative humidities, paired with higher temperatures. Lower percentage losses in wet years are derived from lower atmospheric demand, paired with increased moisture content in soils and shallow groundwater, leading to greater re-charge fractions.

## **GEOLOGY**

The San Francisco Volcanic Field covers approximately 1,800 square miles in northern Arizona. The Field lies along the southern perimeter of the Colorado Plateau, defined by the Mogollon Rim to the south of Flagstaff. The most prominent peaks within the field are the San Francisco Peaks, including Humphreys Peak, which at 12,633 feet is the highest mountain in Arizona. Collectively, Humphreys Peak, Agassiz Peak (12,356 feet), and Fremont Peak (11,696 feet) are referred to as the San Francisco Peaks. A large portion of the San Francisco Volcanic Field lies

<sup>341</sup> Brandes, David and B. Wilcox, 2000

within the Coconino and Kaibab national forests. This zone of relatively recent volcanism contains more than 600 volcanoes, active at various time periods during the past six million years.<sup>342</sup>

Most of the mountains between Flagstaff and the Grand Canyon are dormant volcanoes, and are comparatively young geologically. Most prominent among these features are basaltic cinder cones such as Sunset Crater, O’Leary Peak, Bill Williams Mountain, and Kendrick Peak. Sunset Crater is the youngest volcano within the field, last erupting less than 1,000 years ago. The oldest volcanic features within the San Francisco field are a series of six million year old basaltic lava flows that extend south and southwest from the San Francisco Peaks vicinity.<sup>343</sup> These basalts overlie the Triassic sand and mudstones of the Moenkopi formation, as well as the horizontally extensive Permian Kaibab limestone.<sup>344</sup> The younger andesites, rhyolites, and dacites of the San Francisco Peaks exist on top of these older basaltic flows.

San Francisco Peaks are a stratovolcano, with moderately steep slopes formed by the gradual accumulation of layers of andesitic lava flows, cinders, and ash, inter-lensed with deposits from volcanic mudflows. The San Francisco Peaks are the only stratovolcano within the San Francisco Volcanic Field. The eruptions that formed the Peaks occurred between 0.4 and one million years ago.<sup>345</sup> The Inner Basin is a prominent glaciated valley along the northeastern slopes of the San Francisco Peaks. Most geologists currently believe that the Inner Basin is a caldera formed by a lateral blast similar to that which occurred at Mt. St. Helens in 1980.<sup>346</sup> Projecting the existing slope of the San Francisco Peaks range upward, it is estimated that the original summit of the San Francisco Peaks reached approximately 15,400 feet<sup>347</sup> Pleistocene era glaciation further sculpted the Inner Basin, and occurred after the most recent period of volcanic orogenic activity.<sup>348</sup>

## SOILS

Information on soils within the project area was obtained from the CNF Terrestrial Ecosystem Survey GIS database. Within the CNF Terrestrial Ecosystem Survey database, soils are classified to the family level of Soil Taxonomy. Soils exhibiting very similar profiles comprise a soils family. Allowing for differences in surface texture or underlying layers, soils within a family exhibit major horizons that are similar in thickness, composition, and arrangement. A number of soils families are present throughout the project area; the predominant mapped soils units within the project area are outlined in Table 3I-8 and their locations are graphically depicted in Figure 3I-2.

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<sup>342</sup> Priest et al., 2001

<sup>343</sup> Higgins, 1998

<sup>344</sup> Id.

<sup>345</sup> Priest et al., 2001

<sup>346</sup> Id.

<sup>347</sup> Higgins, 1998

<sup>348</sup> Id.

**Table 3I-8  
Mapped Soil Units  
Arizona Snowbowl SUP Area**

<b>Map Unit</b>	<b>Component<sup>a</sup></b>	<b>Component Name</b>	<b>Acres</b>	<b>Percent of Mapped Soils</b>
640	0.1	Pachic Udic Argiborolls	62.1	8%
	0.5	Pachic Udic Haploborolls		
	0.5	Pachic Paleborolls		
715	0.1	Andic Cryoborolls	64.1	8%
	0.5	Pachic Cryoborolls		
740	0.1	Cryic Pachic Paleborolls	271.8	35%
	0.2	Andic Cryoborolls		
	0.5	Pachic Cryoborolls		
770	0.1	Vitrandic Cryochrepts	167.1	21%
	0.2	Talus		
	0.5	Mollic Cryoboralfs		
785	0.1	Andic Cryoborolls	133.0	17%
	0.5	Pachic Cryoborolls		
	0.6	Vitandic Cryochrepts		
790	0.1	Vitrandic Cryochrepts	52.2	7%
	0.5	Vitrandic Cryoborolls		
	0.6	Rock Outcrop		
850	0.1	Pergelic Cryochrepts	27.4	4%
	0.5	Talus		
	0.6	Pergelic Cryorthents		

<sup>a</sup> Components within a soils map unit are identified by a decimal and followed by a number (.1 to .4). A maximum of four major named components are allowed in each map unit. Each map unit can have two minor inclusion components (.5 and .6).

Source: USDA Forest Service, 2003

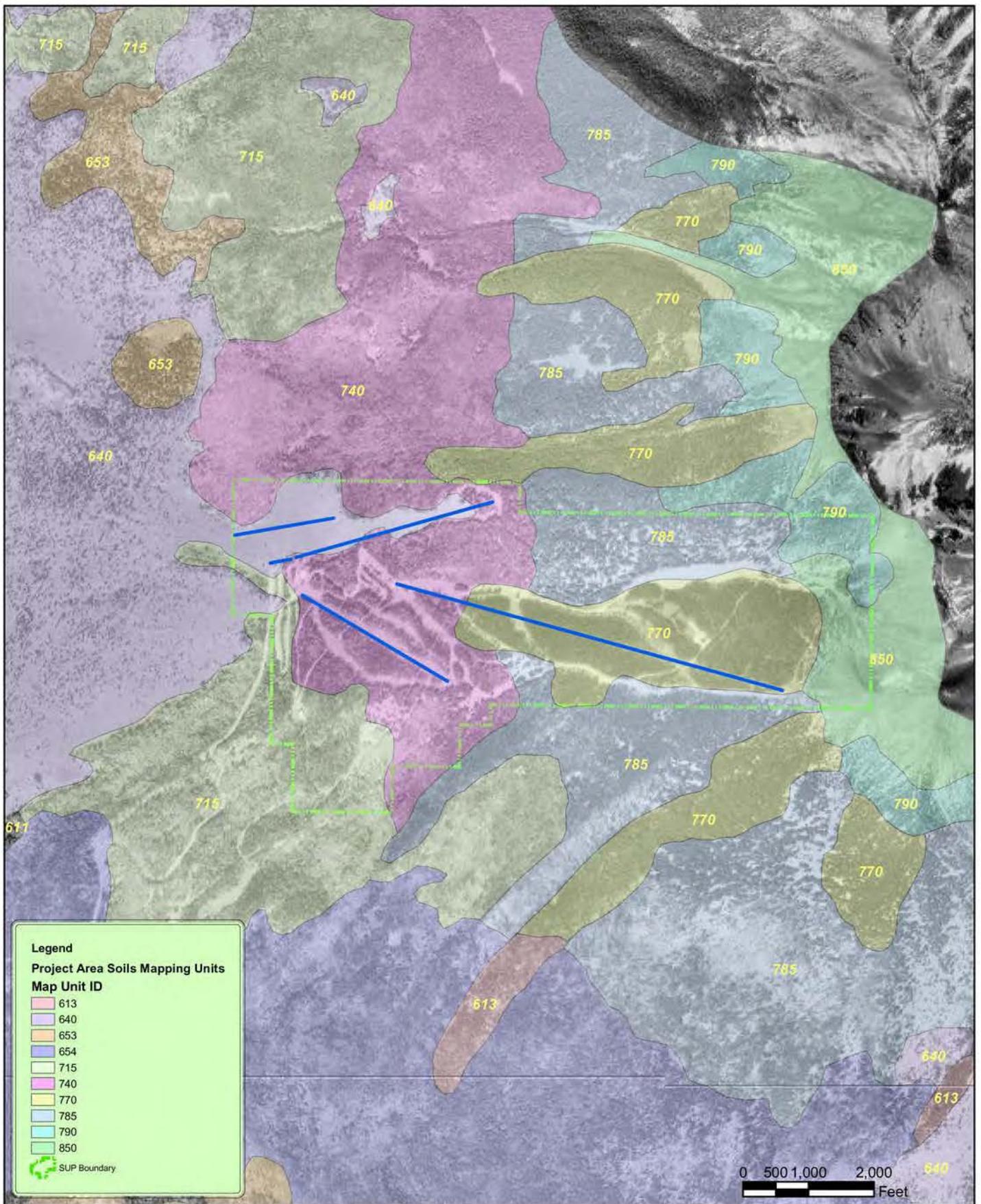
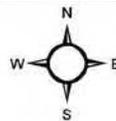


Figure 31-2  
 Project Area Soils Mapping



File: 994-1.0  
 Date: 09/26/2003



1 inch equals 2,000 feet



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Soils unit 640 is a gravelly loam, dominated by components of Pachic Udic Argiborolls, with inclusions of Haploborolls and Paleborolls, realized as alluvium/colluvium from andesite/dacite parent material. This map unit is classified as a fire disclimax.<sup>349</sup> Fire created and maintained the open park-like conditions of this unit's predominant grasslands prairies in the past. Slopes range from zero to 40 percent. This unit occurs on warmer, dryer aspects than the adjacent mixed conifer map units. This map unit is dependent on recurrent wildfire to maintain the high canopy coverage of grass and low canopy coverage of mixed conifer.

Soils unit 715 is a bouldery sandy loam, dominated by an Andic Cryoborolls component, with Pachic inclusions. The unit is deposited as colluvium from andesite/dacite parent material. Vegetation within this unit is currently in mid- to late seral stage as indicated by the high canopy cover. Exposures of andesite rock outcrop occur throughout the map unit. Slopes range from 25-35 percent.

Soils unit 740 is a gravelly fine sandy loam. The primary soils classification is Cryic Pachic Paleborollos with major inclusions of Andic Cryoborolls and minor inclusions of Pachic Cryoborolls. The soils are formed as colluvium of andesite/dacite parent material, and andesite rock outcrop may occur in the upper end of the slope range. This component has a severe erosion hazard. Natural re-generation potential is high.

Soils unit 770 is a stony fine sandy loam. The primary taxonomic classification is Vitrandic Cryochrepts, with Talus outcrops and Mollic Cryoborolls inclusions. The soil is derived as colluvium and residuum from andesite/breccia parent material. This shallow to moderately deep soil occurs in the vicinity of rock outcrop and talus. Snow avalanche hazard is moderate in areas with little or no tree canopy cover. Mass wasting hazard is moderate and occurs as debris slide and debris avalanche in and around talus areas. This map unit has a moderate erosion hazard. Natural regeneration and reforestation potentials are low due to surface rock fragments and cold climatic conditions.

Soils unit 785 is a very stony fine sandy loam. The primary taxonomy is Andic Cryoborolls, with minor inclusions of Pachic Cryoborolls and Vitrandic Cryochrepts. Most areas within this unit are currently in mid-seral vegetative stage, due to past wildfires. Snow avalanche hazard is moderate in areas with little or no tree canopy cover. This map unit has a severe erosion hazard. Natural re-generation potential is high. Reforestation and re-vegetation potentials are low due to very steep slopes.

Soils unit 790 is a very cobbly sandy loam, with a primary classification of Vitrandic Cryochrepts, with minor inclusions of Vitrandic Cryoborolls and rock outcrops. The soil is a colluvium derived from dacite/andesite parent material. This soil's mass wasting hazard is severe. Snow avalanche hazard is moderate in areas with little or no tree canopy cover. Erosion hazard is severe. Natural regeneration, reforestation and revegetation potentials are low due to steep slopes and cold climatic conditions.

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<sup>349</sup> A relatively stable ecological community often including organisms foreign to the region and displacing the climax (the final stage in ecological succession) because of natural fire or anthropogenic disturbance.

Soils unit 850 is an extremely bouldery sandy loam, a colluvium derived from andesite/breccia parent material. The taxonomy is a Pergelic Cryochrepts, with Talus and Cryorthents inclusions. Shallow and moderately deep soils may occur in the vicinity of rock outcrop and talus. Mass wasting hazard is moderate and occurs as debris slide and debris avalanche around talus areas. Snow avalanche hazard is moderate to high. This high-elevation soil supports a fragile alpine tundra habitat. This map unit has a severe erosion hazard. Revegetation potential is low due to surface rock fragments and cold climatic conditions.

The primary use and management considerations for the soils units present in the SUP area are summarized in Table 3I-9.

**Table 3I-9  
Mapped Soils Units  
Management and Usage Limitations**

Map Unit	Component	Percent of Mapped Units	Cut and Fill Slope Stability	Unsurfaced Road Stability	Erosion Hazard	Re-vegetation Potential
640	0.1	8%	N/A	Moderate	Moderate	High
	0.5		*	*	*	*
	0.6		*	*	*	*
715	0.1	8%	Moderate	Moderate	Severe	Low
	0.5		*	*	*	*
740	0.1	35%	Moderate	Moderate	Severe	Moderate
	0.2		Moderate	Moderate	Severe	Low
	0.5		*	*	*	*
770	0.1	21%	Moderate	Moderate	Severe	Moderate
	0.2		Moderate	Moderate	Severe	Low
	0.5		*	*	*	*
785	0.1	17%	Severe	Severe	Severe	Low
	0.5		*	*	*	*
	0.6		*	*	*	*
790	0.1	7%	Severe	Severe	Severe	Low
	0.5		*	*	*	*
	0.6		*	*	*	*
850	0.1	4%	Severe	Severe	Severe	Low
	0.5		*	*	*	*
	0.6		*	*	*	*

\* = No record.

Source: USDA Forest Service, 2003

Overall, the primary soils units within the SUP area exhibit low to moderate re-vegetation potential and severe erosion hazards. Maintenance of vegetative cover is important to minimize the potential for sheet and rill erosion with these soil units.

# ENVIRONMENTAL CONSEQUENCES

## SUMMARY OF ENVIRONMENTAL CONSEQUENCES AND CONCLUSIONS

Major conclusions and determinations of this Soils and Geology analysis are summarized below. A more detailed analysis of the direct and indirect environmental consequences (from which this summary was derived) follows.

### Alternative 1 - No Action

Under the No Action Alternative, the infrastructure and operation of the Snowbowl would remain unchanged from current conditions. The environmental consequences of the No Action alternative would reflect those associated with the on-going operation of the existing ski area, including potential disturbances to vegetative cover, and/or soils associated with routine maintenance and repair requirements, occurring in previously disturbed areas. No consequences to the watershed hydrology or soils chemistry would be realized under the No Action Alternative.

### Alternative 2 – The Proposed Action

#### Anticipated changes in the duration and intensity of annual snowmelt

The Proposed Action's 205 acres of snowmaking would result in a 15 percent increase in recharge in the primary receiving watershed, with a six percent increase overall. These water balance effects alone would be unlikely to increase the risk for surface flow, rilling, or sedimentation on un-graded terrain, where high infiltration rates result in little or no surface runoff. On graded terrain, soils compaction can result in surface runoff generation. In areas where there are no topographic constraints (i.e., confined valleys) to concentrate surface flows, the potential for rilling and sedimentation may be adequately mitigated via careful implementation and maintenance of typical drainage management routing infrastructure (i.e., waterbars). In areas where the surface topography tends to concentrate surface flows, increased water inputs would result in a moderate to high risk of rilling or sedimentation, as evidenced by their occurrence in existing confined graded terrain on *Logjam* (trail #25).

#### Anticipated changes in erosion/sedimentation

The grading of terrain associated with the Proposed Action would result in a post-disturbance increase of 530 tons of net sediment detachment, which would decrease to 87 tons following six to 10 years of re-vegetation. This represents a substantial potential increase in sediment yield. Preservation of topsoil prior to grading, and re-distribution prior to re-seeding, would enhance re-vegetation potential, and mitigate the risk of increased detachment on slopes of gradients less than 30 percent. On steeper slopes of 30 percent gradient and higher, the rates of anticipated detachment coupled with low soil re-generation potential would make preservation of topsoil difficult. While mitigation measures such as jute-netting or geo-textile mesh can improve soils stability on steeper slopes, the risk of erosion and soil loss would be moderate to high.

#### Potential changes to soil chemistry due to anticipated increases in soil moisture consistency and nutrient loading

Input of reclaimed water from the City of Flagstaff's Rio de Flag Water Reclamation Plant in the form of snowmaking would alter the soils chemistry for affected soils units. Overall, percolating

treated wastewater through the soil profile would be unlikely to have a negative impact on either the soils or treated water. Existing fecal coliform in the A-horizon soil could be reduced via the percolation of chlorinated wastewater. The acidity of the soil and parent material would be progressively buffered to more alkaline levels by percolation of the treated wastewater. The higher alkalinity would inhibit the leaching and mobilization of soils metals to the groundwater. The increased nitrogen loading via application of the reclaimed wastewater would be likely to initially cause increases in organic and bio-available nitrogen within the soils, until reaching a critical threshold. Subsequently, increases in nitrogen mineralization and inorganic nitrogen would be expected, followed by increased leaching of excess nitrogen through the soils column to groundwater.

### **Alternative 3**

#### **Anticipated changes in the duration and intensity of annual snowmelt**

Because Alternative 3 would not implement snowmaking infrastructure with accompanying snowmaking water inputs, the water balance effects of this Alternative would be relatively minor. Trail clearing and grading activities would result in changes in the water balance. Interception and evaporation losses from the forest canopy would be reduced. Vegetation removal would affect the infiltration characteristics of the watershed, generally resulting in quicker runoff generation. Changes in vegetative cover would affect the solar energy balance of the watershed, permitting increased solar radiation and therefore earlier and faster snowmelt in areas where new trails would be implemented.

#### **Anticipated changes in erosion/sedimentation**

The grading of terrain associated with Alternative 3 would result in a post-disturbance increase of 369 tons of net sediment detachment, which would decrease to 73 tons following six to 10 years of revegetation. This represents a substantial potential increase in sediment yield. Preservation of topsoil prior to grading, and re-distribution prior to re-seeding, would enhance re-vegetation potential, and mitigate the risk of increased detachment on slopes of gradient below 30 percent. On steeper slopes of 30 percent gradient and higher, the rates of anticipated detachment coupled with low soil re-generation potential would make preservation of topsoil difficult. While mitigation measures such as jute-netting or geo-textile mesh can improve soils stability on steeper slopes, the risk of erosion and soil loss would moderate to high.

#### **Potential changes to soil chemistry due to anticipated increases in soil moisture consistency and nutrient loading**

The soils compaction and turnover associated with Alternative 3 grading and trail construction activities would cause compaction of soils and loss of organic matter and tilth,<sup>350</sup> and a decrease in soils aeration, within affected soils units. However, no snowmaking infrastructure would be implemented. Therefore, no changes to soils chemistry would occur due to the input of reclaimed water in the form of snowmaking.

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<sup>350</sup> The state of aggregation of a soil especially in relation to its suitability for supporting growth of vegetation

## DETAILED ANALYSIS OF DIRECT AND INDIRECT EFFECTS

*The Proposed Action has potential to change soil chemistry and moisture due to the application of machine-produced snow.*

Indicator:

Anticipated Volume of Machine-Produced Snow Applied Under Various Scenarios:  
Dry Year, Average Year, and Wet Year

### **Alternative 1 – No Action**

Under the No Action Alternative, implementation of snowmaking infrastructure would not occur, and current conditions as presented above would be expected to persist. No machine-produced snow would be applied within the project area.

### **Alternative 2 – The Proposed Action**

Under the Proposed Action, a total of 205.2 acres of snowmaking terrain would be implemented at the Snowbowl. This terrain would be primarily implemented within the Snowbowl watershed, with smaller acreages implemented in other proximal watersheds (see Table 3I-3 Sub-Watershed Characteristics).

The depth of snow that would be initially produced on existing and proposed terrain would result in an average coverage depth across all terrain types of slightly more than 25 inches of snow. Estimated operational conditions under the varying climatic scenarios are outlined as follows:<sup>351</sup>

1. Once all the trails have been covered with the specified depth of snow, resurfacing operations would typically commence to recover from any thaws and replenish snow that has become hardened through wear and temperature cycling. The amount of resurfacing required would depend on natural snowfall. In a wet year, it is estimated that only the initial application would be required. This application could be spread out over the season if there was abundant snow early in the year, or it could be concentrated at the beginning of the season if the bulk of the snow arrives after December.
2. On an average year, it is estimated that an additional half-application of machine-produced snow would be required after the initial coverage for a seasonal total of 1.5 coverages.
3. On a dry year, it is estimated one additional full application of machine-produced snow would be required after the initial coverage for a seasonal total of two coverages.

Snowmaking water used under average, dry, and wet year conditions are outlined by watershed in Table 3I-10.

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<sup>351</sup> Sno.matic, 2003

**Table 3I-10  
Anticipated Snowmaking Water Use**

<b>Watershed</b>	<b>New Snowmaking Acreage</b>	<b>Average Year Snowmaking Diversions (AF)</b>	<b>Dry Year Snowmaking Diversions (AF)</b>	<b>Wet Year Snowmaking Diversions (AF)</b>
Hart Prairie	22.5	39.9	53.3	26.6
Humphreys	28.4	50.4	67.3	33.6
Leroux	0.0	0.0	0.0	0.0
Lower Agassiz Ridge	12.7	22.5	30.1	15.0
Middle Agassiz Ridge	3.9	6.9	9.2	4.6
Snowbowl	131.9	234.0	312.4	156.2
Sunset	5.5	9.8	13.0	6.5
Upper Agassiz Ridge	0.3	0.5	0.7	0.4
<b>Total</b>	<b>205.2</b>	<b>364.0</b>	<b>486.0</b>	<b>243.0</b>

Source: Resource Engineering, Inc., Sno.matic, 2003

### **Alternative 3**

Under Alternative 3, implementation of snowmaking would not occur, and current conditions would be expected to persist. No machine-produced snow would be applied.

#### Indicator:

#### Modeled Anticipated Changes in the Duration and Intensity of Annual Snowmelt Compared to Historic Natural Variation

### **Alternative 1 – No Action**

Under the No Action alternative, input of additional water in the form of snowmaking would not occur, and no change in the annual snowmelt regime would be likely to occur.

### **Alternative 2 – The Proposed Action**

Selection of the Proposed Action would result in snowmaking coverage on 205.2 acres of existing and proposed terrain. Of this coverage, the largest increases would occur in the following watersheds: Snowbowl (132 acres), Humphreys (28 acres) and Hart Prairie (23 acres). The proposed snowmaking coverage would require approximately 364 AF of snowmaking water use on average.

In addition to increased snowmaking coverage, implementation of the Proposed Action would involve clearing of vegetation on approximately 76.3 acres. Table 3I-11 outlines trail clearing and snowmaking coverage areas by watershed associated with the Proposed Action.

**Table 3I-11  
Alternative 2 Trail Clearing  
and Snowmaking by Watershed**

<b>Watershed</b>	<b>Trail Clearing (Acres)</b>	<b>Snowmaking Acreage</b>
Hart Prairie	3.7	22.5
Humphreys	9.6	28.4
Lower Agassiz Ridge	7.2	12.7
Middle Agassiz Ridge	1.6	3.9
Snowbowl	54.0	131.9
Sunset	0.2	5.5
Upper Agassiz Ridge	0.0	0.3
<b>Total</b>	<b>76.3</b>	<b>205.2</b>

Source: Resource Engineering, Inc, 2003

Proposed activities would affect the watershed hydrology in the study area. The application of snowmaking alters the volume and timing of snowmelt. A machine-produced snowpack typically exhibits smaller grain size and higher snowpack density and water equivalent than a natural snowpack. Due to these differences in physical properties, machine-produced snow typically begins to melt later in the season than natural snow. This can increase the average duration of seasonal melt. Trail clearing affects the water balance by decreasing the amount of water removed via evapotranspiration, thus increasing the quantity of water available for infiltration or runoff. Interception and evaporation losses from the forest canopy would be reduced. Vegetation removal would affect the infiltration characteristics of the watershed, generally resulting in quicker runoff generation. Changes in vegetative cover also can affect the solar energy balance of the watershed, permitting increased solar radiation and therefore earlier and faster snowmelt. Together these changes would alter water balance characteristics and snowmelt timing.

### Water Balance

The water balance model described previously under the Existing Conditions section was used to provide estimates of expected changes in the volume and distribution of water due to the Proposed Action. Summaries of the anticipated water balance changes for average, dry, and wet climatic conditions are outlined in the following tables.

*Average Year Water Balance Characteristics*

**Table 3I-12  
Alternative 2 Average Year Water Balance Characteristics**

<b>Watershed</b>	<b>Precipitation (AF)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>
Hart Prairie	1930.1	39.9	1254.0	716.0
Humphreys	784.0	50.4	451.8	382.5
Lower Agassiz Ridge	568.1	22.5	377.5	213.2
Middle Agassiz Ridge	573.5	6.9	376.7	203.7
Snowbowl	1,791.3	234.0	1,043.0	982.3
Sunset	192.7	9.8	116.7	85.7
Upper Agassiz Ridge	672.4	0.5	433.0	239.9
<b>Total</b>	<b>6,512.1</b>	<b>364.0</b>	<b>4,052.7</b>	<b>2,823.3</b>

Source: Resource Engineering, Inc, 2003

**Table 3I-13  
Alternative 2 Change in Average  
Year Water Balance Characteristics**

<b>Watershed</b>	<b>Percent Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	64%	22.8	3%
Humphreys	54%	27.5	8%
Lower Agassiz Ridge	64%	13.3	7%
Middle Agassiz Ridge	65%	3.9	2%
Snowbowl	51%	131.8	15%
Sunset	58%	4.7	6%
Upper Agassiz Ridge	64%	0.3	0%
<b>Total</b>	<b>60%</b>	<b>204.3</b>	<b>6%</b>

<sup>a</sup> Compared to existing conditions.

Source: Resource Engineering, Inc, 2003

Under the Proposed Action, introduction of additional water equivalent in the form of machine-produced snow, coupled with changes in land use due to trail construction activities, would result in a six percent increase in watershed recharge in an average year. The Snowbowl watershed, which would experience the majority of the proposed snowmaking terrain, would experience a 15 percent increase in recharge annually.

Most of the un-graded terrain at Snowbowl exhibits excellent vegetative cover, which binds root structure and stabilizes the surface soil horizon. Introduction of snowmaking water on un-graded trails would be unlikely, in and of itself, to markedly increase the erosion potential, so long as snowmaking is accompanied by implementation and maintenance of typical drainage mechanisms such as adequately spaced waterbars (see Table 2-2).

However, field review of the primary drainage within the Snowbowl watershed, in which most of the proposed snowmaking is slated to occur, reveals that surface runoff does occur during peak snowmelt conditions. Although essentially all of the observed surface flow eventually re-

infiltrates into the soils, in areas where grading activity has resulted in soils turnover and compaction, surface flow has caused rilling and sedimentation.

Field review of heavily graded terrain on *Logjam* (trail #25) indicates that inadequate waterbar spacing has contributed to poor drainage routing, which has contributed to the development of concentrated surface flows, and incised rilling. Contributing to the concerns on *Logjam* (trail #25) is that the terrain modification filled in a historic flow channel, and the topography naturally concentrates flows in this vicinity. A review of graded terrain on *Upper Ridge* (trail # 26) and *Lower Ridge* (trail #21) reveals few instances of concentrated surface flow or rilling on these trails where the topographic constraints do not confine the flow of water. In general, effectively implemented and maintained drainage control mechanisms such as waterbars should adequately reduce the risk of increased erosion on graded terrain, so long as drainage control is accompanied by effective re-establishment of vegetative cover. Re-vegetation in relationship to existing and proposed graded terrain is discussed in the following section analyzing increased sediment yields due to graded terrain modification.

### Dry Year Water Balance Characteristics

**Table 3I-14**  
**Alternative 2 Dry Year Water Balance Characteristics**

Watershed	Precipitation (AF)	Snowmaking (AF)	Watershed Loss (AF)	Recharge (AF)
Hart Prairie	794.3	53.3	817.5	30.1
Humphreys	322.6	67.3	358.8	31.1
Lower Agassiz Ridge	233.8	30.1	263.9	0.0
Middle Agassiz Ridge	236.0	9.2	245.2	0.0
Snowbowl	737.2	312.4	927.2	122.4
Sunset	79.3	13.0	87.8	4.6
Upper Agassiz Ridge	276.7	0.7	277.4	0.0
<b>Total</b>	<b>2,679.9</b>	<b>486.0</b>	<b>2,977.8</b>	<b>188.2</b>

Source: Resource Engineering, Inc, 2003

**Table 3I-15**  
**Alternative 2 Change in Dry Year Water Balance Characteristics**

Watershed	Percent Loss	Recharge Change (AF)	Percent Change
Hart Prairie	96%	12.5	71%
Humphreys	92%	4.0	15%
Lower Agassiz Ridge	100%	0.0	0%
Middle Agassiz Ridge	100%	0.0	0%
Snowbowl	88%	22.8	23%
Sunset	95%	0.1	2%
Upper Agassiz Ridge	100%	0.0	0%
<b>Total</b>	<b>96%</b>	<b>39.4</b>	<b>16%</b>

Source: Resource Engineering, Inc, 2003

Overall, a sixteen percent increase in annual recharge would be anticipated during dry-year conditions, although for the Agassiz ridge watersheds, both existing and Alternative two

conditions reflect 100 percent watershed losses in the dry-year scenario. For the primary snowmaking watershed, a 23 percent increase in recharge would occur. The following tables show anticipated water balance characteristics in the wet-year scenario.

### *Wet Year Water Balance Characteristics*

**Table 3I-16  
Alternative 2 Wet Year Water Balance Characteristics**

<b>Watershed</b>	<b>Precipitation (AF)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>
Hart Prairie	2941.8	26.6	1311.8	1656.6
Humphreys	1,194.9	33.6	461.3	767.2
Lower Agassiz Ridge	865.9	15.0	390.6	490.3
Middle Agassiz Ridge	874.1	4.6	388.4	490.3
Snowbowl	2,730.2	156.2	1055.5	1831.0
Sunset	293.8	6.5	121.6	178.7
Upper Agassiz Ridge	1,024.9	0.4	446.0	579.3
<b>Total</b>	<b>9,925.6</b>	<b>242.9</b>	<b>4,175.2</b>	<b>5,993.4</b>

Source: Resource Engineering, Inc, 2003

**Table 3I-17  
Alternative 2 Change in Wet Year Water Balance Characteristics**

<b>Watershed</b>	<b>Percent Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	44%	11.1	1%
Humphreys	38%	15.7	2%
Lower Agassiz Ridge	44%	8.1	2%
Middle Agassiz Ridge	44%	2.3	1%
Snowbowl	37%	77.0	4%
Sunset	40%	2.4	1%
Upper Agassiz Ridge	43%	0.1	0%
<b>Total</b>	<b>42%</b>	<b>116.7</b>	<b>2%</b>

<sup>a</sup> Compared to existing conditions.

Source: Resource Engineering, Inc, 2003

In a wet year, snowmaking represents a very small percentage of the overall water balance. For the Snowbowl watershed, receiving most of the snowmaking input, the change in recharge compared to existing conditions is two percent.

### **Alternative 3**

Implementation of Alternative 3 would not include snowmaking coverage within the Snowbowl SUP area. However, implementation of Alternative 3 would entail trail construction involving clearing of vegetation on approximately 64 acres. Table 3I-18 outlines the trail construction acreage totals associated with the Alternative 3.

**Table 3I-18  
Alternative 3 Trail Clearing**

<b>Watershed</b>	<b>Trail Clearing (ares)</b>
Hart Prairie	1.6
Humphreys	2.0
Lower Agassiz Ridge	7.2
Middle Agassiz Ridge	1.6
Snowbowl	51.4
Sunset	0.2
Upper Agassiz Ridge	0.0
<b>Total</b>	<b>64.0</b>

Source: Resource Engineering, Inc., 2003

Trail clearing affects the water balance by decreasing the amount of water removed via evapotranspiration, thus increasing the quantity of water available for runoff. Interception and evaporation losses from the forest canopy would be reduced. Vegetation removal would affect the infiltration characteristics of the watershed, generally resulting in quicker runoff generation. Changes in vegetative cover also can affect the solar energy balance of the watershed, permitting increased solar radiation and therefore earlier and faster snowmelt. Vegetation removal would alter the water balance characteristics and snowmelt timing.

**Water Balance**

The following tables outline the effects of the proposed trail construction activities under Alternative 3 on the surface water balance for the various project area watersheds in an average year.

*Average Year Water Balance Characteristics*

**Table 3I-19  
Alternative 3 Average Year Water Balance Characteristics**

<b>Watershed</b>	<b>Precipitation (AF)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>
Hart Prairie	1930.1	0.0	1236.9	693.1
Humphreys	784.0	0.0	428.2	355.8
Lower Agassiz Ridge	568.1	0.0	365.3	202.8
Middle Agassiz Ridge	573.5	0.0	373.1	200.4
Snowbowl	1,791.3	0.0	919.0	872.3
Sunset	192.7	0.0	111.6	81.2
Upper Agassiz Ridge	672.4	0.0	432.8	239.7
<b>Total</b>	<b>6,512.1</b>	<b>0.0</b>	<b>3,866.9</b>	<b>2,645.3</b>

Source: Resource Engineering, Inc, 2003

**Table 3I-20  
Alternative 3 Change in Average Year  
Water Balance Characteristics**

<b>Watershed</b>	<b>Percent Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	64%	0.0	0%
Humphreys	55%	0.8	0%
Lower Agassiz Ridge	64%	3.0	1%
Middle Agassiz Ridge	65%	0.6	0%
Snowbowl	51%	21.8	3%
Sunset	58%	0.1	0%
Upper Agassiz Ridge	64%	0.0	0%
<b>Total</b>	<b>60%</b>	<b>26.3</b>	<b>1%</b>

<sup>a</sup> Compared to existing conditions.

Source: Resource Engineering, Inc, 2003

In comparison to the combined effects of both snowmaking and trail clearing, the areas of trail construction alone proposed under Alternative 3 represent a fairly minor change in the annual water balance of one percent. The Snowbowl watershed, slated to receive most of the proposed trail construction, would experience a three percent change in the annual water balance.

*Dry Year Water Balance Characteristics*

**Table 3I-21  
Alternative 3 Dry Year Water Balance Characteristics**

<b>Watershed</b>	<b>Precipitation (AF)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>
Hart Prairie	794.3	0.0	776.7	17.6
Humphreys	322.6	0.0	294.8	27.9
Lower Agassiz Ridge	233.8	0.0	233.8	0.0
Middle Agassiz Ridge	236.0	0.0	236.0	0.0
Snowbowl	737.2	0.0	614.8	122.4
Sunset	79.3	0.0	74.7	4.6
Upper Agassiz Ridge	276.7	0.0	276.7	0.0
<b>Total</b>	<b>2,679.9</b>	<b>0.0</b>	<b>2,507.5</b>	<b>172.5</b>

Source: Resource Engineering, Inc, 2003

**Table 3I-22  
Alternative 3 Change in Dry Year  
Water Balance Characteristics**

<b>Watershed</b>	<b>Percent Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	98%	0.0	0%
Humphreys	91%	0.8	3%
Lower Agassiz Ridge	100%	0.0	0%
Middle Agassiz Ridge	100%	0.0	0%
Snowbowl	83%	22.8	23%
Sunset	94%	0.1	2%
Upper Agassiz Ridge	100%	0.0	0%
<b>Total</b>	<b>95%</b>	<b>23.7</b>	<b>4%</b>

<sup>a</sup> Compared to existing conditions.

Source: Resource Engineering, Inc, 2003

During dry years, the Snowbowl watershed, experiencing most of the proposed trail construction, would experience a 23 percent increase in recharge as compared to existing conditions. Changes in vegetative cover would be likely to increase the potential for surface runoff occurrence, which would subsequently re-infiltrate into the soils.

*Wet Year Water Balance Characteristics*

**Table 3I-23  
Alternative 3 Wet Year Water Balance Characteristics**

<b>Watershed</b>	<b>Precipitation (AF)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>
Hart Prairie	2941.8	0.0	1296.3	1645.4
Humphreys	1,194.9	0.0	442.6	752.3
Lower Agassiz Ridge	865.9	0.0	380.7	485.2
Middle Agassiz Ridge	874.1	0.0	385.4	488.7
Snowbowl	2,730.2	0.0	954.6	1,775.6
Sunset	293.8	0.0	117.4	176.4
Upper Agassiz Ridge	1,024.9	0.0	445.7	579.1
<b>Total</b>	<b>9,925.6</b>	<b>0.0</b>	<b>4,022.7</b>	<b>5,902.7</b>

Source: Resource Engineering, Inc, 2003

**Table 3I-24  
Alternative 3 Change in Wet Year  
Water Balance Characteristics**

<b>Watershed</b>	<b>Percent Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	44%	0.0	0%
Humphreys	37%	0.8	0%
Lower Agassiz Ridge	44%	2.9	1%
Middle Agassiz Ridge	44%	0.6	0%
Snowbowl	35%	21.6	1%
Sunset	40%	0.1	0%
Upper Agassiz Ridge	43%	0.0	0%
<b>Total</b>	<b>41%</b>	<b>26.0</b>	<b>0%</b>

<sup>a</sup> Compared to existing conditions.

Source: Resource Engineering, Inc, 2003

Under Alternative 3, during wet year conditions, the changes in vegetation caused by trail construction activities would result in water balance changes that would be minor fractions of the overall water input in a wet year. The Snowbowl watershed, experiencing most of the proposed trail construction, would experience a one percent increase in recharge as compared to existing conditions.

Indicator:

Modeled Anticipated Changes in Erosion/Sedimentation Due to Predicted Changes in Total Snowpack

**Alternative 1 – No Action**

Under the No Action alternative, new trail construction or grading would occur, and no changes in erosion or sedimentation would be expected.

**Alternative 2 – The Proposed Action**

In order to quantify the potential sediment yield associated with the proposed ground disturbance, the USDA-ARS Water Erosion Prediction Project (WEPP) model was applied to compute increases in sediment detachment for trail construction and improvement areas where grading would be applied, as well as areas of new road construction/improvements.

There are several primary effects to soil resources associated with graded terrain modifications. Grading and re-contouring using heavy machinery causes soils compaction and loss of soil tilth. Loss of top soil and a decrease in soils organic matter associated with disturbances to the rooting zone can reduce the soils productivity. Lastly, soils disturbances, coupled with increased water inputs in the form of snowmaking, increase the risk of soil particle detachment and transport due to surface water erosion, increasing sediment yields.

The Forest Service has developed a set of forest simulation parameters for WEPP based on model calibration and validation to observed forested watershed behavior. These custom WEPP

parameters are described in *Water Erosion Prediction Project Forest Applications*.<sup>352</sup> The WEPP model is a process-based, continuous computation, distributed parameter erosion prediction model implemented as a computer numerical simulation.<sup>353</sup> The model is based on numerical representations of the physical processes influencing runoff and sediment yield. Thus, it permits a simulation of various actual watershed processes, including: rainfall/snowfall, infiltration, runoff, soil moisture accounting, snow accumulation/melt, evapotranspiration, plant growth and litter decomposition, and sediment detachment and deposition. The model parameters include rainfall amounts and intensity, soil textural properties, plant growth parameters, residue decomposition factors, slope shape, steepness, and orientation, and soil erodibility parameters. Soils may be represented in multiple layers with multiple parameters describing texture, rock content, moisture, permeability, organic content, and cation exchange capacity. The model uses a statistically generated synthetic climate dataset to drive its simulations. The synthetic dataset is derived by applying a probabilistic model using statistical parameters computed from observed climate trends. High resolution climate data (including temperature, wind speed and direction, relative humidity, and solar radiation) is derived via a sophisticated spatial algorithm. The PRISM climate data modeling process interpolates these variables based on both geographic position and elevation, from proximal NOAA, BLM RAWS, and NRCS-SNOTEL climate stations.

The soil type chosen for simulation within WEPP was a “sandy loam.” CNF Terrestrial Ecology Survey mapping within the Snowbowl SUP confirm that the andesite/dacite-derived soils in the Snowbowl watersheds are sandy loams.

The WEPP model treats hillslope erosion and sediment detachment by modeling overland flow elements (OFE’s). The OFE’s allow the model to describe different treatment prescriptions, e.g. an upper OFE modeling a disturbed area, delivering sediment into and through a lower OFE which could model a vegetated buffer region.

The WEPP model was executed over a simulation period of 30 years. The model simulations were driven by climatic data derived from the PRISM model, corresponding to average-year conditions. The event-based model output includes rainfall events statistically generated by the USDA-ARS CLIGEN package to produce the synthetic climate dataset, and runoff events resulting from either rainfall or snowmelt. In order to simulate snowmaking water inputs under Alternative 2, the CLIGEN precipitation input was modified to reflect increased precipitation water input commensurate to the proposed quantities of snowmaking water equivalent.

The sediment yield predictions from this simulation period offer an average and maximum value for soil detachment. It should be noted that the model is run over a 30-year period using the same treatment prescription to provide a dataset of sufficient length to compute averages and return periods. The results from a 30-year simulation should not be interpreted to be potential erosion rates for full a 30-year time period following construction. Another factor of note when interpreting the model results is that the model assumes that the full area of construction is disturbed at any one time during the simulation process. In practice, disturbances associated

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<sup>352</sup> Elliot, William J and David E. Hall, 1997

<sup>353</sup> USDA Forest Service, 2000

with terrain modification would be phased over a number of years and would thereby minimize the overall extent of disturbance at any point in time.

For purposes of modeling sediment production, only graded and re-contoured areas of *new* grading, re-contouring, or ground disturbance are considered in the WEPP modeling process. Therefore, the modeled results represent potential changes or increases in detachment due to various project elements.

To facilitate the analysis for graded terrain, the surface hydraulic conductivity was selected to be a comparatively low value of 3.5 millimeters per hour to reflect the soil compaction and decreased infiltration exhibited by areas of terrain grading and re-contouring. In order to assess the potential sediment detachment associated with the proposed terrain modifications, the WEPP model was executed for three different land cover prescriptions, alternatively modeling sediment production under the following scenarios through time:

**1. Post-Disturbance**

**Selected Land Cover Prescription:** Mechanically disturbed & compacted soils

**Cover Density:** 0 percent

**Surface Rock Fraction:** 35 percent

**2. Re-vegetated Conditions (1-4 years)**

**Selected Land Cover Prescription:** Short Grass

**Cover Density:** 35 percent

**Surface Rock Fraction:** 35 percent

**3. Future Conditions (5-10 Years)**

**Selected Land Cover Prescription:** Tall Grass

**Cover Density:** 40 percent

**Surface Rock Fraction:** 35 percent

Each of these treatment prescriptions was modeled for a representative 250 foot hillslope upper OFE transitioning into a lower OFE “buffer” of short grass, which can be conceptualized as a vegetated buffer strip. Model runs for each of the above three prescriptions were performed for each of several slope gradients, as described below.

Because land slope is one of the primary determinants driving the potential for detachment of soil particles under the influence of water-driven erosional processes, the graded areas were subdivided into zones by slope gradient as follows:

- 0 - 10 percent slope gradient
- 10 - 20 percent slope gradient
- 20 - 30 percent slope gradient
- 30 - 40 percent slope gradient
- Greater than 40 percent slope gradient

In addition to the above process for modeling regions of trail construction, sediment yield modeling for the new road segment associated with the snowmaking pond access road was performed using the WEPP: Road module, which specifically models sediment detachment and transport from road surfaces on forested lands. The road segment was modeled as a native surface, out-sloped road. Obviously, in modeling road sediment production through time, it was assumed to be a permanent additional sediment source, whose detachment rates do not decrease through time.

The breakdown of graded terrain by slope class for the Proposed Action is outlined in the following table.

**Table 3I-25  
Alternative 2 Graded Terrain By Slope Class**

<b>Soil Unit</b>	<b>&lt;10% (Acres)</b>	<b>10 - 20 % (Acres)</b>	<b>20 - 30 % (Acres)</b>	<b>30 - 40 % (Acres)</b>	<b>&gt; 40% (Acres)</b>	<b>Total<sup>a</sup> (Acres)</b>
<b>Grading</b>						
640	4.4	12.9	5.9	2.2	0.2	<b>25.6</b>
715	0.4	1.3	0.2	0.0	0.0	<b>1.9</b>
740	2.7	19.1	23.2	12.2	4.6	<b>61.7</b>
770	0.0	0.5	1.1	3.1	12.6	<b>17.3</b>
785	0.2	3.7	8.1	5.3	2.5	<b>19.9</b>
850	0.1	1.9	1.9	0.5	0.0	<b>4.5</b>
<b>Total Grading</b>	<b>7.8</b>	<b>39.5</b>	<b>40.3</b>	<b>23.4</b>	<b>19.9</b>	<b>130.9<sup>a</sup></b>
<b>Agassiz Hiking Trail Construction</b>						
770	0.0	0.0	0.0	0.0	0.6	<b>0.6</b>
<b>Road Construction</b>						
715	1.0	0.5	0.0	0.0	0.0	<b>1.6</b>
740	0.8	1.2	0.1	0.0	0.0	<b>2.0</b>
<b>Total Road Construction</b>	<b>1.1</b>	<b>1.1</b>	<b>0.1</b>	<b>0.0</b>	<b>0.0</b>	<b>2.3</b>

<sup>a</sup>Note: The total graded area reported in this table is greater than that reported in Table 2-4 (Alternatives Matrix/Summary of Environmental Consequences) table in Chapter 2. The reason for this difference is that the graded areas within this table encompass multiple disturbance types, including utility corridors. Therefore, this table considers potential erosion effects caused by all varieties of ground-disturbing activities.

Source: Resource Engineering, Inc., 2003

The options for treatment prescription and slope gradient classes were subsequently used as input to the WEPP model to produce predictions for potential sediment yield. The model results are outlined in the Table 3I-26.

**Table 3I-26  
Alternative 2 WEPP Model Predicted Erosion Rate  
(Slope Class, Tons/Acre)**

<b>Slope Gradient (%)</b>	<b>Post Disturbance</b>	<b>After Re-Vegetation, Years 2-5<sup>a</sup></b>	<b>After Re-Vegetation, Years 6 Onward<sup>a</sup></b>
<10%	0.05	0.4	0.1
10 - 20 %	0.44	1.7	0.8
20 - 30 %	1.4	2.7	1.3
30 - 40 %	4.4	3.5	1.7
>40%	14.8	4.3	2.1

<sup>a</sup>Note: Years 2-5 use the Disturbed WEPP Short Grass management prescription, while year six and onward use the Tall Grass management prescription. For slopes less than 30%, WEPP predicts more erosion for the re-vegetated prescriptions than for the skid trail prescription used for post-disturbance circumstances. Although this result is counter-intuitive, no adjustments were made during the modeling process, in order to avoid arbitrary adjustment of input parameters, and to maintain a conservative and defensible analysis.

Source: Resource Engineering, Inc, 2003

In implementation, WEPP models hillslope erosional processes, and produces site-specific predictions for both sediment detachment and sediment deposition at each model increment along both the upper and lower OFE. Thus WEPP is capable of predicting the quantity of sediment that ultimately transports through a given vegetated buffer. In practice, modeling each individual hillslope component for every region of terrain modification in the Proposed Action was impractical. Therefore, the general model results for sediment detachment per unit area (tons per acre) for each combination of prescription and slope gradient, as outlined in Table 3I-25, were selectively multiplied by the graded areas (acres) categorized by slope class, as outlined in Table 3I-26, to provide predictions of sediment detachment (tons) per graded area, as provided in Table 3I-27.

**Table 3I-27  
Proposed Action Graded Areas -  
Potential Increased Sediment Detachment Above Existing Conditions**

<b>Soil Unit</b>	<b>Post Implementation (tons)</b>	<b>Post Re-Vegetation (Years 2-5<sup>a</sup>) (tons)</b>	<b>Post Re-Vegetation (Years 6 Onward<sup>a</sup>) (tons)</b>
<b>Grading</b>			
640	26.3	48.0	22.5
715	0.9	2.9	1.3
740	162.6	158.5	76.1
770	201.6	68.7	33.5
785	74.2	58.0	28.0
850	6.4	10.3	4.9
<b>Total Detachment Grading</b>	<b>471.9</b>	<b>346.6</b>	<b>166.3</b>
<b>Agassiz Hiking Trail Construction</b>			
770	8.7	8.7	8.7
<b>Road</b>			
715	2.2	2.2	2.2
740	23.3	23.3	23.3
<b>Total Detachment Road</b>	<b>25.5</b>	<b>25.5</b>	<b>25.5</b>
<b>Road De-Commissioning</b>			
715	-14.3	-14.3	-14.3
<b>Total Detachment</b>	<b>491.8</b>	<b>366.5</b>	<b>186.2</b>

No re-vegetation was assumed to occur for road surface.  
Source: Resource Engineering, Inc, 2003

While the sediment detachment quantities predicted by this WEPP analysis are measures of potential detachment, and not actual sediment yield or delivery, the anticipated increase in post-implementation detachment of 492 tons is substantial. After re-vegetation, even with de-commissioning of a portion of the existing mountain access road reducing detachment by approximately 14 tons per year, the total increase in detachment is anticipated to be almost 186 tons. This increase is driven primarily by 43.3 acres of the 131 acres of total disturbance that are proposed to occur on slopes of 30 percent slope gradient or higher. Furthermore, five of the six affected soils mapping units have erosion hazards rated as “Severe,” while re-vegetation potential is rated as Low to Moderate.

Re-establishment of vegetative cover is of critical importance for control of potential erosion from graded terrain. Field review of graded terrain on the *Logjam* (trail #25) and *Upper Ridge* (trail #26) trails, where grading has occurred within the last six to 10 years, reveals that re-vegetation over that time period has yielded typical vegetation cover densities of only 15 to 20 percent. The surface rock fraction for graded terrain is higher, and loss of topsoil has resulted due to the turnover of graded soils. On existing graded trails, in areas where finer-grained soil particles have settled, re-vegetation has resulted in somewhat higher cover densities, ranging from 30 to 40 percent. The assumptions used for the WEPP analysis incorporate a long-term re-vegetation cover fraction attainment of 40 percent. For comparison, existing trails which have

been flush-cut exhibit excellent vegetative cover, with cover densities ranging from 70 to 80 percent, and well-established (although rocky) topsoils.

In order to sufficiently reduce the risk of increased soil loss, and reach the 40 percent long-term cover densities assumed in the WEPP model, attainment of adequate re-establishment of vegetative cover would be essential. Stockpiling of topsoil prior to grading, preservation, and re-distribution following grading, accompanied by mulching and re-vegetation, would likely result in improved re-vegetation in comparison to existing graded terrain, especially on gentler slopes (less than 30 percent slope gradient). In these areas, post-grading erosion risk would be moderate.

However, a review of Table 3I-26 reveals that for areas with greater than 30 percent slope gradient, potential immediate post-disturbance sediment detachment rates range from approximately 3 to 10 times those exhibited by slopes in the 20 to 30 percent range. Coupled with the severe erosion hazard for the affected soils units, the risk of topsoil loss is severe. Table 2-2 (Mitigation Measures and Best Management Practices) in Chapter 2 outlines several specific erosion control measures, such as jute-netting or geo-textile mesh, designed to enhance soils stabilization and re-vegetation potential for these steeper slopes. Successful implementation of such measures can reduce, but not eliminate the high risk of erosion and topsoil loss on steeper slopes. Successful and secure installation of these measures can be difficult on steeper terrain. Thus, the risk of erosion and topsoil loss following grading on slopes with gradients of 30 percent or greater would likely be moderate to high.

In interpreting the sediment yield predictions, it is important to note that the quantities refer to sediment detachment, and do not represent actual delivery of sediment to stream systems within the watersheds. Furthermore, the WEPP documentation cautions that “At best, any predicted runoff or erosion value, by any model, will be within only plus or minus 50 percent of the [actual] value. Erosion rates are highly variable, and most models can predict only a single value. Replicated research has shown that observed values vary widely for identical plots, or the same plot from year-to-year. Also, spatial variability... of soil properties add[s] to the complexity of erosion prediction.”<sup>354</sup>

### **Alternative 3**

Under Alternative 3, there are slight differences in the areas proposed for grading. Because snowmaking would not be implemented, no road would be constructed from the existing maintenance facility to the snowmaking water impoundment location, nor would the impoundment construction create ground disturbance. Further, additional water input in the form of snowmaking would not occur on the graded terrain. The breakdown of graded terrain by slope class for Alternative 3 is outlined in the Table 3I-28.

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<sup>354</sup> USDA Forest Service, 2000

**Table 3I-28**  
**Alternative 3 - Graded Terrain by Slope Class**

Soil Unit	<10% (acres)	10 - 20 % (acres)	20 - 30 % (acres)	30 - 40 % (acres)	> 40% (acres)	Total (acres)
<b>Grading</b>						
640	2.7	10.2	5.6	2.2	0.2	<b>20.8</b>
715	0.2	0.5	0.1	0.0	0.0	<b>0.9</b>
740	1.9	14.9	21.8	12.2	4.6	<b>55.3</b>
770	0.0	0.5	1.1	3.1	12.6	<b>17.3</b>
785	0.2	3.7	8.1	5.3	2.5	<b>19.9</b>
850	0.1	1.9	1.9	0.5	0.0	<b>4.5</b>
<b>Agassiz Hiking Trail Construction</b>						
770	0.0	0.0	0.0	0.0	0.6	<b>0.6</b>
<b>Total</b>	<b>5.1</b>	<b>31.7</b>	<b>38.5</b>	<b>23.4</b>	<b>20.5</b>	<b>119.3<sup>a</sup></b>

<sup>a</sup>Note: The total graded area reported in this table is greater than that reported in Table 2-4 (Alternatives Matrix/Summary of Environmental Consequences) table in Chapter 2. The reason for this difference is that the graded areas within this table encompass multiple disturbance types, including utilities corridors. Therefore, this table considers potential erosion effects caused by a variety of ground-disturbing activities.  
Source: Resource Engineering, Inc, 2003

The options for treatment prescription and slope gradient classes were subsequently used as input to the WEPP model to produce predictions for potential sediment yield. The model results are outlined in Table 3I-29.

**Table 3I-29**  
**Alternative 3 - WEPP Model Predicted Erosion Rate**  
**(by Slope Class, Tons/Acre)**

Slope Gradient (%)	Post Disturbance (tons/acre)	After Re-Vegetation, Years 2-5 (tons/acre) <sup>a</sup>	After Re-Vegetation, Years 6 Onward (tons/acre) <sup>a</sup>
< 10%	0.05	0.4	0.1
10 - 20 %	0.44	1.7	0.8
20 - 30 %	1.4	2.7	1.3
30 - 40 %	4.4	3.5	1.7
> 40%	14.8	4.3	2.1

<sup>a</sup>Note: Years 2-5 use the Disturbed WEPP Short Grass management prescription, while years 6 onward use the Tall Grass management prescription. For slopes less than 30%, WEPP predicts more erosion for the re-vegetated prescriptions than for the skid trail prescription used for post-disturbance circumstances. Although this result is counter-intuitive, no adjustments were made during the modeling process, in order to avoid arbitrary adjustment of input parameters, and to maintain a conservative and defensible analysis.  
Source: Resource Engineering, Inc, 2003

The general model results for sediment detachment per unit area (tons per acre) for each combination of prescription and slope gradient as outlined in Table 3I-28 were selectively multiplied by the graded areas (acres) categorized by slope class as outlined in Table 3I-29, to yield predictions of sediment yield (tons) per graded area, as provided in Table 3I-30.

**Table 3I-30  
Alternative 3 Graded Areas  
Potential Increased Sediment Detachment  
Above Existing Conditions**

Soil Unit	Post Implementation (tons)	After Re- Vegetation, Years 2-5 (tons)	After Re- Vegetation, Years 6 Onward (tons)
<b>Grading</b>			
640	24.5	41.8	19.7
715	0.4	0.0	0.0
740	158.6	147.2	70.7
770	201.6	68.7	33.5
785	74.2	58.0	28.0
850	6.4	10.3	4.9
<b>Agassiz Hiking Trail Construction</b>			
	8.7	8.7	8.7
<b>Total Detachment</b>	<b>474.3</b>	<b>336.0</b>	<b>166.2</b>

Source: Resource Engineering, Inc, 2003

The anticipated increase in detachment immediately following project implementation is approximately 474 tons, and is three percent lower than the Proposed Action. The detachment rates are driven primarily by 42 acres of the 119 acres of total grading that are proposed to occur on slopes of 30 percent slope gradient or higher. Furthermore, five of the six affected soils mapping units have erosion hazards rated as “Severe,” while re-vegetation potential is rated as Low to Moderate.

In order to sufficiently reduce the risk of increased soil loss, and reach the 40 percent long-term cover densities assumed in the WEPP model, attainment of adequate re-establishment of vegetative cover would be essential. Stockpiling of topsoil prior to grading, preservation, and re-distribution following grading, accompanied by mulching and re-vegetation, would likely result in improved re-vegetation in comparison to existing graded terrain, especially on gentler slopes (less than 30 percent slope gradient). In these areas, post-grading erosion risk would be moderate.

However, a review of Table 3I-29 reveals that for slopes with greater than 30 percent slope gradient, potential immediate post-disturbance sediment detachment rates range from approximately 3 to 10 times those exhibited by slopes in the 20 to 30 percent range. Coupled with the severe erosion hazard for the affected soils units, the risk of topsoil loss is severe. Table 2-2 (Mitigation Measures and Best Management Practices) in Chapter 2 outlines several specific erosion control measures, such as jute-netting or geo-textile mesh, designed to enhance soils stabilization and re-vegetation potential for these steeper slopes. Successful implementation of such measures can reduce, but not eliminate the high risk of erosion and topsoil loss on steeper slopes. Successful and secure installation of these measures can be difficult on steeper terrain. Thus, the risk of erosion and topsoil loss following grading on slopes with gradients of 30 percent or greater would likely be moderate to high.

Indicator:

Analysis of Potential Changes to Soil Chemistry Due to Anticipated Increases in Soil Moisture Consistency and Nutrient Loading

**Alternative 1 – No Action**

Under the No Action alternative, input of additional water in the form of snowmaking would not occur, and no change in the soil chemistry regime would be likely to occur.

**Alternative 2 – The Proposed Action**

Summary of the Analysis Procedure

The following analysis is excerpted from the soils column test report produced by ESN Rocky Mountain.<sup>355</sup> The entire report is contained in the official project record. Soils sampling and laboratory analyses were performed in order to assess the potential changes in soil chemistry resulting from the introduction of tertiary-treated reclaimed municipal wastewater in the form of machine-produced snow. Undisturbed, intact, soil cores were collected from a location at the base of slope areas within the SUP area using a “direct push” drilling methods. One undisturbed core was also collected from two to three feet with a California Geotechnical Sampler, in order to test for soils’ physical properties. The depth of the cores ranged from 8 to 11 feet.

The site from which the cores were obtained is approximately 900 feet east (upslope) of the existing lower terminal of the Agassiz Lift. The site is located within soils mapping unit 740, within the primary watershed drainage slated to receive snowmaking water input under the Proposed Action. The soils are classified as Andic Cryoborolls. In descending order, the soil profile used in the column experiment consists of a well-decomposed A-horizon, a zone of eluviation (Ae), and B-horizon and C-horizon andesitic parent material.

The soils and parent material retrieved were used to re-construct the “in-situ” soil profile in a 10-foot long PVC column in the laboratory. This column was used to conduct a loading test on the soil using treated wastewater from the City of Flagstaff. Initial baseline soil chemistry was analyzed using representative composited samples from each of the major soils horizons (A, B, and C).

Subsequently, approximately 44 gallons of treated wastewater were percolated through the soil column over a period of roughly 60 hours. This volume is equivalent to 67.6 feet of treated wastewater application to the soil and does not take into account dilution from natural snowfall. The volume corresponds to 38 years of seasonal snowmaking application, for average operational conditions.

Two sets of water samples were collected at different stages of the test. Water samples were drawn from valves installed along the soil column at the A/B and B/C horizon boundaries, as well as at the bottom of the column. Early percolation samples were collected after 6.6 gallons had been pumped through the column. Late percolation water samples were collected after 41 gallons of treated water had passed through the column. Once percolation was complete, the soil

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<sup>355</sup> ESN Rocky Mountain, 2003

column was de-constructed and composite soil samples were collected from each horizon, in order to assess the resultant soils chemistry.

*Physical Properties of the Soils*

Some settling occurred in the column after water pumping commenced. The resulting length of each horizon (after settling) is shown below in Table 3I-31. Also shown is the weight of material removed from the column after separating each horizon and the sand pack intervals. Densities in the column were calculated based on the corrected dry weight of the soil removed from each horizon. The density can be compared to the core densities from the geotechnical sample (refer to Table 3I-32) collected at the site.

**Table 3I-31  
Soils Column Physical Properties**

Soil Horizon Column Section Units	Wet Soil Weight (pounds)	Post-run Soil Moisture (percent)	Calc. Dry Basis Soil Weight (pounds)	Settled Soil Depth (inches)	Dry Basis Soil Density (g/cm <sup>3</sup> )
A	12	27.4	8.8	16.0	1.20
B	37	13.9	32.0	51.8	1.35
C	26	22.5	20.1	34.0	1.31
<b>Total</b>	<b>75</b>			<b>102</b>	

Source: ESN Rocky Mountain, 2003

**Table 3I-32  
Moisture and Density from Advanced Terra Testing**

Core Section Units	Wet Density (lb/ft <sup>3</sup> )	Percent Moisture (percent)	Dry Density (lb/ft <sup>3</sup> )	Dry Density (g/cm <sup>3</sup> )
A	122	13.9	107	1.71
B	112	8.0	104	1.67
C	114	7.0	107	1.71
D	116	5.1	110	1.76

Source: ESN Rocky Mountain, 2003

*Soils Baseline and Post-Percolation Chemical Analysis*

An evaluation of the soil column analytical results was carried out to:

- Document variations in fecal bacteria, and trace and major cations and anions.
- Assess the environmental impact of these variations on the treated water and flushed soils.

The soil horizons and treated water were sampled and analyzed both before and after percolation of the treated wastewater. The variations of bacteria and trace and major anions and cations in the water and soils were examined both before and after percolation.

The analytical results for the water and soils are also provided in the following tables.

**Table 3I-33  
Column Test Soils Chemistry**

Method Employed		NCA 0103	EPA SW-846 9045C		HACH 9056	SM-4500	9060	SW-846 6010B				
LIMS ID	Sample ID	% Moisture	pH	Fecal Coliform	Total Phosphate	N-Ammonia	TOC	Sb	As	Ba	Be	Cd
Units		%		MPN/100 g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
101293-0001	Initial A	4.58	6.45	400	5083	< 8	1.70	< 50	< 50	188	< 2.5	< 5
101293-0002	Initial B	1.36	7.12	< 20	3802	< 8	0.37	23	32	93	< 1.0	< 2
101293-0003	Initial C	2.28	8.84	< 20	4554	< 8	0.19	16	19	76	0.9	< 1
101293-0004	Final A	27.40	7.48	< 20	4683	< 8	1.95	< 20	< 20	159	< 1.0	< 2
101293-0005	Final B	13.90	7.50	< 20	5168	< 8	0.30	20	23	68	< 0.5	< 1
101293-0006	Final C	22.50	9.30	< 20	4710	< 8	0.23	14	20	93	0.7	< 1
Method Employed		SW-846 6010B										
LIMS ID	Sample ID	Ca	Cr	Cu	Pb	Mg	Ni	K	Se	Ag	Na	Sr
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
101293-0001	Initial A	6003	12	17.1	< 25.00	6414	21	1413	< 125	< 5	< 1250	57
101293-0002	Initial B	5031	11	16.3	11.15	6613	16	576	< 50	< 2	< 500	42
101293-0003	Initial C	6667	7	14.5	8.29	6626	15	528	< 25	< 1	1571	49
101293-0004	Final A	5691	10	15.3	< 10.00	5930	17	1209	< 50	< 2	< 500	42
101293-0005	Final B	4422	8	14.0	8.01	6516	14	533	< 25	< 1	328	33
101293-0006	Final C	7194	5	10.8	9.03	5539	11	529	< 25	< 1	1938	47
Method Employed		SW-846 6010B		EPA SW-846 7471A	EPA SW-846 9056						EPA SW846 1664	
LIMS ID	Sample ID	Tl	Zn	Hg	Br	Cl	F	SO <sub>4</sub>	NO <sub>3</sub>	NO <sub>2</sub>	O&G	
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
101293-0001	Initial A	< 100	63	< 0.03	< 1.0	6	< 1.0	2	51.0	< 1.0	52	
101293-0002	Initial B	< 40	55	< 0.03	< 1.0	1	< 1.0	< 2	< 1.0	< 1.0	64	
101293-0003	Initial C	< 30	45	< 0.03	< 5.0	13	< 5.0	84	< 5.0	< 5.0	56	
101293-0004	Final A	< 50	58	< 0.03	< 1.0	26	< 1.0	8	< 1.0	< 1.0	59	
101293-0005	Final B	< 50	49	< 0.03	< 1.0	10	< 1.0	6	2.0	< 1.0	< 25	
101293-0006	Final C	< 50	37	< 0.03	< 5.0	13	< 5.0	39	< 5.0	< 5.0	126	

**Table 3I-34  
Column Test Water Chemistry**

Method Employed		EPA SW-846 9045C			8048	EPA SW-846 9056	SM-4500		SW-846 6010B				
LIMS ID	Sample ID	pH	TDS	Fecal Coliform	Total Phosphate	Dissolved Phosphate	Ortho-phosphate	N-Ammonia	TOC	Sb	As	Ba	Be
Units			mg/L	MPN/100 ml	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
101277-0001	Initial Water	7.47	394	< 2	< 0.5	< 0.5	< 2.00	< 0.8	4.8	<0.1	<0.1	0.27	< 0.005
101277-0002	Early Water (A/B)	6.44	349	7	< 0.5	< 0.5	< 2.00	< 0.8	12.9	<0.1	<0.1	0.26	< 0.005
101277-0003	Early Water (B/C)	6.59	355	< 2	< 0.5	< 0.5	< 2.00	< 0.8	5.8	<0.1	<0.1	0.17	< 0.005
101277-0004	Early Water (Bot. C)	7.08	558	< 2	< 0.5	< 0.5	< 2.00	< 0.8	7.9	<0.1	<0.1	0.22	< 0.005
101277-0005	Late Water (A/B)	7.17	390	14	< 0.5	< 0.5	< 2.00	< 0.8	12	<0.1	<0.1	0.26	< 0.005
101277-0006	Late Water (B/C)	6.98	387	< 2	< 0.5	< 0.5	< 2.00	< 0.8	5.3	<0.1	<0.1	0.14	< 0.005
101277-0007	Late Water (Bot. C)	7.71	404	< 2	< 0.5	< 0.5	< 2.00	< 0.8	5.2	<0.1	<0.1	0.13	< 0.005
101277-0008	Final Water	7.44	396	2	< 0.5	< 0.5	< 2.00	< 0.8	5.3	<0.1	<0.1	0.12	< 0.005
Method Employed		EPA SW-846 6010B											
LIMS ID	Sample ID	Cd	Ca	Cr	Cu	Pb	Mg	Ni	K	Se	Ag	Na	Sr
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
101277-0001	Initial Water	< 0.01	32	< 0.005	0.013	< 0.05	17	0.030	14	< 0.25	0.015	91	0.10
101277-0002	Early Water (A/B)	< 0.01	19	< 0.005	0.013	< 0.05	4	< 0.025	18	< 0.25	0.012	87	0.18
101277-0003	Early Water (B/C)	< 0.01	23	< 0.005	0.012	< 0.05	9	0.031	13	< 0.25	0.013	67	0.25
101277-0004	Early Water (Bot. C)	< 0.01	26	< 0.005	0.017	< 0.05	6	0.031	9	< 0.25	0.014	165	0.27
101277-0005	Late Water (A/B)	< 0.01	31	< 0.005	0.015	< 0.05	16	0.037	13	< 0.25	0.015	87	0.25
101277-0006	Late Water (B/C)	< 0.01	26	< 0.005	0.011	< 0.05	12	0.033	12	< 0.25	0.012	3	0.25
101277-0007	Late Water (Bot. C)	< 0.01	26	< 0.005	0.011	< 0.05	11	0.029	11	< 0.25	0.012	90	0.25
101277-0008	Final Water	< 0.01	24	< 0.005	0.011	< 0.05	8	0.031	11	< 0.25	0.011	100	0.23

**Table 3I-34, Continued  
Column Test Water Chemistry**

Method Employed		EPA SW-846 6010B		EPA SW-846 7471A	EPA SW-846 9056						EPA SW846 1664
LIMS ID	Sample ID	Tl	Zn	Hg	Br	Cl	F	SO <sub>4</sub>	NO <sub>3</sub>	NO <sub>2</sub>	O&G
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
101277-0001	Initial Water	< 0.2	0.08	< 0.0005	< 1.0	101	< 1.0	22	20	< 1.0	1.0
101277-0002	Early Water (A/B)	< 0.2	0.06	< 0.0005	< 1.0	102	< 1.0	22	21	< 1.0	8.6
101277-0003	Early Water (B/C)	< 0.2	0.02	< 0.0005	< 1.0	97	< 1.0	19	33	< 1.0	7.0
101277-0004	Early Water (Bot. C)	< 0.2	0.03	< 0.0005	< 1.0	109	< 1.0	74	29	< 1.0	2.8
101277-0005	Late Water (A/B)	< 0.2	0.07	< 0.0005	< 1.0	102	< 1.0	21	19	< 1.0	1.7
101277-0006	Late Water (B/C)	< 0.2	0.10	< 0.0005	< 1.0	101	< 1.0	24	19	< 1.0	1.0
101277-0007	Late Water (Bot. C)	< 0.2	0.05	< 0.0005	< 1.0	102	< 1.0	23	19	< 1.0	1.0
101277-0008	Final Water	< 0.2	0.04	< 0.0005	< 1.0	103	< 1.0	28	20	< 1.0	< 1.0

Only those analyses that show a noticeable change in the treated water and soil are described and discussed in the following section. These include major cations and anions, acidity and fecal coliform. Trace elements (e.g., Ni, Zn, Cu) were at or near detection limit levels in the water (i.e., below EPA limits for primary drinking water) and these constituents exhibit only minor concentration variations in the soils after water percolation.

### Summary of the Changes to Soil and Water Chemistry

#### *Variations noted in the treated water after flow through the soil column*

1. Moderate increase of fecal coliform (0-2 MPN/100 ml), strontium (0.096 to 2.3 mg/L), and sulfate (22 to 28 mg/L)
2. Minor increase of nickel, chloride and total organic carbon
3. Minor decrease of barium, magnesium, zinc, calcium and potassium

#### *Changes to the A-horizon soil after water percolation*

1. Moderate increase of chloride (6.4 to 26.3 mg/kg), sulfate (2.1 to 8.5 mg/kg), and pH (6.45 to 7.48)
2. Moderate decrease of fecal coliform (400 to 0 MPN/100 g), nitrate (51 to 0mg/kg), phosphate (5,083 to 4,683 mg/kg)
3. Minor decrease of potassium, calcium, magnesium, strontium, barium, chromium, copper, nickel, and zinc

#### *Changes to the B-horizon soil after water percolation*

1. Moderate increase of chloride (1.5 to 10.4 mg/kg), sulfate (0 to 5.6 mg/kg), nitrate (0 to 2 mg/kg) and total phosphate (3,802 to 5,168 mg/kg)
2. Minor decrease of potassium, calcium, strontium, barium, chromium, copper, nickel, and zinc

#### *Changes to the C-horizon parent material after water percolation*

1. Moderate increase of barium (76 to 93 mg/kg), calcium (6,667 to 7194 mg/kg), and pH (8.84 to 9.3)
2. Minor increase of chloride and total phosphate
3. Moderate decrease of sulfate (84 to 39 mg/kg) and magnesium (6,626 to 5,539 mg/kg)
4. Minor decrease of strontium, chromium, copper, nickel and zinc

#### *Fecal Coliform*

As indicated in the results of the column test experiment, all fecal coliform is contained in the A-horizon soil in relatively minor amounts and is a result of animal droppings. Sampling and analysis of waters after 6.6 and 41.2 gallons of percolation reveals most of the fecal coliform in water draining the A-horizon soil as expected. With time, the fecal coliform bacteria are eradicated by the chlorinated treated water, leaving no colonies in the soil after percolation of the 44 gallons. Only traces of fecal coliform remain in the water after percolation of all the water.

### Soil Acidity

Sulfate and chloride can contribute to soil acidity by complexing with free hydrogen to form sulfuric and hydrochloric acid respectively. In the case of the Snowbowl soils, sulfate is being flushed out of the C-horizon parent material, but chloride is accumulating in all horizons. Measurements of pH, however, suggest that chloride is not contributing to acidity in these soils. In fact, the natural acidity of the soils is buffered to more neutral values by percolation of treated water through the column. Early water samples from the A/B and B/C intervals are acidic, but later samples from these intervals reveal more neutral values. This is probably the result of the water flushing out organic acids in the A- and B-horizons. Buffering of the A- and B-horizons by the treated water helps prevent the dissolution and loss of toxic metals (e.g., Ni, Cr) to the groundwater and also allows for adequate supply of essential micronutrients (e.g., Fe, Mn, Cu, Zn and Co). The low-level addition of chloride to the soils is not detrimental to plant growth because it is an essential micronutrient at these levels.<sup>356</sup>

### Essential Nutrients

In addition to the soils cores collected for the column test, 14 surficial soils samples were collected from various locations within the Snowbowl SUP area. The nutrient content for these soils was analyzed, and the results are outlined in Table 3I-35.

**Table 3I-35  
Nutrient Analysis of Snowbowl Soils**

Method Employed		EPA SW-846 9056		HACH 9056
LIMS ID	Sample ID	NO <sub>2</sub>	NO <sub>3</sub>	Phosphate
Units		mg/kg	mg/kg	mg/kg
101314-0001	SS-01	< 1.0	297	ND
101314-0002	SS-02	< 1.0	112	ND
101314-0003	SS-03	< 1.0	108	ND
101314-0004	SS-04	< 1.0	79	ND
101314-0005	SS-05	< 1.0	4	ND
101314-0006	SS-06	ND	52	ND
101314-0007	SS-07	ND	24	< 2.0
101314-0008	SS-08	<1.0	123	ND
101314-0009	SS-09	<1.0	176	< 2.0
101314-0010	SS-10	<1.0	33	4.5
101314-0011	SS-11	2.2	153	< 2.0
101314-0012	SS-12	<1.0	100	< 2.0
101314-0013	SS-13	ND	2	ND
101314-0014	SS-14	ND	70	ND

ND = Not Detected at Specified Reporting Limit  
Source: ESN Rocky Mountain, 2003

<sup>356</sup> Brady, 1990

Although the reclaimed water contains high levels of nitrate (approximately 20 mg/L), the soils column experiment shows leaching of nitrate from the soils by the treated wastewater. The soils column test, simulating many years of water loading, removes such processes as vegetative uptake and biological nitrogen fixation from the nutrient dynamics of the soils.

In the 14 soils analyzed the nitrate content ranges from two to 297 mg/kg with a median concentration of 85 mg/kg. The results of the column test suggest that most of this nitrate would leach to groundwater early in the percolation of the treated wastewater. The nitrate would, however, be replenished to the soil through biological fixation of nitrogen from the atmosphere (i.e., conversion of N<sub>2</sub> to ammonia by soil microorganisms) and from deposition of nitrogen compounds from rain and snow.<sup>357</sup> Rates of nitrogen addition to soil by biological fixation and precipitation have been estimated at 15 and 5-8 kg/ha respectively.<sup>358</sup> Ammonia inputs would be oxidized to nitrate during the summer months by the nitrification process. The A-horizon soils promote nitrification because they are well aerated with an abundance of carbon and base-forming cations (e.g., Ca). The laboratory column experiment suggests that although some of the soluble nitrate would be leached in the spring by percolation of treated water from melting snow, it would be replenished during the summer months.

The manner in which these dynamics would be manifested in field conditions is subject to some uncertainty. The addition of reclaimed water had the effect of removing nitrogen from the soils in the accelerated laboratory experiment. However, the laboratory experiment does not consider the important processes of vegetative uptake, or nutrient cycling by soils microbes. Infiltration of reclaimed water snowmelt would occur over seasonal, annual, and decadal time scales. Under field conditions, the increased nitrogen loading via application of reclaimed water would be subject to uptake from vegetation and microbes, and could increase nitrogen availability in the soils.

A controlled experimental nitrogen fertilization study in the Loch Vale and Fraser experimental forests in northern Colorado from 1997-1999 offers some insight into potential soils response to increased nitrogen loading in a coniferous forest.<sup>359</sup> Two sites were treated with an ammonium nitrate (NH<sub>4</sub>NO<sub>3</sub>) fertilizer at a rate of 25 kg N/ha<sup>-1</sup>/yr<sup>-1</sup>.<sup>360</sup> The results of the study support the conclusion that generally, in nitrogen-limited forests, the available nitrogen pool does increase in response to fertilization. Initially, the increased nitrogen inputs were realized in the soil as organic nitrogen, and in the vegetation as increased foliar nitrogen levels.<sup>361</sup> This trend continued until the carbon-to-nitrogen (C:N) ratio of the forest soil reached a specific threshold, after which further nitrogen additions increased the rate of nitrogen mineralization by the soil and inorganic soil nitrogen levels.<sup>362</sup> Once this threshold was reached, increased rates of nitrogen cycling, and subsequent increased rates of nitrogen leaching from the soil were observed.<sup>363</sup>

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<sup>357</sup> Id.

<sup>358</sup> Id.

<sup>359</sup> Rueth, et al. 2003.

<sup>360</sup> Id.

<sup>361</sup> Id.

<sup>362</sup> Id.

<sup>363</sup> Id.

It is likely that the response of the soils at the Snowbowl to increased nitrogen inputs would be similar. The increased nitrogen loading via application of the reclaimed wastewater would be likely to initially cause increases in organic and bio-available nitrogen within the soils, until reaching a similar threshold. Subsequently, increases in nitrogen mineralization and inorganic nitrogen would be expected, followed by increased leaching of excess nitrogen through the soils column.

A small amount of potassium was flushed from the soil (approximately 4.0 ppm) early in the percolation, but the overall potassium concentration of the soil is not affected by percolation of the treated water. In the column test, a substantial amount of phosphate leached from the A-horizon and re-precipitated in the B-horizon, but this phosphate was not detected in the early, late, or final water samples. The phosphate was therefore not being flushed from the soils by the treated water.

#### *Total Dissolved Solids*

Total Dissolved Solids (TDS) expresses the total concentration of solids remaining when a water sample is evaporated to dryness. The TDS of the treated water increases sharply in the early water sample from the bottom of the C-horizon and this probably reflects rapid flushing of sulfate from the parent material and strontium from soils to the treated water. The overall salinity or TDS of the treated water would not be expected to change noticeably via percolation of treated water through the soil profile.

#### *Total Organic Carbon*

Organic carbon creates reducing conditions in aquifers and surface waters, which can create biological oxygen demand (BOD) and hinder aquatic life habitat. The percolated treated water is receiving carbon mainly from the A-horizon, but the amount is inconsequential in relationship to the potential for change in redox conditions in groundwater and discharge areas.

#### *Base-forming Cations*

Calcium, which is an important cation for buffering acidity, uptake of nutrients for plants, and nitrification processes can contribute to water hardness depending on the amounts flushed to soil solution and groundwater. The calcium in this case is leached from both A- and B-horizons, but it is re-precipitated or adsorbed in the C-horizon. It would therefore not be flushed out of the soils to potentially contribute to the hardness of the groundwater. Strontium, on the other hand, would be flushed out of the A-horizon mainly, but minor increases in concentration in the treated water does not contribute to higher total dissolved solids.

#### *Conclusions*

The primary conclusions of the soil column experiment are:

1. Percolating treated wastewater through the soil profile would be unlikely to have a negative impact on either the soils or treated water.
2. Fecal coliform in the A-horizon soil could be reduced via the percolation of chlorinated wastewater. However, under field conditions, due to the chlorine's volatility and the aerating effect of distribution through snowmaking, the quantity of chlorine within the

snowpack would be reduced, and the subsequent effect on soils bacteria would be less than observed in the laboratory.

3. Chloride and sulfate would be added to both the A- and B-horizon soils. A larger amount of sulfate could be lost from the C-horizon parent material to the groundwater. The low-level addition of these essential nutrients to the soils is generally beneficial to plant growth.
4. The acidity of the soil and parent material would be progressively buffered to more alkaline levels by percolation of the treated wastewater. The higher alkalinity would inhibit the leaching and mobilization of toxic metals to the groundwater, and would allow for an adequate supply of bio-available micronutrients (e.g. Fe, Mn, Cu, Zn, Co) to remain available for plant growth.
5. Nitrate, which is concentrated in A-horizon soil, would leach to the groundwater as the treated wastewater percolates through the column. The nitrate, however, would be replenished during the summer months by the addition of ammonia from the atmosphere through biological fixation and precipitation with subsequent oxidation of the ammonia to nitrate. However, under field conditions the nitrogen dynamics would differ. Due to vegetative and microbial assimilation, the increased nitrogen loading via the application of reclaimed water would initially increase organic nitrogen content and availability in the soils. After reaching a new dynamic equilibrium, however, further nitrogen inputs would be realized as increases in soils nitrogen mineralization, inorganic nitrogen, and leaching from the surface soils horizon. Other essential nutrients (i.e. potassium, phosphate, and sulfate) would not be removed from the A- and B horizon soils in substantial amounts.
6. Although the results of the column test show that salinity of the treated water (TDS) increases initially because of the addition of sulfate and strontium from the parent materials and soils, the overall salinity of the reclaimed water would be unlikely to change substantially through the soils column.
7. The total organic carbon content of the treated wastewater increased slightly, but would be unlikely to produce more reduced conditions in groundwater.

Although the results of the column test show that salinity of the treated water (TDS) increases initially because of the addition of sulfate and strontium from the parent materials and soils, the overall salinity of the reclaimed water would be unlikely to change substantially through the soils column.

The total organic carbon content of the treated wastewater increased slightly, but would be unlikely to produce more reduced conditions in groundwater.

### **Alternative 3**

Under Alternative 3, input of additional water in the form of snowmaking would not occur, and changes in the soil chemistry regime are not anticipated. However, the proposed grading activities, using heavy machinery, would cause soils compaction and loss of soil tilth. Loss of top soil and a decrease in soils organic matter associated with disturbances to the rooting zone could reduce the soils productivity.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

The temporal extent for the cumulative effects to soils and geological resources includes the lifespan of past, present, and reasonably foreseeable future projects outlined in Table C-1, located in Appendix C. This time period begins with initial construction of ski area trails and infrastructure in the late 1930s. The listed projects include various on-going activities, including private land development, whose timing is indefinite. For the purposes of this cumulative effects analysis, a period of 10 years from the date of this document has been considered.

#### **Spatial Bounds**

The spatial extent for the cumulative effects analysis is limited to the Snowbowl SUP area and adjacent restoration and development activities, as defined below.

### **Past, Present, and Reasonably Foreseeable Future Actions**

Past, present and reasonably foreseeable future projects that, in addition to Snowbowl's existing and proposed facilities, could cumulatively affect soils and geological resources include:

1. San Francisco Mountain Mineral Withdrawal/White Vulcan Mine Settlement
2. Bebbs Willow Restoration Project
3. Transwestern Lateral Pipeline Project
4. Inner Basin Water Pipeline Development and Maintenance
5. Private Land Development
6. Miscellaneous/ongoing Recreational Uses
7. Miscellaneous facilities and trail construction within Snowbowl's SUP area
8. Patented mining claims on the east slopes of the Peaks are experiencing erosion problems

In addition, three indicators that were addressed in the direct and indirect analysis are repeated in this cumulative effects analysis to provide a conservative analytical reference point from which to compare cumulative basin water balance changes between pre-development conditions and proposed conditions within the SUP area. The analysis assumes that that undeveloped forested conditions exhibited 100 percent cover density. Actual conditions in a forest unaffected by human influences vary over time through cycles of fire, re-growth, and variation in vegetation species and density, and do not necessarily reflect a fully forested, mature vegetative cover.

These effects reflect the differences in the water balance between mature forest, and conditions where the fully forested baseline has been altered by the presence of vegetative clearing to construct existing ski trails and additional snowmaking water applications. The differences in the water balance between two different scenarios were analyzed:

1. Forest environment undisturbed by human activities, with mature trees, and a canopy with 100 percent cover density
2. Forest environment with the existing and proposed trail and snowmaking infrastructure present

### San Francisco Mountain Mineral Withdrawal

As part TCP designation, the Peaks and surrounding area were withdrawn from availability for mineral entry in 2000. This action precludes individuals and entities from staking a mineral claim in preface to planned extraction activities within the withdrawn area. In addition, a condition of the White Vulcan Mine Settlement which stimulated TCP designation and mineral withdrawal actions, stipulated that Tufflite Inc. and its affiliates relinquish all of their mining claims within the TCP. This action has and will provide added protection for soils and will decrease erosion potential by limiting potential ground disturbing activities associated with mining. The settlement also requires that the White Vulcan Mine site be completely reclaimed within 10 years of the date of the settlement.

### Bebbs Willow Restoration Project

In its Environmental Assessment,<sup>364</sup> the Forest Service anticipates that: “Soil condition will not be significantly affected by the thinning and tree removal aspect of the project.” No heavy equipment will be used to harvest trees or pile slash. Most of the tree cutting will be accomplished by hand, producing no impact to the soil surface. Some soil cover and increase in coarse woody debris will result from the boles and limbs of the trees that remain after burning. By removing all trees over 60 acres and thinning trees less than six inches DBH over 288 acres, the grassland character of the prairie will be promoted. Ground cover composition will favor grasses and plant litter over needle cast from conifer trees.

Low-intensity fire can promote sediment production in the short term, before vegetation is re-established. In a natural fire disclimax, however, grassland vegetation re-establishes quickly. Over the long term, frequent, low-intensity fires that mimic the natural fire cycle can reduce sediment production by reducing the probability of a high-intensity fire and subsequent loss of soil organic matter and productivity.

### Transwestern Lateral Pipeline

On-going operation and maintenance of the pipeline includes potential soil-disturbing activities, due to equipment and pipeline access. Many of these effects would be temporary during construction activities; however some activities could result in soil compaction and potential loss of productivity that would be cumulative in nature.

### Inner Basin Water Pipeline Maintenance

Maintenance of the existing water pipeline operated by the City of Flagstaff within the Inner Basin on the northern slopes of the San Francisco Peaks includes pipeline repair and replacement activities that would involve soils disturbances from equipment access, as well as disturbance of

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<sup>364</sup> USDA Forest Service, 2001b.

shallow soil horizons during pipeline repairs. Many of these effects would be temporary during construction activities; however some activities could result in soils compaction and potential loss of productivity that would be cumulative in nature.

### Private Land Development

Construction of houses and other buildings and infrastructure on private lands located within the lower Hart Prairie has and may continue to create localized soil disturbances associated with equipment access and construction activities. During construction, when vegetation is removed and soils are exposed, there is the potential for soil loss via erosion and sediment transport. The risk of soil loss typically decreases after landscaping and re-vegetation is complete. Many of these effects would be temporary during construction activities; however some activities could result in soils compaction and potential loss of productivity that would be cumulative in nature. Currently, there are approximately 13 summer homes developed in the lower Hart Prairie area. Additionally there are approximately four parcels of land which could potentially be developed as home sites.

### Miscellaneous Recreational Uses

The San Francisco Peaks region is a popular destination for recreational activities, and recreational use is likely to increase in the future.<sup>365</sup> On-going recreational uses include hiking, camping, horse-back riding, bicycling, and off-road vehicle use. Scattered throughout the vicinity, recreational uses can cause loss of vegetative ground cover, soil compaction, localized erosion, and increased runoff. Although these effects are widely distributed in nature, and mitigated by Forest Service BMP's concerning recreational uses, they do represent cumulative impacts to soils resources.

### Alternative 1 – No Action

Sediment-related cumulative effects are somewhat difficult to quantify. Existing conditions reflect changes in sediment yield, soils compaction and productivity that are reflective of distinct differences in land use, management, and cover between pre-Snowbowl development conditions and the modern ski area infrastructure, and are difficult to quantify accurately. Nonetheless, ground disturbance associated with past development/construction activities at the Snowbowl have cumulatively impacted soil resources in, and in the vicinity of, the SUP area from time to time. Historic and on-going operational and maintenance activities involve continuing use of existing roads, as well as some level of soils disturbance associated with routine construction and maintenance activities. Many of the effects are temporary during construction activities; however some activities would result in compacted soils and loss of organic matter, which would be ultimately permanent in nature, and therefore cumulative in effect beyond existing conditions.

Nonetheless, two activities noted above - San Francisco Mountain Mineral Withdrawal and Bebb's Willow Restoration – would cumulative benefit soil resources in the area.

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<sup>365</sup> USDA Forest Service, 2001b.

Indicator:

Modeled Anticipated Changes In The Duration And Intensity Of Annual Snowmelt Compared To Historic Natural Variation

The cumulative changes in the water balance for Alternative 1 may be portrayed by comparing existing conditions to inferred pre-development conditions. The following tables display this comparison for average, dry, and wet-year climatic scenarios. Because precipitation inputs remain the same as those outlined in the previous sections, the tables show only the areas of trail construction, the projected watershed losses, recharge and the percent change versus pre-development conditions for each pertinent watershed.

**Table 3I-36**  
**Alternative 1 Average Year Water Balance Cumulative Effects**

<b>Watershed</b>	<b>Trail Construction (Acres)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>% Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	0.64	1236.9	693.1	64%	9.8	1%
Humphreys	0.59	429.0	355.0	55%	0.2	0%
Lower Agassiz Ridge	13.50	368.3	199.8	65%	5.2	3%
Middle Agassiz Ridge	3.30	373.7	199.8	65%	1.3	1%
Snowbowl	123.10	940.8	850.5	53%	49.7	6%
Sunset	0.00	111.6	81.1	58%	0.0	0%
Upper Agassiz Ridge	0.00	432.8	239.7	64%	0.0	0%
<b>Total</b>	<b>145.0</b>	<b>3893.1</b>	<b>2619.0</b>	<b>61%</b>	<b>66.2</b>	<b>3%</b>

<sup>a</sup> Compared to pre-development conditions.  
Source: Resource Engineering, Inc, 2003

**Table 3I-37**  
**Alternative 1 Dry Year Water Balance Cumulative Effects**

<b>Watershed</b>	<b>Trail Construction (Acres)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>% Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	0.64	776.7	17.6	98%	5.2	42%
Humphreys	0.59	295.6	27.0	92%	0.2	1%
Lower Agassiz Ridge	13.50	233.8	0.0	100%	0.0	0%
Middle Agassiz Ridge	3.30	236.0	0.0	100%	0.0	0%
Snowbowl	123.10	637.6	99.5	86%	52.0	109%
Sunset	0.00	74.8	4.5	94%	0.0	0%
Upper Agassiz Ridge	0.00	276.7	0.0	100%	0.0	0%
<b>Total</b>	<b>145.0</b>	<b>2531.3</b>	<b>148.7</b>	<b>96%</b>	<b>57.4</b>	<b>63%</b>

<sup>a</sup> Compared to pre-development conditions.  
Source: Resource Engineering, Inc, 2003

**Table 3I-38  
Alternative 1 Wet Year Water Balance Cumulative Effects**

<b>Watershed</b>	<b>Trail Construction (Acres)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>% Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	0.64	1296.3	1645.4	44%	9.8	1%
Humphreys	0.59	443.4	751.5	37%	0.2	0%
Lower Agassiz Ridge	13.50	383.6	482.3	44%	5.1	1%
Middle Agassiz Ridge	3.30	386.0	488.0	44%	1.3	0%
Snowbowl	123.10	976.2	1,754.0	36%	49.3	3%
Sunset	0.00	117.4	176.3	40%	0.0	0%
Upper Agassiz Ridge	0.00	445.7	579.1	43%	0.0	0%
<b>Total</b>	<b>145.00</b>	<b>4048.9</b>	<b>5876.6</b>	<b>41%</b>	<b>65.7</b>	<b>1%</b>

<sup>a</sup> Compared to pre-development conditions.

Source: Resource Engineering, Inc, 2003

A review of the water yield comparisons for the No Action alternative reveals that existing and Alternative 1 conditions reflect an approximate three percent change in annual recharge under average-year conditions, a 16 percent change in dry year conditions, and a one percent change in wet-year conditions, when compared to pre-development conditions. For the primary Snowbowl watershed, which contains the bulk of the existing trail system, the Alternative 1 cumulative changes are six percent, 109 percent, and three percent, for the average, dry, and wet scenarios, respectively.

### **Alternative 2 – The Proposed Action**

The Proposed Action would involve approximately 10.4 acres of permanent ground disturbance and 245.4 acres of temporary ground disturbance both within, and outside of, the SUP area.

The soils compaction and turnover associated with the proposed grading and trail construction activities would cause compaction of soils and loss of organic matter and tilth that would ultimately be permanent in nature, and therefore cumulative when considered with other past, present and reasonably foreseeable future actions, both within and outside of the SUP area. The estimates of increased sediment detachment would result in cumulative increases in sediment production of 186 tons for Alternative 2. Under Alternative 2, the anticipated decrease in detachment associated with decommissioning a section of existing access road would be 14.3 tons. The new road segment to serve the snowmaking water impoundment access road in Alternative 2 would represent an increase of 25.5 tons of sediment detachment. The net result would be an increase in road detachment of 11.2 tons that contributes six percent of the anticipated cumulative increase of 186 tons. These quantities represent detachment, not transport, but highlight the importance of implementation and operational practices designed to manage water drainage, facilitate re-vegetation, and minimize sediment transport.

When considered with the Transwestern Lateral Pipeline construction, Inner Basin water pipeline maintenance, private land development and miscellaneous recreational uses, the Proposed Action represents a cumulative effect to soil resources in the analysis area.

Indicator:

Modeled Anticipated Changes In The Duration And Intensity Of Annual Snowmelt Compared To Historic Natural Variation

The snowmaking and trail construction of the Proposed Action would result in cumulative water balance effects, for average, dry, and wet-year climates as indicated in the following tables.

**Table 3I-39**  
**Alternative 2 - Average Year Water Balance Cumulative Effects**

<b>Watershed</b>	<b>Trail Construction (Acres)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>% Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	3.7	39.9	1254.0	716.0	64%	32.6	5%
Humphreys	9.6	50.4	451.8	382.5	54%	27.8	8%
Lower Agassiz Ridge	7.2	22.5	377.5	213.2	64%	18.5	10%
Middle Agassiz Ridge	1.6	6.9	376.7	203.7	65%	5.1	3%
Snowbowl	54.0	234.0	1,043.0	982.3	51%	181.5	23%
Sunset	0.2	9.8	116.7	85.7	58%	4.7	6%
Upper Agassiz Ridge	0.0	0.5	433.0	239.9	64%	0.3	0%
<b>Total</b>	<b>76.3</b>	<b>364.0</b>	<b>4052.8</b>	<b>2823.3</b>	<b>60%</b>	<b>270.5</b>	<b>8%</b>

<sup>a</sup> Compared to pre-development conditions.  
Source: Resource Engineering, Inc, 2003

**Table 3I-40**  
**Alternative 2 - Dry Year Water Balance Cumulative Effects**

<b>Watershed</b>	<b>Trail Construction (Acres)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>% Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	3.7	53.3	817.5	30.1	96%	17.7	142%
Humphreys	9.6	67.3	358.8	31.1	92%	4.3	16%
Lower Agassiz Ridge	7.2	30.1	263.9	0.0	100%	0.0	0%
Middle Agassiz Ridge	1.6	9.2	245.2	0.0	100%	0.0	0%
Snowbowl	54.0	312.4	927.2	122.4	88%	74.8	157%
Sunset	0.2	13.0	87.8	4.6	95%	0.1	2%
Upper Agassiz Ridge	0.0	0.7	277.4	0.0	100%	0.0	0%
<b>Total</b>	<b>76.3</b>	<b>486.0</b>	<b>2977.9</b>	<b>188.1</b>	<b>96%</b>	<b>96.9</b>	<b>45%</b>

<sup>a</sup> Compared to pre-development conditions.  
Source: Resource Engineering, Inc, 2003

**Table 3I-41  
Alternative 2 - Wet Year Water Balance Cumulative Effects**

<b>Watershed</b>	<b>Trail Construction (Acres)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>% Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	3.7	26.6	1311.8	1656.6	44%	21.0	1%
Humphreys	9.6	33.6	461.3	767.2	38%	16.0	2%
Lower Agassiz Ridge	7.2	15.0	398.7	482.3	45%	5.1	1%
Middle Agassiz Ridge	1.6	4.6	384.6	494.1	44%	7.3	1%
Snowbowl	54.0	156.2	1,090.1	1,796.3	38%	91.6	5%
Sunset	0.2	6.5	121.6	178.7	40%	2.4	1%
Upper Agassiz Ridge	0.0	0.4	446.0	579.3	43%	0.1	0%
<b>Total</b>	<b>76.3</b>	<b>243.0</b>	<b>4175.2</b>	<b>5993.3</b>	<b>42%</b>	<b>182.4</b>	<b>2%</b>

<sup>a</sup> Compared to pre-development conditions.  
Source: Resource Engineering, Inc, 2003

A review of the water yield comparisons for the Proposed Action reveals that Alternative 2 conditions reflect an approximate 8 percent change in annual recharge under average conditions, 45 percent in dry year conditions, and two percent in wet year conditions, when compared to pre-development conditions. For the primary Snowbowl watershed, which would experience most of the proposed snowmaking and trail construction, cumulative changes associated with the Proposed Action are 23 percent, 157 percent, and five percent, for the average, dry, and wet scenarios, respectively.

The primary potential cumulative effect of the changes in the water balance, paired with changes in soils properties caused by the proposed trail construction and trail grading, would be enhancement of the potential for concentrated surface flows. In addition, field review reveals that in existing areas of heavily graded terrain, surface overland flow does occur during the snowmelt season. The increases in water input due to snowmaking would be likely to enhance the potential for further rilling and incisement of flow channels, and transport of surface sediments on graded terrain. As discussed in the Direct and Indirect Effects section, the risk of surface flow and rilling would be minimal for ungraded and flush-cut terrain. For graded terrain, implementation of adequately spaced waterbars to route and dissipate surface flows, coupled with successful re-vegetation, would mitigate the risk of surface rilling in areas where topographic constraints do not tend to channelize and concentrate flows. In areas where topographic lows tend to concentrate any occurring surface flows, the risk of rilling and sedimentation would be moderate to high for graded terrain.

Indicator:

Analysis Of Potential Changes To Soil Chemistry Due To Anticipated Increases In Soil Moisture Consistency And Nutrient Loading

Soil Acidity

The laboratory column experiment suggests that application of the reclaimed water product via snowmaking would increase the alkalinity of the receiving soils, thereby resulting in an increased buffering capacity. Mixed and diluted by natural precipitation, this buffering effect would be

reduced. However, over time, the cumulative trend would be towards slightly more alkaline soils over natural conditions.

### Essential Nutrients

A review of the existing nitrogen content for the soils within the SUP area reveals nominal levels of nitrate. The laboratory experiment, conducted on an accelerated timescale when compared to natural processes, suggests that nitrate would be leached from the surface soils horizon by the reclaimed water. However, under field conditions the nitrogen dynamics would differ. Due to vegetative and microbial assimilation, the increased nitrogen loading via application of reclaimed water would initially increase organic and bio-available nitrogen content in the soils. Once a critical carbon-to-nitrogen ratio is reached, subsequent increases in nitrogen mineralization and inorganic soils nitrogen content would be realized. Subsequently, excess nitrogen would begin to leach from the soils column to groundwater. Nonetheless, these effects would be limited in spatial extent to the receiving soils within Snowbowl's ski trail corridors. Effects to the native, undisturbed soils under the forest canopy would be minimal. Increased nutrient loading could increase the biomass of grasses on existing trails, and enhance the re-vegetation process on new or recently disturbed ski trails, improving the resultant cover density for the native grass species that would be used for re-seeding and re-vegetation.

### Alternative 3

Alternative three would involve approximately 1.7 acres of permanent ground disturbance and 131.4 acres of temporary ground disturbance within the SUP area. The soils compaction and turnover associated with Alternative 3 grading and trail construction activities (after re-vegetation) would cause compaction of soils and loss of organic matter and tilth that would ultimately be permanent in nature, and therefore cumulative when considered with other past, present and reasonably foreseeable future actions, both within and outside of the SUP area. The estimates of increased sediment detachment associated with Alternative 3 would result in cumulative increases in sediment production of 166 tons. The primary difference between alternatives 2 and 3 is the lack of the proposed snowmaking water impoundment and the associated access road. The new road spur would not be present in Alternative 3, nor would decommissioning of a portion of the existing access road occur. Thus, no net changes in the road sediment detachment would be anticipated under Alternative 3. These quantities represent detachment, not transport, but highlight the importance of implementation and operational practices designed to manage water drainage, facilitate re-vegetation, and minimize sediment transport.

When considered with the Transwestern Lateral Pipeline construction, Inner Basin water pipeline maintenance, private land development and miscellaneous recreational uses, Alternative 3 represents a cumulative effect to soil resources in the analysis area, although it is less than the Proposed Action.

Indicator:

Modeled Anticipated Changes In The Duration And Intensity Of Annual Snowmelt Compared To Historic Natural Variation

Although no snowmaking is proposed under Alternative 3, clearing of vegetation and land cover changes resulting from trail construction would alter the water balance in a cumulative manner. The effects are outlined in the following tables:

**Table 3I-42**  
**Alternative 3 - Average Year Water Balance Cumulative Effects**

<b>Watershed</b>	<b>Trail Construction (Acres)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>% Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	1.6	0.0	1236.9	693.1	64%	9.8	1%
Humphreys	2.0	0.0	428.2	355.8	55%	1.0	0%
Lower Agassiz Ridge	7.7	0.0	365.3	202.8	64%	8.2	4%
Middle Agassiz Ridge	1.6	0.0	373.1	200.4	65%	1.9	1%
Snowbowl	54.0	0.0	919.0	872.3	51%	71.6	8%
Sunset	0.2	0.0	111.6	81.2	58%	0.1	0%
Upper Agassiz Ridge	0.0	0.0	432.8	239.7	64%	0.0	0%
<b>Total</b>	<b>67.1</b>	<b>0.0</b>	<b>3866.8</b>	<b>2645.3</b>	<b>60%</b>	<b>92.5</b>	<b>2%</b>

<sup>a</sup> Compared to pre-development conditions.  
Source: Resource Engineering, Inc, 2003

**Table 3I-43**  
**Alternative 3 - Dry Year Water Balance Cumulative Effects**

<b>Watershed</b>	<b>Trail Construction (Acres)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>% Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	1.6	0.0	776.7	17.6	98%	5.2	42%
Humphreys	2.0	0.0	294.8	27.9	91%	1.1	4%
Lower Agassiz Ridge	7.7	0.0	233.8	0.0	100%	0.0	0%
Middle Agassiz Ridge	1.6	0.0	236.0	0.0	100%	0.0	0%
Snowbowl	54.0	0.0	614.8	122.4	83%	74.8	61%
Sunset	0.2	0.0	74.7	4.6	94%	0.1	2%
Upper Agassiz Ridge	0.0	0.0	276.7	0.0	100%	0.0	0%
<b>Total</b>	<b>67.1</b>	<b>0.0</b>	<b>2507.6</b>	<b>172.4</b>	<b>95%</b>	<b>81.2</b>	<b>29%</b>

<sup>a</sup> Compared to pre-development conditions.  
Source: Resource Engineering, Inc, 2003

**Table 3I-44  
Alternative 3 - Wet Year Water Balance Cumulative Effects**

<b>Watershed</b>	<b>Trail Construction (Acres)</b>	<b>Snowmaking (AF)</b>	<b>Watershed Loss (AF)</b>	<b>Recharge (AF)</b>	<b>% Loss</b>	<b>Recharge Change (AF)<sup>a</sup></b>	<b>Percent Change<sup>a</sup></b>
Hart Prairie	1.6	0.0	1296.3	1645.4	44%	9.8	1%
Humphreys	2.0	0.0	442.6	752.3	37%	1.0	0%
Lower Agassiz Ridge	7.7	0.0	380.7	485.2	44%	8.1	2%
Middle Agassiz Ridge	1.6	0.0	385.4	488.7	44%	1.9	0%
Snowbowl	54.0	0.0	954.6	1,775.6	35%	70.9	4%
Sunset	0.2	0.0	117.4	176.4	40%	0.1	0%
Upper Agassiz Ridge	0.0	0.0	445.7	579.1	43%	0.0	0%
<b>Total</b>	<b>67.1</b>	<b>0.0</b>	<b>4022.8</b>	<b>5902.7</b>	<b>41%</b>	<b>91.8</b>	<b>1%</b>

<sup>a</sup> Compared to pre-development conditions.  
Source: Resource Engineering, Inc, 2003

A review of the water yield comparisons for Alternative 3 reveals an approximate two percent change in annual recharge under average conditions, 29 percent in dry year conditions, and one percent in wet year conditions, when compared to pre-development conditions. For the primary Snowbowl watershed, which would experience most of the proposed snowmaking and trail construction, the Alternative 3 cumulative changes are eight percent, 61 percent, and four percent, for the average, dry, and wet scenarios, respectively.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Because pedogenesis (development or generation of new soils) is a process that occurs over the course of decades and centuries, the effects of soils compaction, loss of organic matter and tilth, and soils loss via increased detachment and transport may be considered an irreversible commitment of resources. Careful implementation of the mitigation measures outlined in Chapter 2 would reduce the overall magnitude of these anticipated losses.

## 3J. VEGETATION

### SCOPE OF THE ANALYSIS

The analysis area for vegetation includes the SUP area, Snowbowl Road, and the proposed reclaimed water pipeline alignment between the City of Flagstaff and the SUP. Indirect effects to vegetation are considered in the areas adjacent to the SUP, Snowbowl Road, and the pipeline alignment. This includes undeveloped portions of the CNF, the Kachina Peaks Wilderness, and areas downslope of the SUP area (primarily Hart Prairie). The extent to which adjacent areas are included in the overall analysis area varies with each specific issue analyzed. Vegetation communities in the analysis area are primarily montane conifer forests and grasslands.

### EXISTING CONDITIONS

#### PLANT COMMUNITIES

The SUP is located on the southwestern slopes of the San Francisco Peaks, at elevations ranging from approximately 9,150 feet to 12,040 feet elevation. The predominant biotic community within the Snowbowl SUP is Rocky Mountain Subalpine Conifer Forest and Woodland, within the Engelmann Spruce-Subalpine Fir Series (Table 3J-1).<sup>366</sup> Subalpine or corkbark fir (*Abies lasiocarpa*) is dominant in this community, followed by Engelmann spruce (*Picea engelmannii*), and in places stands of aspen (*Populus tremuloides*) with a spruce-fir understory.

Approximately 21.7 acres of the extreme southwest corner of the SUP is mapped as Mixed Conifer Forest, within the Rocky Mountain Montane Conifer Forest biotic community. These areas support Douglas-fir (*Pseudotsuga menziesii*), limber pine (*Pinus flexilis*), and aspen, but less than five percent subalpine or corkbark fir and few Engelmann spruce.

The upper portion of Hart Prairie, in the northwest corner of the SUP, is best described as Rocky Mountain Subalpine Grassland. This area is dominated by grasses and forbs, including fescue (*Festuca spp.*), squirrel-tail (*Sitanion hystrix*), orchard grass (*Dactylis glomerata*), wheat-grass (*Agropyron trachycaulum*), deers-ears (*Swertia sp.*), silverleaf cinquefoil (*Potentilla anserina*), red-root eriogonum (*Eriogonum racemosum*), Rocky Mountain iris (*Iris missouriensis*), lupine (*Lupinus sp.*), Indian paintbrush (*Castilleja sp.*), and towering delphinium (*Delphinium tenuisectum*).

The extreme eastern extent of the SUP area, on the western slope of Agassiz Peak and above the top terminal of the Agassiz Chairlift, supports Alpine Tundra. Tundra plants are predominantly forbs, with islands of gnarled krummholz of bristlecone pine (*Pinus aristata*), corkbark fir, and Engelmann spruce.<sup>367</sup> The upper portion of Snowbowl Road winds through aspen, spruce-fir, and mixed conifer forest. The remainder of Snowbowl Road below approximately 8,000 feet in elevation and the remainder of the proposed reclaimed water pipeline alignment are located in ponderosa pine forest.

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<sup>366</sup> Brown, 1994.

<sup>367</sup> Id.

The Kachina Peaks Wilderness adjacent to the SUP supports high elevation mixed conifer forest, spruce-fir forest, and alpine tundra. The upper portion of Hart Prairie (above approximately 8,500 feet) represents subalpine grassland.<sup>368</sup> Lower portions of Hart Prairie represent montane meadow grassland, transitioning to plains grassland in the Fort Valley area.

Of the broad categories of vegetation types that occur in the project area, subalpine grassland, spruce-fir forest, and alpine tundra have the most limited extent in this region. The approximate area of these specific vegetation types within the SUP and on the San Francisco Peaks is identified in Table 3J-1 below.<sup>369</sup>

**Table 3J-1  
Approximate Area of Subalpine Grassland, Spruce-fir Forest, and Alpine Tundra in the SUP and on the San Francisco Peaks<sup>a</sup>**

Type	SUP <sup>b</sup>	San Francisco Peaks
Subalpine Grassland	±37 acres	1,027 acres
Spruce-fir Forest	±547 acres	7,170 acres
Alpine Tundra	±20 acres	±1,600 acres

<sup>a</sup> Areas outside SUP. Estimated based in part on descriptions in Brown (1994) and Northland Research (2003)

<sup>b</sup> Excludes developed ski trails (138.6 acres) and other developed areas such as roads, guest service facilities, parking, and buildings (±20 acres). The ±17 acres of Subalpine Grassland disturbed in Hart Prairie is still classified as such.

### **THREATENED, ENDANGERED, AND SENSITIVE SPECIES**

Section 7 of the Endangered Species Act of 1973 (ESA), as amended 1978, 1979, 1982, and 1988 declares that "...all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."<sup>370</sup> Section 7 directs Federal agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats.<sup>371</sup> Federal agencies also must consult with U.S. Fish and Wildlife Service whenever an action authorized by the agency is likely to affect a species listed as threatened or endangered or to affect its critical habitat. ESA mandates conference with the Secretary of the Interior whenever an action is likely to jeopardize the continued existence of any species proposed for listing as threatened or endangered, or whenever an action might result in destruction or adverse modification of critical habitat proposed for listing.<sup>372</sup>

Forest Service Sensitive species are defined as "those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: a) major current or predicted downward trends in population numbers or density, or b) major current or predicted downward trends in habitat capability that would reduce a species' existing distribution".<sup>373</sup> It is

<sup>368</sup> Id.

<sup>369</sup> Id.

<sup>370</sup> 16 U.S.C. 1531 et seq.

<sup>371</sup> 16 U.S.C. 1536 et sq.

<sup>372</sup> 16 U.S.C. 1536(a) 4

<sup>373</sup> FSM 2670.5(19)

the policy of the Forest Service regarding Sensitive Species to: 1) assist States in achieving their goals for conservation of endemic species, 2) as part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species, 3) avoid or minimize impacts to species whose viability has been identified as a concern, 4) if impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole (the Line Officer, with project approval authority, makes the decision to allow or disallow impacts, but the decision must not result in loss of species viability or create significant trends toward Federal listing), and 5) establish management objectives in cooperation with the State when projects on National Forest system lands may have a major effect on sensitive species population numbers or distributions. Establish objectives for Federal candidate species, in cooperation with the U.S. Fish and Wildlife Service and Arizona State.<sup>374</sup>

A Biological Assessment/Biological Evaluation (BA/BE) was prepared for this project and will be submitted to the U.S. Fish and Wildlife Service for concurrence with the determination of effects to T and E species. The Forest Service will also review and approve the BE according to its determinations for Forest Service Sensitive species.

The Threatened, Endangered, and Sensitive Species (TES) List for the Mormon Lake and Peaks Ranger District was reviewed by the Forest botanist, and a TES list was created for this project in July 2002. One federally-listed threatened plant species occurs in the analysis area: San Francisco Peaks groundsel (*Senecio franciscanus*). Critical habitat designated for this plant includes the extreme eastern portion of the SUP area, above the top terminal of the Agassiz Chairlift. Two Forest Service Sensitive plant species occur within the analysis area: bearded gentian (*Gentiana barbellata*) and Rusby's milkvetch (*Astragalus rusbyi*). Potential habitat exists within the analysis area for the Forest Service Sensitive crenulate moonwort (*Botrychium crenulatum*). This species has not been recorded within the SUP area. There are no other listed, proposed, or candidate species or their habitat in the analysis area. There is no other designated or proposed critical habitat either. Sensitive species that have been eliminated from further analysis due to lack of habitat are listed in Table 3J-2.

**Table 3J-2**  
**Forest Service Sensitive Plant Species**  
**Eliminated from Further Analysis**

Common Name	Scientific Name
Arizona Bugbane	Cimicifuga arizonica
Cliff Fleabane	Erigeron saxatilis
Flagstaff Beardtongue	Penstemon nudiflorus
Flagstaff Pennyroyal	Hedeoma diffusum
Sunset Crater Beardtongue	Penstemon clutei
Disturbed Rabbitbrush	Chrysothamnus molestus

<sup>374</sup> FSM 2670.32

### **San Francisco Peaks Groundsel (*Senecio franciscanus*) - Threatened**

San Francisco groundsel is endemic to the San Francisco Peaks and grows on gravelly, sandy loams of talus in alpine fellfield above 10,900 feet in elevation.<sup>375</sup> It is generally found on southeast exposures with 20 percent slope and reproduces mainly via rhizomes, although sexual reproduction also occurs. Flowering is from August to early September, fruits mature in mid-September, and the plant becomes winter-dormant in early October.<sup>376</sup> Critical habitat has been designated and includes a portion of the eastern-most extent of the SUP, above the Agassiz Chairlift top terminal.<sup>377</sup>

Plant populations were originally mapped and described in 1978 and 1980 and have been periodically monitored since that time. Surveys of proposed disturbance areas were completed in 1993 and 2002.<sup>378</sup> Approximately 10 individuals of San Francisco Peaks groundsel were found in an approximate one foot by one inch patch. These occur immediately adjacent to the unnamed catwalk above the Upper Bowl. They have been rocked off from the rest of the catwalk with small boulders. They occur approximately half way between the old lift terminal and the switchback. Consultation with US Fish and Wildlife Service on the effects of recreation is ongoing. The Recovery Plan for San Francisco Peaks Groundsel is currently being updated.

### **Bearded Gentian (*Gentiana barbellata*) - Sensitive**

Bearded gentian grows on moderately wet rocky slopes, meadows, and open woods in Wyoming, Utah, New Mexico, and northern Arizona. In Arizona, it is known only in the San Francisco Peaks at 8,700 to 12,000 feet.<sup>379</sup>

Surveys were conducted in 2002 for the proposed project elements within the SUP. Six individuals of bearded gentian were found, two on *Lower Bowl* (trail #29) and four on *Lower Sundance* (trail #30).<sup>380</sup> The CNF also conducted surveys over a two-week period on and around the high peaks and ridges east of the SUP area. These surveys covered an estimated 30 percent of potentially suitable habitat identified on aerial photos.<sup>381</sup>

### **Rusby's Milkvetch (*Astragalus rusbyi*) - Sensitive**

Rusby's milkvetch is a slender perennial that grows on dry basaltic soils in openings or meadows in Ponderosa Pine forest and at the edges of thickets and aspen groves. It occurs in the Flagstaff area and the lower slopes of the San Francisco Peaks at 7,000 to 8,000 feet, and down into Oak Creek Canyon.<sup>382</sup> It is known only from northern Arizona at 5,400 feet to 9,000 feet. This species is fire-adapted and has a high tolerance for disturbance.

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<sup>375</sup> Arizona Rare Plant Committee, 2001 and USFWS 1998

<sup>376</sup> USDI 1983

<sup>377</sup> USDI 1983

<sup>378</sup> Phillips, 1993 and Northland, 2003

<sup>379</sup> Northland Research, 2003 and Kearny and Peebles, 1960 and McDougall, 1973

<sup>380</sup> Northland Research, 2003

<sup>381</sup> CNF Zone Botanist personal communication, 2003

<sup>382</sup> Arizona Rare Plant Committee, 2001

Suitable habitat for Rusby's milkvetch occurs along Snowbowl Road between the SUP and U.S. Highway 180 (US 180). During surveys in 2003, it was found along two distinct segments of the road; the first was within 1-2 miles of US 180, and the second was within about 4-5 miles of US 180. Plants were found mainly in the drainage area next to the road, although some occurred higher up on the hill or cut slope. An estimated total of 120 plants were found along these two segments of Snowbowl Road.

### **Crenulate Moonwort (*Botrychium crenulatum*) - Sensitive**

The crenulate moonwort is a tiny grape-fern that was described as a separate species in 1981 from the more widespread moonwort (*Bothrychium lunaria*). This plant was first collected in 1884 on Mt. Agassiz at an elevation of 11,000 feet. The 1884 collection has been annotated as *B. crenulatum*. Several more recent collections of *B. lunaria* and other species of *Botrychium* have been made on the Peaks. The more widespread *B. lunaria* has been found on Fremont, the southwest side of Agassiz at 11,700 feet under bristlecone pine, and in the Inner Basin.<sup>383</sup> Habitat for *B. crenulatum* in California is described as "drier places of damp meadows, boggy areas ...".<sup>384</sup>

Surveys were conducted in 1993 for the catwalk between the Agassiz Chairlift mid-station and Ridge (trail #26) and for the widening of Logjam (trail #25).<sup>385</sup> Additional surveys were conducted in 2002 for the proposed project elements within the SUP.<sup>386</sup> No individuals of crenulate moonwort or any member of this genus were observed during surveys.

### **NOXIOUS WEEDS**

Noxious and invasive weeds are defined as "those plant species designated as noxious and invasive weeds by the Secretary of Agriculture or by the responsible State Official. Noxious and invasive weeds generally possess one or more of the following characteristics; aggressive and difficult to manage, poisonous or toxic, parasitic, a carrier or host of serious insects or disease, and being non-native, new to, or not common to the United States or parts thereof."<sup>387</sup>

Six species included on the Coconino, Kaibab, and Prescott National Forests Invasive Plant Species List of 2001 have been documented within the analysis area (Table 3J-3). The plants on this list have weedy characteristics that include the ability to rapidly colonize a variety of environments and geographic locations, the ability to dominate a plant community or establish a monoculture in severely disturbed areas, become a permanent member of the native plant community or colonize undisturbed native plant communities. Three weedy species have been documented in the SUP: dalmation toadflax (*Linaria dalmatica*), mullein (*Verbascum thapsus*), and houndstongue (*Cynoglossum officinale*). All of these plants were found in disturbed soils around the base of the ski area, including ski trails, roads, buildings, lifts, parking lots, and heavily used pedestrian areas such as Hart Prairie. None of these species were found spreading into undisturbed, unfragmented forest habitat, and no noxious weeds were found above 9,800

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<sup>383</sup> Phillips, 1993 and Northland Research, 2003

<sup>384</sup> Phillips, 1993

<sup>385</sup> Phillips, 1993

<sup>386</sup> Northland Research, 2003

<sup>387</sup> FSM 2080

feet in elevation.<sup>388</sup> In addition to these species, the following weedy species were also documented along Snowbowl Road and the reclaimed water pipeline alignment: bull thistle (*Cirsium vulgare*), musk thistle (*Carduus nutans*), and kochia (*Kochia scoparia*). The latter three species were found in relatively few distinct locations, while dalmation toadflax and mullein are fairly common along the length of Snowbowl Road and the length of the potential reclaimed water pipeline alignment.<sup>389</sup>

**Table 3J-3  
Noxious Plant Species Documented within the Analysis Area and their Distribution**

Common Name	Scientific Name	Distribution	Area Occupied
Dalmation toadflax	Linaria dalmatica	SUP	0.04 ac. (21 locations)
		Snowbowl Rd/Pipeline	Throughout
Mullein	Verbascum thapsus	SUP	0.003 ac. (17 locations)
		Snowbowl Rd/Pipeline	Throughout
Houndstongue	Cynoglossum officinale	SUP	0.001 ac. (3 locations)
		Snowbowl Rd/Pipeline	None
Bull thistle	Cirsium vulgare	SUP	None
		Snowbowl Rd/Pipeline	Two plants (1 location)
Musk thistle	Carduus nutans	SUP	None
		Snowbowl Rd/Pipeline	Six plants (1 location)
Kochia	Kochia scoparia	SUP	None
		Snowbowl Rd/Pipeline	30 sq. ft. (1 location)

## ENVIRONMENTAL CONSEQUENCES

### SUMMARY OF ENVIRONMENTAL CONSEQUENCES AND CONCLUSIONS

Major conclusions and determinations of this vegetation analysis are summarized below. A more detailed analysis of the direct and indirect environmental consequences – from which this summary was derived – follows.

#### Alternative 1 – No Action

In summary, Alternative 1 would result in no changes to existing ski area operations or to forest management practices within the SUP area. As a result, the CNF would continue treatment of spruce bark beetle infected trees. This type of treatment would not address overall stand health.

#### Alternative 2 – The Proposed Action

The Proposed Action would affect approximately one percent of the total spruce-fir forest cover on the San Francisco Peaks and approximately 14 percent of the spruce-fir forest within the SUP area. It would also allow for the treatment of 48.4 acres of spruce-fir forest to address a localized spruce bark beetle outbreak. This would result in an improvement to stand health overall. This alternative would result in the temporary ground disturbance along 14 miles of proposed

<sup>388</sup> Northland Research, 2003

<sup>389</sup> Northland Research, 2003 and USDA, 2003

reclaimed water pipeline right-of-way, and the associated removal of 22 aspen trees and 134 pine trees.

Alternative 2 would permanently affect 0.3 percent, and temporarily affect 1.7 percent of subalpine grassland on the San Francisco Peaks. It would result in permanent losses of 7.3 percent and temporary effects to 49.2 percent of the subalpine grassland within the SUP area, most of which has been previously disturbed.

The Proposed Action would result in disturbance within mapped critical habitat for the threatened San Francisco Peaks groundsel, but would not affect actual habitat or plants. It also may impact individuals of the bearded gentian and the Rusby's milkvetch, but it is not likely to result in a trend toward Federal listing or loss of viability. Alternative 2 would have no impact on the crenulate moonwort.

Lastly, the addition of snowmaking to operations at Snowbowl would result in an overall increase in moisture and nutrients and may change plant species composition within the SUP area. Proposed snowmaking is likely to add 31.1 lbs/acre/yr of nitrogen over historic natural deposition. This may increase the dominance of early successional or weedy plant species. In turn, this may reduce overall plant diversity in some portions of the SUP; however, this effect would be restricted to developed ski trails and therefore localized.

### **Alternative 3**

Because Alternative 3 does not propose snowmaking or snowplay, the effects to vegetation resources would be fewer than those disclosed under Alternative 2. With respect to trail clearing, 64.4 acres of permanent overstory clearing would occur in spruce-fir forest (compared to 76.3 acres under Alternative 2). Additionally, Alternative 3 includes the treatment of 48.4 acres of spruce-fir to address a localized outbreak of spruce bark beetle. As stated previously, this would result in an improvement to stand health overall. There would be no removal of trees for construction of a reclaimed water pipeline under this alternative.

Because snowplay facilities are not proposed under Alternative 3, the effects to subalpine grasslands would be greatly reduced as compared to those disclosed in the Proposed Action. This alternative would result in the permanent loss of 0.01 percent, and the temporary disturbance of 1.7 percent, of the subalpine grassland on the San Francisco Peaks.

Alternative 3 would result in disturbance within mapped critical habitat for the threatened San Francisco Peaks groundsel, but would not affect actual habitat or plants. It also may impact individuals of the bearded gentian. Because no pipeline from Flagstaff is proposed, Alternative 3 would have no impact on the Rusby's milkvetch. As with the Proposed Action, this alternative would have no effect on the crenulate moonwort.

## DETAILED ANALYSIS OF DIRECT AND INDIRECT EFFECTS

### Impacts to T, E, and S plant species, and regionally important plant communities

*Plant communities within the SUP area may be altered as a result of the proposed projects.*

Indicator:

Acres of High-Elevation Forest Type on the San Francisco Peaks, Within The SUP, and Potentially Affected by the Proposed Action

#### **Alternative 1 – No Action**

Under Alternative 1, there would be no overstory tree removal in the analysis area; therefore, the total acreage of mixed conifer and spruce-fir forest on the San Francisco Peaks would not change. The CNF would continue treatment of spruce-fir stands in the SUP infected by spruce bark beetles. These treatments would be limited to specific infected trees, which would be felled and de-barked in-place. These treatments would likely also include the use of an anti-aggregation pheromone to attempt to curtail the spread of bark beetles, but would not address overall stand condition. Past vegetation manipulation activities within the SUP area are further discussed in the Cumulative Effects section.

#### **Alternative 2 – The Proposed Action**

This alternative would result in 76.3 acres of permanent overstory vegetation removal within spruce-fir forest in the SUP. This represents about one percent of the total spruce-fir forest cover on the San Francisco Peaks and about 14 percent of the remaining spruce-fir forest in the SUP. Cutting of new ski trails would expose previously interior trees to newly-cleared edges. Some additional (secondary) mortality of trees from wind blowdown along these cleared edges would likely occur. There would be no overstory vegetation removal within the identified mixed conifer forest. Up to 22 aspen trees and 134 pine trees would be removed over 14 miles of right-of-way to allow construction of the reclaimed water pipeline.

In addition to tree removal associated with new ski trails, the Proposed Action would allow treatment of 48.4 acres of spruce-fir forest within the Agassiz and Sunset pods to create gladed skiing terrain and to address a localized spruce bark beetle outbreak. This treatment would consist of removal of up to 20 percent of standing trees and removal of dead and down material. Tree removal would target pockets of overmature and beetle-infested trees. Removal of trees and dead and down materials would result in a more open stand with a higher diversity of size classes and greater proportion of younger vegetation structural stages. Compared with existing treatment that would occur under the No Action alternative, treatment of entire stands would be more effective in addressing the localized spruce bark beetle outbreak. It would reduce the probability of complete loss of this stand and inhibit the potential infestation of other stands in the SUP and in the adjacent Kachina Peaks Wilderness.

Noxious weeds have been found in the analysis areas, including the lower portion of the SUP and areas immediately adjacent to Snowbowl Road. The likelihood or risk of noxious weed spread is rated as moderate. Project activities under Alternative 2 may result in additional areas becoming

infested with invasive weed species even when preventative management actions are followed. However, mitigation measures are incorporated in Chapter 2 for both action alternatives to reduce the likelihood of invasion and spread.

### **Alternative 3**

The effects of this alternative are similar to the Proposed Action, but would result in 12 fewer acres of impact to spruce-fir forest. This alternative would result in 64.4 acres of permanent overstory vegetation removal within spruce-fir forest. This represents less than one percent of the total spruce-fir forest cover on the San Francisco Peaks and about 12 percent of the remaining spruce-fir forest in the SUP. The reduction in impact to this forest type under this alternative is due to the elimination of the snowplay area and snowmaking water impoundment, and fewer acres of developed ski trails. Secondary mortality to trees from wind throw along newly-exposed ski trail edges would be similar to that under the Proposed Action. No trees would be removed along Snowbowl Road or the remainder of the reclaimed water pipeline right-of-way proposed under Alternative 1.

This alternative would also allow treatment of 48.4 acres of spruce-fir forest within Agassiz and Sunset pods to create gladed skiing and address a localized spruce bark beetle outbreak and the effects would be the same as those described under the Proposed Action.

#### Indicator:

#### Potential Impacts to Montane Grasslands Within the SUP as a Proportion of Total Grasslands on the San Francisco Peaks

### **Alternative 1 – No Action**

Under Alternative 1, there would be no disturbance in Hart Prairie. As a result, there would be no change in acreage of subalpine grassland either within the SUP area or on the San Francisco Peaks. Past effects to subalpine grasslands in Hart Prairie are discussed in the Cumulative Effects analysis.

### **Alternative 2 – The Proposed Action**

This alternative would result in 2.7 acres of permanent loss, and 18.2 acres of temporary disturbance to subalpine grassland in the SUP. Permanent impacts would be associated with lift realignment/construction, construction of the snowplay area, and construction of facilities associated with snowplay at the upper end of Hart Prairie. Temporary disturbance would consist of recontouring the ground surface, primarily to accommodate the snowplay area near the bottom terminal of the Hart Prairie Chairlift. Disturbed areas would subsequently be reseeded. Due to prior activities, this portion of Hart Prairie already includes introduced plant species such as orchard grass, slender wheatgrass, and timothy. Plant species composition in disturbed and reclaimed areas would likely include more plants and/or biomass of introduced plant species found in seed mixes. Effects of this alternative would be the permanent loss of 7.3 percent, and the temporary disturbance of 49.2 percent of the subalpine grassland in the SUP. Most of the grassland which would be affected was previously disturbed by establishment of *Hart Prairie* (trail #3) and *Aspen Meadows* (trail #1) ski trails and chairlifts. This alternative would result in a

permanent loss of approximately 0.3 percent, and the disturbance of 1.7 percent of the subalpine grassland on the San Francisco Peaks.

### **Alternative 3**

This alternative would result in 0.1 acre of permanent loss, and about 17.7 acres of temporary disturbance to subalpine grassland in the SUP associated with lift realignment/construction and recontouring at the upper end of Hart Prairie. Temporary disturbance would consist of recontouring the ground surface near the bottom terminal of the Hart Prairie Chairlift. Elimination of the snowplay area parking lot under this alternative would reduce permanent impacts to subalpine grassland by 2.6 acres and temporary impacts by 0.5 acres as compared with the Proposed Action. Similar to the Proposed Action, reseeding of temporary disturbance areas under this alternative would likely change plant species composition to include more plants and/or biomass of introduced plant species found in seed mixes. Effects of this alternative are the permanent loss of 0.3 percent, and the disturbance of 47.8 percent of the subalpine grassland in the SUP. Most of the grassland affected was previously disturbed by establishment of the *Hart Prairie* (trail #3) and *Aspen Meadows* (trail #1) ski trails and chairlifts. This alternative would result a permanent loss of approximately 0.01 percent and the disturbance of 1.7 percent of the subalpine grassland on the San Francisco Peaks.

#### Indicator:

#### Disclosure of Effects to Potentially Occurring Threatened, Endangered, and/or Sensitive Plant Species

### **Alternative 1 – No Action**

Under this alternative, there would be no changes in the analysis area. There would be No Affect on the endangered San Francisco Peaks groundsel or its habitat, including designated critical habitat in the upper portion of the SUP. This alternative would not affect the Forest Service Sensitive bearded gentian, Rusby’s milkvetch, or crenulate moonwort. Past impacts to threatened, endangered, and sensitive species are further discussed in the cumulative effects analysis.

### **Alternative 2 – The Proposed Action**

This alternative would result in disturbance within mapped critical habitat for the threatened San Francisco Peaks groundsel, but would not affect actual habitat or plants. Extending, smoothing, and recontouring of existing runs would result in a total of 2.44 acres of disturbance within “mapped critical habitat.” However, field review indicates that the proposed disturbance areas lack the necessary affinities to be actual potential habitat. All of this disturbance would take place within spruce-fir forest below timberline. The proposal would therefore not specifically affect individual plants or habitat for the San Francisco Peaks groundsel. There would be about 0.5 acres of disturbance on the talus slope immediately above the Agassiz Chairlift top terminal; this is within the Alpine tundra zone, but no plants have been found in this area and it is outside designated critical habitat. No known plant populations would be impacted by the proposed activities. Establishing a hiking trail in this area would not increase the number of visitors using the Scenic Sky Ride in the summer months, but it would increase pedestrian activity on the lower slopes of Agassiz Peak. Continued access restrictions, enforcement, monitoring, and construction of interpretive signs along the trail would minimize the potential for impacts to

Alpine Tundra and the San Francisco Peaks groundsel. As documented within the Biological Assessment (BA) prepared for the project, the Proposed Action “may affect, but is not likely to adversely affect” the San Francisco Peaks groundsel. As required by the Endangered Species Act, the USFWS has reviewed and concurred with this determination. The BA and the USFWS concurrence are located in the project record on the Coconino National Forest.

The Proposed Action may impact individuals of the bearded gentian, but it is not likely to result in a trend toward federal listing or loss of viability. Recontouring and rock/stump removal on *Lower Bowl* (trail #29) and *Sundance* (trail #30) would impact six individuals of the bearded gentian. Relatively few populations of this plant are known. Surveys recently completed by CNF found a total of 57 plants in 18 populations, mostly on the steep southern slopes of Agassiz, Fremont, and Doyle peaks, and in Abineau Canyon.<sup>390</sup> Based on these numbers, about 10 percent of the known population occurs within the SUP, although it is likely that not all plants in either the SUP or the surrounding areas have been found. The CNF may allow the collection of some of these plants for genetic research. Impacts to the overall population would be mitigated by the collection of those plants that would be impacted under this alternative.

The Proposed Action may impact individuals of the Rusby’s milkvetch, but it is not likely to result in a trend toward federal listing or loss of viability. Construction activities associated with installation of the reclaimed water pipeline along Snowbowl Road would impact up to 120 plants. Most of the plants located during the survey occur in the drainage area adjacent to the road and would likely be impacted by trench excavation and backfilling operations. Some plants growing further up the hill or cut slope would likely be avoided. The Proposed Action would not affect the population viability of Rusby’s milkvetch. This plant occurs in a number of other locations around the Peaks and appears to prefer open and disturbed habitats. This plant is expected to reestablish itself in the project area from the seed bank and/or from recolonization of nearby, unaffected plants.

This alternative would have no long-term impact on the crenulate moonwort or its habitat.

### **Alternative 3**

This alternative would result in disturbance within mapped critical habitat for the threatened San Francisco Peaks groundsel, but would not affect actual habitat or plants. The effects of this alternative would be the same as those described under the Proposed Action.

This alternative may impact individuals of the bearded gentian, but it is not likely to result in a trend toward federal listing or loss of viability. The effects of this alternative would be the same as those described under the Proposed Action.

No reclaimed water pipeline would be constructed along Snowbowl Road under this alternative; therefore, this alternative would have no impact on the Rusby’s milkvetch. This alternative would have no impact on the crenulate moonwort or its habitat.

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<sup>390</sup> CNF Zone Botanist personal communication., 2003

## **Vegetation Composition**

*The Proposed Action has potential to change vegetation composition within the SUP area due to the application of machine-produced snow.*

Indicator:

### **Potential Changes to Plant Species Composition Due to the Application of Machine-Produced Snow**

Several other indicators were identified pertaining to vegetation issues. Due to their specific relevance to water quality and quantity affects, it was determined that these indicators were most appropriately discussed within the Water Resources section of this chapter.

#### **Alternative 1 – No Action**

Under this alternative, there would be no changes in the analysis area and no snowmaking. Vegetation communities in the analysis area would receive only natural precipitation.

#### **Alternative 2 – The Proposed Action**

Application of machine-produced snow would result in an overall increase in moisture and nutrients available to plants and may change plant species composition on ski trails within the SUP. Under Alternative 2, machine-produced snow would be applied over 205.2 acres of existing and new ski trails. Application would occur on an annual basis between November and the end of February, extending into March under favorable conditions. Annual total volume of machine-produced snow would average 364 AF per year and would supplement an average annual precipitation volume of about 3,000 AF per year. Nitrogen concentration (as nitrate [NO<sub>3</sub>-]) in reclaimed water proposed for snowmaking is estimated at 6 mg/L or 428µmol/L. Nitrogen deposition rate with snowmaking would be about 53.5 lbs/acre/yr on average within the Snowbowl Sub-watershed (Table 3J-4). Snowmaking on the 205.2 acres of ski trails in the SUP is estimated to add 31.1 lbs/acre/yr of nitrogen over historic natural deposition.<sup>391</sup>

**Table 3J-4  
Volume of Snowmaking and Nitrogen Deposition Rate  
within the Snowbowl Sub-watershed in Dry, Average, and Wet Years**

Condition	Snowmaking Volume	Background N	N Deposition Rate with
		Depositional Rate	Snowmaking
Dry Year	486 acre-feet/year	9.23 lbs/acre/yr	50.76 lbs/acre/yr
Average Year	364 acre-feet/year	22.41 lbs/acre/yr	53.51 lbs/acre/yr
Wet Year	243 acre-feet/year	34.18 lbs/acre/yr	54.97 lbs/acre/yr

Additional water and nitrogen from snowmaking would increase plant growth and may change plant species composition on existing and newly developed ski trails. Several studies have looked specifically at the effects of nitrogen loading on soils and plant communities as a result of applying reclaimed water or nitrogen fertilizers. These studies are summarized in Table 3J-5. They have generally documented initial nitrogen retention in the soil due to increased

<sup>391</sup> Schwartzman and Springer, 2002

assimilation by plants and microorganisms, followed by rapid leaching of nitrates to the groundwater as an assimilation threshold is reached.<sup>392</sup>

Effects of supplemental nitrogen on plant communities on ski trails would be dependent on local conditions, nitrogen concentrations in the reclaimed water, and deposition rates. The rate of nitrogen saturation of the soil would be dependent on a number of factors, including soil physical and chemical characteristics, existing soil nutrient content, plant species diversity and density, and climate. Net nitrogen deposition as a result of snowmaking in the SUP area (range:  $\pm 50$ -55 lbs/acre/year) would be anticipated to be from roughly two-fold to over 60-fold lower than that in the studies cited in Table 3J-5 (range:  $\pm 85$ -3,310 lbs/acre/year). Therefore, nitrogen saturation would likely occur over a longer time period. As soils in the SUP reach the assimilation threshold, there may be a shift in dominance of plant species or a change in plant species composition on the cleared ski trails. The availability of additional moisture and nitrogen would likely increase the net primary productivity and dominance of early successional or weedy plant species. This may reduce overall plant species diversity in some portions of the SUP. The combined effects of construction activities and additional moisture and nutrients have potential to increase the local abundance of noxious weeds in the SUP.

Potential changes in plant species composition or dominance would be limited in part by the characteristics of the affected plant communities. Historically, the majority of existing ski trails were seeded with commercial seed mix species, which have become well established. Most of the seed mix species are early seral (successional) annual and perennial plants that exhibit rapid growth under favorable nutrient and moisture conditions. Increased moisture and nitrogen from snowmaking would therefore be expected to increase the biomass or cover of the existing plant community on the ski trails. These conditions may differentially enhance the growth of forbs over that of the perennial cool-season grasses.<sup>393</sup> Since very little vegetative cover on reclaimed ski trails consist of native perennial, mid- to late seral plant species, no substantial change in native plant species diversity would occur in most of the area affected by snowmaking. Reduction of native plant species diversity may occur in areas where native perennial, mid- to late seral species are still important, such as *Hart Prairie* (trail #3) and some of the less disturbed ski trails, such as *Casino* (trail #23). The spatial extent of these potential effects would be dependent on hydrologic characteristics.

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<sup>392</sup> Jordan et al., 1997 and McNulty et al., 1996 and Dise and Wright, 1995 and Aber et al., 1998 and Currie et al., 1996 and Rueth et al., 2003

<sup>393</sup> Reed, 1977 and Kirchner, 1977

**Table 3J-5**  
**Summary of Studies on the Effects of Nitrogen Addition on Plant Communities**

Study/location	Plant community	Application (kg/ha/yr) (lbs/acre/yr)	Application type	Duration (yr)	Results
Sopper (1971) Pennsylvania	Mixed oak stand Red pine plantation Old field	393 2,122	Municipal wastewater	6	No effect on red pine. Increased diameter growth of mixed hardwood species. Height increase in white spruce saplings in old field. Increase in height, density, and dry matter production of herbaceous groundcover.
Chadwick et al. (1974) England	Lowland heath	613 3,310	Polluted river water	2	Increased dry matter production of herbaceous groundcover. No change in plant species composition.
Reed (1977) Michigan	Old field	450 2,430	Dry fertilizer	1	Increased dry matter production of herbaceous groundcover. Reduction in plant species richness. Shift in dominance to C3 dicots.
Kirchner (1977) Colorado	Short-grass prairie	150 810	Dry fertilizer and water	3	Increased dry matter production of C4 plants. Reduction of plant species diversity through shift in dominance to earlier seral species. Increase in arthropod diversity and biomass.
Hunt and Shure (1980) South Carolina	Pine forest	nm (5.3cm/wk applied)	Industrial wastewater	4	Increased dry matter production of herbaceous groundcover. Reduction of plant species diversity through shift in dominance to earlier seral C3 species. Increase in arthropod diversity and biomass.
McNulty et al. (1996) Vermont	Spruce-fir forest	15.7 - 31.4 84.7 - 169.5	Dry fertilizer	7	Initial increase in basal diameter growth of red spruce and birch, subsequent increased mortality of red spruce. Predicted shift in dominance from evergreen to deciduous species.
Jordan et al. (1997) Massachusetts	Pine forest Oak forest Old field	370 - 480 1,998 - 2,592	Municipal wastewater	2	Increase in dry matter production in pine forest, but no change detected in oak forest. Reduction in shrub biomass and shift in dominance to early seral forbs (weedy species) in old fields.
Magill et al (1996) Maine	Mixed deciduous forest	18 - 61 97 - 329	Dry fertilizer	4	Increase in mean wood production. Increased tree mortality at low and high N application rates, resulting in decline in cumulative biomass over the study period.

Local patterns of run-off and infiltration influence the spatial extent over which changes in plant species composition would occur. Snowpack moisture not lost to sublimation predominantly infiltrates the permeable soils in the SUP to reach shallow perched aquifers. Little surface runoff occurs in the SUP or areas downstream of the SUP. The effects of added moisture and nitrogen on plant communities in the SUP would therefore be localized. It is noted that, in one study, weedy plant species persisted after nine years of irrigation with reclaimed water, but did not

spread beyond the treated area.<sup>394</sup> The extent to which added moisture and nutrients influence plant species composition in the SUP would be largely restricted to the cleared ski trails, with limited impacts to the adjacent spruce-fir forest. It was noted a decline in mature spruce and fir trees and increased mortality of seedlings after seven years of nitrogen fertilization at rates between 84.7 – 169.5 lbs/acre/year (15.7 and 31.4 kg/ha/year).<sup>395</sup> This rate is two to three times greater than would occur under this alternative. Nevertheless, some mortality of spruce and fir trees may occur along the edges of the cleared ski runs. Because most of the snowpack would infiltrate in-place, trees in the interior of spruce-fir stands would not be affected.

### **Alternative 3**

This alternative would not include snowmaking. Therefore the effects would be the same as those described in Alternative 1.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

The temporal bounds of the cumulative effects analysis for vegetation extend from the initial development of Snowbowl as a winter recreational area into the foreseeable future during which recreation-related activities may affect vegetation.

#### **Spatial Bounds**

The physical extent of this cumulative effects analysis comprises mainly the Snowbowl SUP area, the proposed reclaimed water pipeline alignment between the City of Flagstaff and the SUP, and adjacent public lands to the extent they would be potentially affected. These adjacent lands include a portion of the Kachina Peaks Wilderness, areas adjacent to the reclaimed water pipeline alignment, and areas downslope of the SUP area (primarily Hart Prairie). Other projects in the Peaks area that affect vegetation are also included in the cumulative effects analysis.

### **Past, Present, and Reasonably Foreseeable Future Actions**

1. Development and Maintenance of the SUP as a Recreational Area
2. Spruce Bark Beetle Control within the SUP
3. Kachina Peaks Wilderness Designation
4. Bebbs Willow Restoration Project
5. Fort Valley Restoration Project
6. Transwestern Lateral Pipeline Project
7. Peaks Segment of the Arizona Trail
8. Private Land Development
9. Miscellaneous/ongoing Recreational Uses
10. Power Line Maintenance
11. Various Aspen Regeneration and Enclosure Fences

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<sup>394</sup> Jordan et al., 1997

<sup>395</sup> McNulty et al., 1996

12. Inner Basin Waterline Pipeline Maintenance
13. Snowbowl Road Paving

Appendix C includes the full list of past, present, and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

## Alternative 1 – No Action

### Plant Communities

Cumulative effects of the No Action Alternative on plant communities are primarily related to past development of the SUP area as a winter recreational area; past, present, and future maintenance activities within the SUP to support recreational uses; and natural events and measures implemented to control a spruce bark beetle outbreak. Effects of these activities on plant communities are limited to the SUP area. Other projects in the Peaks area also contribute to cumulative effects on plant communities.

Both management activities and natural events have influenced plant communities in the analysis area. Since inception of the ski area, approximately 160 acres of natural vegetation within the SUP have been modified for recreational use. Of this total, approximately 139 acres have been modified for the establishment and maintenance of dedicated ski trails as well as for support facilities and associated infrastructure. Most the clearing has affected spruce-fir forest, but approximately 17 acres of subalpine grassland was disturbed for the establishment and maintenance of the *Hart Prairie* (trail #3) and *Aspen Meadows* (trail #1) ski trails and chairlifts. In order to rapidly stabilize disturbed soils, reclamation of ski runs has used commercial seed mixes dominated by non-native species (refer to Table 3J-6). As a result, species composition on revegetated ski trails is predominantly non-native. Native species from adjacent or nearby undisturbed areas have not substantially recolonized the ski trails. Conversely, non-native species have not substantially spread to adjacent or nearby undisturbed areas.<sup>396</sup>

**Table 3J-6  
Plant Species Included In Seed-Mixes for Ski Trail Reclamation**

Common Name	Scientific Name	Status
Slender wheatgrass	<i>Agropyron trachycaulum</i>	Exotic
Mountain brome	<i>Bromus marginatus</i>	Native
Timothy	<i>Phleum pratense</i>	Exotic
Sheep fescue	<i>Festuca ovina</i>	Native
Creeping red fescue	<i>F. rubra</i>	Native
Canada bluegrass	<i>Poa compressa</i>	Exotic
Orchard grass	<i>Dactylis glomerata</i>	Exotic
Small burnet	<i>Sanguisorba minor</i>	Exotic
Hairy vetch	<i>Vicia villosa</i>	Exotic
Birdsfoot trefoil	<i>Lotus corniculatus</i>	Exotic
Clover	<i>Trifolium hybridum</i>	Exotic
Wooly pod vetch	<i>Vicia dasycarpa</i>	Exotic

<sup>396</sup> SWCA ,1996a and Van Ommeren, 2001

Periodic maintenance activities within the SUP area include the removal of obstructions and the repair of erosion control features on ski trails and the removal of hazard trees. These activities have had little effect on overall plant community structure or composition.

Measures to control the spruce bark beetle represent a cumulative effect on plant communities in the SUP area. Spruce bark beetles have affected stands of spruce-fir and mixed conifer in the SUP. A cyclonic wind event in the fall of 1999 resulted in a blow down of approximately 25 acres of spruce-fir along the upper portion of the Agassiz Chairlift. This triggered a localized outbreak of the spruce bark beetle which has infected an estimated 1,000 trees. The CNF has implemented a treatment program which involves felling infected trees and the subsequent peeling of the bark to expose and kill beetle larvae. The CNF is also applying an anti-aggregation pheromone to control the spread of bark beetles to adjacent stands of trees. About 150 trees were treated in 2002 and an additional 800 were identified for future treatment. At this time, the spruce bark beetle outbreak is confined to a relatively small area and has not spread to other stands of trees within the SUP area or the adjacent Kachina Peaks Wilderness. Western balsam bark beetle has infected some corkbark fir near Agassiz Lodge, but no treatment has been implemented to date.

Other actions or projects have affected, or have the potential to affect plant communities in the analysis area. Designation of the Kachina Peaks Wilderness in 1984 has resulted in the protection of 18,963 acres of high elevation montane conifer forest and grasslands on the Peaks. Construction of the Transwestern Lateral Pipeline in 1992 resulted in the removal of approximately four acres of predominantly ponderosa pine forest on the south slopes of the Peaks. The ongoing Bebb's Willow Restoration Project includes prescribed burning and thinning of 600 acres of ponderosa pine forest to aid the restoration of a montane riparian plant community. The Fort Valley Restoration Project is thinning approximately 9,100 acres of ponderosa pine forest on the lower south and west slopes of the Peaks. Various fenced plots, totaling about 400 acres, have been established to promote the regeneration of aspen on the Peaks. Development of private lands in Lower Hart Prairie is affecting primarily plains and montane grassland. Maintenance along the power line from Snowbowl Road results in the occasional removal of hazard trees and other vegetation along roughly three acres of right-of-way. Miscellaneous recreational uses on the Peaks contribute primarily temporary impacts on plant communities.

### *Threatened, Endangered, and Sensitive Species*

Recreational use on the Humphreys Trail in the Kachina Peaks Wilderness has resulted in some impacts to the sensitive alpine tundra in the past. However; improved trail markings have minimized those impacts. Recreational activity related to the Scenic Sky Ride within the SUP area has been restricted and monitored to prevent access to Alpine tundra areas. Under the No Action Alternative, closures and trail restrictions would continue to protect this species and also habitat for the sensitive bearded gentian. Past and future avalanche control activities do not result in cumulative effects on plant species. The primary focus of avalanche control is to cause smaller, more frequent, and less damaging slides. These tend to run on snow layers higher in the snowpack. In contrast, naturally-occurring avalanches tend to run on the ground surface and therefore have the potential to disturb soil substrates and plants directly.

Several projects in the Peaks area have the potential to affect the Forest Service sensitive Rusby's milkvetch. The proposed repair of the City of Flagstaff's Inner Basin Waterline across Schultz Pass may impact up to 200 plants near the Weatherford Trail. The proposed Peaks Segment of the Arizona Trail will impact habitat for Rusby's milkvetch. The ultimate trail alignment will be adjusted to avoid directly impacting individual plants. The Fort Valley Ecosystem Restoration Project would impact some Rusby's milkvetch. All of these projects will result in temporary ground disturbance. Since Rusby's milkvetch is often found along disturbed trails and roadways, the cumulative effects of these projects and the continuation of current management practices under the No Action Alternative will be unlikely to affect the population viability of this species or result in a trend toward federal listing.

### Noxious Weeds

Under the No Action Alternative, past development, maintenance, and recreational activities have likely increased the local abundance of noxious weeds within the SUP area. Noxious weeds are spread through the use of mechanized equipment and vehicles for clearing, grading, erosion control, and hazard removal on the ski trails, maintenance of existing roadways in the SUP area, and maintenance of the power line from Snowbowl Road to the SUP area. Miscellaneous recreational activities such as weddings, reunions, recreation events, hiking, and bicycling also have the potential to contribute to the introduction or spread noxious weeds. Since the spread of noxious plant species is usually dependent on disturbance, these recreational activities have not affected undisturbed adjacent areas within the SUP area or in the Kachina Peaks Wilderness. Other past, present, and future projects in the Peaks area contribute disturbance of 10,100 acres of Forest land (including Bebb's Willow Restoration Project, Fort Valley Restoration Project, and Aspen Regeneration Projects), 26 miles of pipeline right-of-way (Transwestern Lateral Pipeline, and Inner Basin Water Pipeline), 12 miles of roadway (Snowbowl Road paving), five miles of power line right-of-way (power line maintenance and Snowbowl Road to SUP), 31 miles of trail (Peaks segment of the Arizona Trail), Forest lands affected by other recreational uses, and an unknown number of acres of private land (private land development and , Lower Hart Prairie). The effects of these projects on the actual or potential establishment and spread of noxious weeds vary. The paving of the Snowbowl Road resulted in the establishment and spread of noxious weeds due to the use of imported fill. Initial development of the ski area occurred prior to active management and monitoring of noxious weeds by the CNF. Development of private lands is not subject to Forest Service directives regarding noxious weeds and therefore has a greater potential effect. Recent, ongoing, and future projects on Forest lands are subject to mitigation measures for the control of noxious weeds and therefore contribute substantially less to their potential establishment and proliferation.

## **Alternative 2 – The Proposed Action**

### Plant Communities

Cumulative effects of the Proposed Action on plant communities are expected to be the same as those described under Alternative 1, with the following exceptions.

The cumulative effect of past ski area development and proposed additional development under the Proposed Action would be the removal, disturbance, or modification of approximately 305.6 acres of montane conifer forest and grassland within the SUP area. This consists of roughly 160

acres affected as a result of past ski area development and proposed improvements that would remove an additional 76.3 acres of spruce-fir forest, remove 2.7 acres and temporarily disturb 18.2 acres of subalpine grassland, and thin 48.4 acres of spruce-fir forest within the SUP area. Approximately 150 trees have already been removed from the SUP area for the control of spruce bark beetles. The total area within the SUP area subject to maintenance activities (such as erosion control and hazard tree removal) would increase from 138.6 acres (i.e., existing dedicated ski trails) to 233.1 acres to encompass new ski trails and other recreational use areas. The increased area subject to maintenance activities would consist of approximately 76.3 acres of spruce-fir forest and 18.2 acres of subalpine grassland. Under this alternative, the total area subject to reclamation with (and establishment of) predominantly non-native grasses and forbs would increase from 138.6 acres (existing ski trails) to 233.1 (new ski trails and recreational use areas).

### Threatened, Endangered, and Sensitive Species

Cumulative effects of the Proposed Action on threatened, endangered, and sensitive species are expected to be the same as those described under Alternative 1, with the following exceptions.

The Proposed Action would result in the removal of approximately six bearded gentian plants from the SUP. The remainder of the known population of this sensitive plant species occurs within the Kachina Peaks Wilderness and is protected by trail closures, access restrictions, and monitoring. The Proposed Action would impact up to 120 Rusby's milkvetch along Snowbowl Road. Other individuals of this plant species were likely impacted during the paving of the Snowbowl Road and individuals and/or habitat will be impacted by the proposed repair of the Inner Basin Waterline across Schultz Pass, construction of the Arizona Trail, and implementation of Fort Valley Ecosystem Restoration Project. All of these projects, including the Proposed Action, would result in temporary ground disturbance and are unlikely to affect the population viability of this species or result in a trend toward federal listing.

### Noxious Weeds

Cumulative effects of the Proposed Action with regard to noxious weeds are anticipated to be the same as those described under Alternative 1, with the following exceptions.

This alternative would increase the area actively managed for recreation within the SUP area from 160 acres to 305.6 acres and would increase the total area of disturbance in which noxious weeds could become established or proliferate. Construction of the reclaimed water pipeline would result in temporary disturbance along 14 miles between the City of Flagstaff and the SUP.

## **Alternative 3**

### Plant Communities

Cumulative effects of the Proposed Action on plant communities are anticipated to be the same as those described under Alternative 1, with the following exceptions.

The cumulative effect of past ski area development and proposed additional development under this alternative would be the removal, disturbance, or modification of 274.9 acres of montane conifer forest and grassland within the SUP area. This consists of 160 acres affected as a result

of past ski area development and proposed improvements that would remove an additional 66.4 acres of spruce-fir forest, remove 0.1 acre of subalpine grassland, and thin 48.4 acres of spruce-fir forest within the SUP area. The total acreage within the SUP area subject to maintenance activities (such as erosion control and hazard tree removal) would increase from 138.6 acres (i.e., existing dedicated ski trails) to 205 acres to encompass new ski trails and other recreational use areas. The increased area subject to maintenance activities consist of 66.4 acres of spruce-fir forest. Under Alternative 3, the total area subject to reclamation with (and establishment of) predominantly non-native grasses and forbs would increase from 138.6 acres (existing ski trails) to 205 (new ski trails and recreational use areas).

### *Threatened, Endangered and Sensitive Species*

Cumulative effects of this alternative are the same as those described under alternatives 1 and 2, except that this alternative would not contribute to cumulative effects to the Forest Service sensitive Rusby's milkvetch.

### *Noxious Weeds*

This alternative would increase the area actively managed for recreation within the SUP area from 160 acres to 274.9 acres and would increase the total area of disturbance in which noxious weeds could become established or proliferate. No reclaimed water pipeline would be constructed between the SUP area and the City of Flagstaff. Otherwise, cumulative effects are the same as those described under Alternative 1.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

The removal of forest cover represents an irretrievable loss of the ecological functions that overstory vegetation provides. However, these effects are not irreversible because the ski area facilities could conceivably be abandoned and trees allowed to re-establish. Irreversible commitments of resources affecting small acreages could stem from the following projects: the construction of additional parking, the snowplay facility, the snowmaking reservoir, realignment of chairlifts and contouring new ski terrain.

## 3K. WILDLIFE

### SCOPE OF THE ANALYSIS

The analysis area for threatened, endangered, and sensitive wildlife; migratory birds; and game and non-game wildlife includes the Snowbowl SUP, Snowbowl Road, the proposed reclaimed water pipeline alignment between the City of Flagstaff and the SUP, and adjacent areas. Because the Snowbowl SUP is managed as a recreation site, analysis of impacts to management indicator species is limited to areas adjacent to the SUP (Kachina Peaks Wilderness) and to areas along and adjacent to the Snowbowl Road and reclaimed water pipeline alignment.

### EXISTING CONDITIONS

#### THREATENED, ENDANGERED, AND SENSITIVE SPECIES

The threatened, endangered, and sensitive Species (TES) list for the Mormon Lake and Peaks Ranger District was reviewed and a TES list for this project was created in July 2002. One federally-listed threatened wildlife species occurs regularly within general the analysis area: Mexican spotted owl (*Strix occidentalis lucida*). The threatened bald eagle (*Haliaeetus leucocephalus*) may occur in the analysis area in winter. The endangered black-footed ferret (*Mustela nigripes*) is not known or expected to occur in the analysis area. Critical habitat for the Mexican spotted owl on NFS lands was proposed for listing November 18, 2003. The final rule for Mexican spotted owl critical habitat was published on August 31, 2004 and became effective September 30, 2004. There is no designated or proposed critical habitat for any other listed or proposed wildlife species. The analysis area includes habitat for two Forest Service sensitive species: Navajo Mountain Mexican vole (*Microtus mexicanus navaho*) and northern goshawk (*Accipiter gentilis*). There is no habitat in the analysis area for the Region 3 Forest Service sensitive peregrine falcon (*Falco peregrinus anatum*). Sensitive species that have been eliminated from further analysis due to lack of habitat are listed in Table 3K-1.

A Biological Assessment/Biological Evaluation (BA/BE) was prepared for this project and has been reviewed by the U.S. Fish and Wildlife Service (USFWS) for concurrence with the determination of effects to T and E species. Per a letter dated July 8, 2004, the USFWS concurred with the Forest Service's determinations.

**Table 3K-1  
Sensitive Wildlife Species Eliminated from Further Analysis**

Common Name	Scientific Name
Wupatki Arizona Pocket Mouse	<i>Perognathus amplus cineris</i>
Narrow-headed Garter Snake	<i>Thamnophis rufipunctatus</i>
Northern Leopard Frog	<i>Rana pipiens</i>
Arynx Giant Skipper	<i>Agathymus arynxa</i>
Freeman's Agave Borer	<i>Agathymus baeuri freemani</i>
Early Elfin	<i>Incisalia fotis</i>
Spotted Skipperling	<i>Piruna polingii</i>
Mountain Silverspot Butterfly	<i>Speyeria nokomis nictotis</i>
Blue-black Silverspot Butterfly	<i>Speyeria nokomis nokomis</i>

**Mexican Spotted Owl (*Strix occidentalis lucida*) - Threatened**

The Mexican spotted owl was listed as a threatened species in 1993. On the CNF, this species occupies mixed conifer and ponderosa pine-Gambel oak vegetation types, usually characterized by high canopy closure, high stem density, multi-layered canopies within the stand, numerous snags, and down woody material. The CNF lies within the Upper Gila Mountain Recovery Unit.

Primary threats to Mexican spotted owls within the Upper Gila Mountain Recovery Unit include timber harvest and catastrophic wildfire, fuelwood cutting, and grazing.<sup>397</sup> Effects of recreation on Mexican spotted owls and habitat are described in the Recovery Plan and relate to recreation indirect habitat disturbance from recreation, as well as the presence and intensity of allowable recreation activities and spatial and temporal restrictions for the owl.<sup>398</sup>

The majority of the SUP supports spruce-fir forest and is therefore not suitable nesting habitat for Mexican spotted owls. A limited area in the southwest corner of the SUP is mapped as mixed conifer forest, which is classified as Restricted Area in the Recovery Plan. The northwest corner of the SUP (i.e., the upper extent of Hart Prairie) supports subalpine grassland. No Mexican spotted owls (MSO) have been detected within the SUP during consecutive surveys conducted since 1990.

Two MSO Protected Activity Centers (PACs) have been established adjacent to and along the Snowbowl Road, south of the SUP. The Snowbowl PAC is located approximately one to two miles from the SUP. The extreme southwest corner of the SUP is approximately 5,000 feet, or about one mile, in linear distance from the northern-most boundary of this PAC. An approximately 1.5-mile segment of Snowbowl Road is located within the boundaries of this PAC. This PAC has supported owls since 1985 and was occupied in 2003. Since 1992, four known nest sites have been identified within this PAC, ranging in linear distance from about 150 feet to 1,500 feet from Snowbowl Road and 5,000 to 7,500 feet from the southern SUP boundary. Owls using this PAC generally fledge young by the end of June or early July. Fledglings remain near the adults through summer and early fall. The adults are thought to remain in the general area throughout the year.<sup>399</sup>

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<sup>397</sup> USDI, 1995

<sup>398</sup> Id.

<sup>399</sup> Jensen, 2003

The Viet Spring PAC extends from the southwest corner of the SUP approximately one to 1.5 miles to the south. Approximately five acres of this PAC overlaps the SUP, in the extreme southwest corner. A section of Snowbowl Road approximately 300-feet in length is within the extreme southwestern PAC boundary; generally this PAC is located 500 to 1,000 feet east of the roadway. The Viet Spring PAC was established in 1997 based on detection of a single roosting male in 1996. This is believed to have been a sub-adult dispersing from a nearby PAC. No MSOs have been detected since that time, and this PAC is believed to have been unoccupied for the last seven years.<sup>400</sup>

### **Bald Eagle (*Haliaeetus leucocephalus*) - Threatened**

Bald eagles are primarily winter visitors to the CNF, occupying all habitat types and elevations. Wintering eagles arrive in the fall, usually late October or early November, and leave in early to mid-April. They feed on fish, waterfowl, terrestrial vertebrates, and carrion. Eagles are often seen perched in trees or snags near water or next to roadways where they feed on road-killed animals. At night, small groups (usually two to 12) or individual eagles roost in clumps of large trees in protected locations such as drainages and hillsides. Eagles usually roost adjacent to or very near food sources.

There are no known nesting areas in the project vicinity. The nearest documented breeding areas are along the upper Verde River, about 35 miles southwest of Flagstaff. Wintering bald eagles may occur occasionally in or near the project area. Perched eagles are sometimes observed in the Flagstaff vicinity, including Fort Valley. Most eagles are seen in ponderosa pine forest, but they are occasionally reported from mixed conifer and spruce-fir forest. The SUP supports mixed conifer and spruce-fir forest and is expected to be rarely visited by eagles in winter. There are two known roost sites in the general project vicinity. A summer roost occurs near Dry Lake, approximately three miles south of the proposed reclaimed water pipeline. A winter roost is located eight miles east of the project area. Bald eagles have been observed perching in snags and dead-topped trees at the fringes of the Fort Valley meadow, including the lower portion of the Snowbowl Road, and near Baderville, Rodgers Lake, Interstates 40 and 17, and Bellemont. There are no significant water bodies in the project vicinity, although eagles may feed on mammalian prey in these areas.

### **Black-footed Ferret (*Mustela nigripes*) - Endangered**

Black-footed ferrets occurred historically in northern Arizona, where their range apparently overlapped that of their primary prey, the Gunnison's prairie dog (*Cynomys gunnisoni*). Wild populations of this species are believed to have been extirpated from the state early in the twentieth century as a result of prairie dog control programs.<sup>401</sup> The only records for the region are one from 1917 at Bacas Ranch, 16 miles northeast of Springerville, Arizona and another record seven miles northeast of Williams in 1929.<sup>402</sup> A report<sup>403</sup> also documented an occurrence from Government Prairie near Parks and another from 12 miles west of Winona.

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<sup>400</sup> Arizona Biological Surveys, 2003

<sup>401</sup> AGFD, 1996 and Hoffmeister, 1986

<sup>402</sup> Hoffmeister, 1986

<sup>403</sup> Cockrum, 1960

There are no records of black-footed ferrets in the analysis area. There is one known Gunnison's prairie dog town within the SUP area. This town is currently active and was estimated to cover about 50 acres in 2002.<sup>404</sup> This is one of six towns that make up a complex. This town was surveyed in 1993 and 1994, but no black-footed ferrets were found. Other prairie dog towns occur in the Flagstaff vicinity.

Prairie dog populations are cyclic and can go from huge numbers to almost no animals within a short time due to disease, weather patterns, predation, and other factors. Population numbers fluctuate yearly, with high numbers in some years and undetectable numbers present in other years. Bubonic plague has been a significant factor in prairie dog colonies in the Flagstaff area in recent years and many recently active colonies have been severely impacted. Other impacts to prairie dogs include predation by coyotes, raptors, and bobcats and legal shooting.

### **Navajo Mountain Mexican Vole (*Microtus mexicanus navaho*) - Sensitive**

Navajo Mountain Mexican voles are found in dry grassy areas in or adjacent to pinyon-juniper woodlands; sagebrush shrublands; and ponderosa pine, mixed conifer forest, and spruce-fir forest in northern Arizona.<sup>405</sup> Navajo Mountain Mexican vole distribution is only known from Navajo Mountain (on the Arizona-Utah border), the south rim of the Grand Canyon, and the Flagstaff and Williams areas.<sup>406</sup> Locations have been reported from 3,800 to 9,700 feet elevation with a number of locations around the San Francisco Peaks. On the San Francisco Peaks, this vole has been found in open grassy areas amid limber pine, spruce, fir, and aspen. They are generally active mid-day and in early evening, but may also be active at night or in winter, depending on temperature.<sup>407</sup> Moisture conditions and the amount of cover are thought to influence the local distribution of voles in the genus *Microtus*.<sup>408</sup>

Several surveys have been conducted within the Snowbowl SUP. Although no individual Navajo Mountain Mexican voles have been seen, numerous signs of their existence were observed. Runways have been found on *Lower Bowl* (trail #29), *Sundance* (trail #30), *White Lightning* (trail #28), *Upper Ridge* (trail #26), *Lower Ridge* (trail #21), *Upper Casino* (trail #23) and in the tree islands between the Hart Prairie Lodge parking lots.

The main threat to the Navajo Mountain Mexican vole is reduced ground cover resulting from increased tree density, grazing or periodic droughts. Recreation use has the potential to reduce habitat for this species.

### **Northern Goshawk (*Accipiter gentilis*) - Sensitive**

Northern goshawks nest in coniferous forest in the mountains and on the high plateaus, including the Kaibab Plateau, the San Francisco Peaks, Flagstaff area, Mogollon Rim, the White Mountains of eastern Arizona, and the high mountain ranges of southeastern Arizona.<sup>409</sup> The

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<sup>404</sup> Northland Research, 2003

<sup>405</sup> Arizona Game and Fish Department, 1996 and Hoffmeister, 1986

<sup>406</sup> Hoffmeister 1986, District records

<sup>407</sup> Hoffmeister, 1986; Northland Research, 2003

<sup>408</sup> Kime et al., 1994

<sup>409</sup> Arizona Game and Fish Department, 1996; Snyder and Snyder, 1998

northern goshawk is a forest habitat generalist that uses a wide variety of forest stages in ponderosa pine and mixed conifer habitat. It prefers stands of intermediate canopy cover for nesting and more open areas for foraging. All ponderosa pine and mixed conifer above the rim is considered northern goshawk habitat, including associated pine or mixed conifer stringers that may extend below the rim.

Northern goshawk foraging occurs predominantly in ponderosa pine vegetation. Although juniper or pinyon-juniper habitat types are not heavily used by northern goshawks, some foraging may occur there, especially in transition areas between ponderosa pine and pinyon-juniper habitats. The northern goshawk preys on large to medium sized birds and mammals.

Nest stands are typically in later successional stages, especially old-growth trees. Nest building begins in March and young are typically fledged by the early part of June.<sup>410</sup> Post-fledgling family areas (PFAs) have patches of dense trees, developed herbaceous or shrubby understories, snags, downed logs, and small openings, which provide cover and prey. Fledglings develop their hunting skills here. Foraging areas are a mosaic of various successional stages and cover types.

There are two PFAs within the analysis area, both of which are located along the Snowbowl Road and the reclaimed water pipeline alignment. The Viet Spring PFA largely overlaps the Snowbowl Mexican spotted owl PAC. There are no recent surveys or monitoring data for this PFA, but it is presumed occupied. The Mars Hill PFA is located north and west of Lowell Observatory, with portions on CNF land, private land, and Arizona State Trust Lands. Only observatory lands within the Mars Hill PFA have been surveyed. The only known nest is located within 0.2 miles of the reclaimed water pipeline alignment.

Threats to northern goshawks are generally related to timber management. However, fire suppression, catastrophic fire, livestock grazing, drought, and toxic chemicals may also be involved. Declines may be related to decreases in prey populations associated with changes in structure and composition of forests.

### **American Peregrine Falcon (*Falco peregrinus anatum*) - Sensitive**

The peregrine falcon was removed from the Federal List of Endangered and Threatened Wildlife in August 1999, and it is now a Region 3 Forest Service sensitive species.<sup>411</sup> The essential habitat for the peregrine falcon includes rock cliffs for nesting and a large foraging area. Suitable nesting sites occur on rock cliffs with a mean height of 200 to 300 feet. The subspecies *anatum* breeds on isolated cliffs and is a permanent resident on the CNF. Peregrines prey mainly on birds found in wetlands, riparian areas, meadows within a 10 to 20 mile radius from the nest site. The peregrine breeding season is from March 1 to August 31.

The project area includes vegetation communities ranging from ponderosa pine forest at lower elevations to mixed conifer forest, spruce-fir forest, subalpine grassland, and alpine tundra at higher elevations on the Peaks. The analysis area lacks steep cliff sites potentially suitable for nesting by this species. Peregrine falcons are not known to nest in the project area or its

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<sup>410</sup> Snyder and Snyder, 1998

<sup>411</sup> USDI, 1999

immediate vicinity. The nearest known active eyrie is located over five miles away from the SUP, Snowbowl Road, and any portion of the reclaimed water pipeline alignment.

The main threat to the peregrine falcon is the continued contamination of its environment by synthetic organochlorine contaminants (e.g., DDT). These contaminants result in eggshell thinning and direct mortality to this species. Other threats include disturbance from rock-climbing near eyries and mortality from encounters with power lines.

## MANAGEMENT INDICATOR SPECIES

The 1982 National Forest Management Act Regulations set forth a process for developing, adopting, and revising land and resource management plans for the National Forest System, and identify requirements for integrating fish and wildlife resources in Forest Land Management Plans.<sup>412</sup> Key provisions for fish and wildlife resources require that fish and wildlife habitat be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area, where a viable population is considered to be one that has the estimated numbers and distribution of individuals to ensure its continued existence is well distributed through the planning area.<sup>413</sup> By definition, the planning area is the area covered by a regional guide and the forest plan.<sup>414</sup> The Forest Planning Regulations require that certain species, whose population changes are believed to indicate the effects of management activities, be selected and evaluated in forest planning alternatives.<sup>415</sup> Additionally, the Planning Regulations require that the population trends of management indicator species be monitored and relationships to habitat changes determined.<sup>416</sup>

Specific management direction for Management Indicator Species (MIS) is also found in Forest Service Manual (FSM) 2600. Policy and direction that tiers to 36 CFR 219.19 is provided for MIS for application at the Forest Plan and project levels relative to species selection, habitat analysis, monitoring and evaluation, and other habitat and planning evaluation considerations, in FSM 2620. FSM 2630 provides guidance on improving MIS habitat, and conducting habitat examinations, and project level evaluations for MIS within the project area.

Management indicator species were identified for each of the management areas described in the Coconino Forest Plan.<sup>417</sup> There are no MIS identified for developed recreation areas (i.e., the Arizona Snowbowl SUP). The Forest Plan did not assign MIS to certain management areas due to their limited size and high amount of human use and alteration of the landscape. MIS were not assigned to Oak Creek (MA14), Developed Recreation Sites (MA15), Inner Basin (MA 16), and Special Areas (such as Botanical and Geologic Areas [MA17], Environmental Study Areas [MA18] and Highway 180 [MA20]). Each of these areas has a different management emphasis. For MA 15, the management emphasis is developed recreation.

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<sup>412</sup> CFR 219.1, CFR 219.13, CFR 219.19

<sup>413</sup> CFR 219.19

<sup>414</sup> CFR 219.3

<sup>415</sup> CFR 219.19

<sup>416</sup> Id.

<sup>417</sup> USDA Forest Service, 1987

The Snowbowl Road and the proposed reclaimed water pipeline alignment cross Management Areas 3, 4, 5, and 9. The MIS analysis reflects only those acres affected by the pipeline. Table 3K-2 describes MIS and the vegetation types they are indicators for. Some species have already been discussed in previous sections of this document and will not be discussed further here: northern goshawk and Mexican spotted owl. Table 3K-3 lists MIS that were considered, but dropped from detailed analysis because habitat does not exist in the analysis area.

### **Abert Squirrel (*Sciurus aberti*)**

The Forest Plan designates the Abert squirrel as an MIS for early seral stage ponderosa pine forests. More recent research indicates that this species best habitat is the intermediate to older aged forest (trees nine to 22 inches DBH, with trees from 18 to 22 inches DBH preferred), where groups of trees have crowns that are interlocking or close. Uneven-aged stand management is thought to benefit the Abert squirrel. Heavy thinning, such as that which occurs at the urban–interface and as part of restoration treatments, reduces habitat quality due to resulting low tree densities and a lack of interlocking tree crowns.<sup>418</sup> Within the analysis area, dense stands of ponderosa pine suitable for Abert squirrels occur along the lower portion of Snowbowl Road and the proposed reclaimed water pipeline alignment. The Forest-wide habitat trend for Abert squirrel is stable, since the age class distribution of ponderosa pine has essentially remained dominated by mid-seral stage stands, with some loss of old-growth and older trees.<sup>419</sup>

There is very little forest-specific data to determine population trends at the forest level. Data from a few studies indicated stable populations within the study areas, but these research projects were limited to only a few locations on the forest and occurred over two to three year periods.<sup>420</sup> AGFD does not quantify small game populations, but does compile data on the number of squirrels killed per hunter day. From 1988-1999, statewide information indicates a stable trend for hunter harvest of squirrels.

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<sup>418</sup> USDA Forest Service, 2002

<sup>419</sup> Id.

<sup>420</sup> Id.

**Table 3K-2  
Coconino National Forest Management Indicator Species**

<b>Management Area (MA)</b>	<b>Species</b>	<b>Habitat</b>
MA 3 (Ponderosa Pine and Mixed Conifer with <40 percent Slopes), MA 4 (Ponderosa Pine and Mixed Conifer with >40 percent Slopes), and MA 6 (Unsuitable Timber Land in Ponderosa Pine)	Abert Squirrel	Early seral ponderosa pine
MA 3 and MA 4	Northern Goshawk	Late seral ponderosa pine
MA 3 and MA 4	Pygmy Nuthatch	Late seral ponderosa pine
MA 3 and MA 4	Turkey	Late seral ponderosa pine
MA 3, MA 4, and MA 6, and MA 7 (Pinyon-juniper Woodland with <40 percent Slopes) and MA 8 (Pinyon-juniper Woodland with >40 percent Slopes)	Elk	Early seral ponderosa pine, mixed conifer, and spruce-fir
MA 3, MA 4, and MA 6	Hairy Woodpecker	Snag component of ponderosa pine, mixed conifer, and spruce-fir
MA 3 and MA 4	Mexican Spotted Owl	Late seral mixed conifer and spruce-fir
MA 3 and MA 4	Red Squirrel	Late seral mixed conifer and spruce-fir
MA 5 (Aspen)	Yellow-bellied (Red-naped) Sapsucker	Late seral and snag component of aspen
MA 5 and MA 6 and MA 7 (Pinyon-juniper Woodland with <40 percent Slopes) and MA 8 (Pinyon-juniper Woodland with >40 percent Slopes)	Mule Deer	Early seral aspen and pinyon-juniper
MA 7 and MA 8	Juniper (Plain) Titmouse	Late seral and snag component of pinyon-juniper
MA 9 (Mountain Grasslands)	Elk, Pronghorn Antelope	Early and late seral grasslands
MA 10 (Grassland and Sparse Pinyon-juniper)	Pronghorn Antelope	Early and late seral grasslands
MA 12 (Riparian and Open Water)	Lincoln's Sparrow	Late seral, high elevation riparian (≥7000')
MA 12	Lucy's Warbler	Late seral, low elevation riparian (<7000')
MA 12	Yellow-breasted Chat	Late seral, low elevation riparian (<7000')
MA 12	Macroinvertebrates	Late seral, high and low elevation riparian
MA 12	Cinnamon Teal	Wetlands/aquatic

**Table 3K-3**

**Management Indicator Species Considered But Eliminated from Detailed Analysis**

<b>Management Area</b>	<b>Species</b>	<b>Habitat</b>
MA 7 and 8	Juniper (Plain) Titmouse	Late seral and snag component of pinyon-juniper
MA 12	Lincoln's Sparrow	Late seral, high elevation riparian ( $\geq 7000'$ )
MA 12	Lucy's Warbler	Late seral, low elevation riparian ( $< 7000'$ )
MA 12	Yellow-breasted Chat	Late seral, low elevation riparian ( $< 7000'$ )
MA 12	Macroinvertebrates	Late seral, high and low elevation riparian
MA 12	Cinnamon Teal	Wetlands/aquatic

**Pygmy Nuthatch (*Sitta pygmaea*)**

The pygmy nuthatch is tied to old ponderosa pine within younger stands, stands of old-growth ponderosa trees, old large oak trees, and cavities. Populations are thought to be stable on the CNF and state-wide. Ponderosa pine snags, a key habitat component for this species, are currently being lost faster than they are replaced and may affect populations of the pygmy nuthatch in the future.<sup>421</sup>

**Wild Turkey (*Meleagris gallopavo merriami*)**

Wild turkey is an indicator of late seral stage ponderosa pine forests, based on roost habitat requirements. Although the age class distribution of ponderosa pine has remained dominated by mid-seral stage stands, there has been some loss of old-growth and older trees, resulting in a decline in forest-wide habitat trend for late seral ponderosa pine habitat. Turkey roosts and nesting habitat occur in steep drainages and on hills. Turkey populations on the CNF declined in the early 1990s and have increased since the mid 1990s in probable response to favorable overwintering conditions, changes in hunt design in the game management unit, and contributions to overall mast production from trees from the 1919 seed year. The age class distribution of ponderosa pine has remained the same during Forest Plan implementation. Late seral stage trees have remained largely unchanged on slopes greater than 40 percent. The loss of large old trees occurred on slopes less than 40 percent during the early stages of Forest Plan implementation. The rate of loss due to timber harvest is now much reduced and for trees over 24 inches dbh rarely occurs. Other factors affecting turkey populations are lack of cover in key areas (including travel corridors), water availability, and forage availability are important factors.<sup>422</sup> Turkey habitat in the analysis area consists of ponderosa pine and mixed conifer forest with openings and small meadows for foraging during summer months. Ponderosa pine mast is the key habitat attribute and steep drainages and hillsides provide roosting and nesting habitat.

Although late seral ponderosa pine habitat has declined some since the Forest Plan was initiated in 1987, and turkey population trends in the early 1990's probably declined, data from the last five years show that populations are increasing on the CNF.

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<sup>421</sup> Id.

<sup>422</sup> Id.

### **Elk (*Cervus elaphus*)**

Elk are indicators of early seral stage ponderosa pine, mixed conifer, and spruce-fir forest. Grasslands are also important to elk. Forest-wide, early seral stage ponderosa pine has not increased in any large degree, although there has been some increase in early stage mixed conifer and spruce fir<sup>423</sup>. Elk are associated with deciduous thickets and early seral forest with interspersed grasses and forbs. They typically summer in mountain meadows and conifer forests and winter in pinyon-juniper woodlands and grasslands at lower elevations. Elk feed mainly on grasses, but will also feed on forbs and browse species. Forest-wide population trend is essentially stable. There was an increase in elk numbers in the early to mid 1990's, with a gradual decline back to late 1980's levels.

The analysis area provides summer range for elk and is located within Arizona Game and Fish Department's Game Management Unit (GMU) 7. This unit shows generally increasing elk numbers since 1986.<sup>424</sup> Elk tend to stay in the higher elevations during the summer months, moving into lower elevation pinyon-juniper woodlands and ecotonal areas north of the Peaks after significant snowfall.<sup>425</sup> Within the analysis area, ecotonal areas between conifer forest and grasslands are important to elk.<sup>426</sup> Recreational activities such as hiking may cause disturbance to elk foraging in meadows or resting in forested or edge areas.

### **Hairy Woodpecker (*Picoides villosus*)**

This species is an indicator of snags in ponderosa pine, mixed conifer, and spruce fir forest. Hairy woodpeckers are over-wintering cavity nesters associated with larger trees and dense forest canopy. They nest in holes in dead or dying trees and appear to be limited primarily by the availability of suitable cavity trees. Data from the CNF indicate that hairy woodpecker populations are stable or slightly increasing on the Forest.<sup>427</sup> Forest-wide, the snag component in ponderosa pine forest has declined, but has increased in mixed conifer and spruce-fir forest due to wildfire and insect outbreaks/disease.<sup>428</sup> Hairy woodpeckers are fairly common in conifer forest types within the analysis area.

### **Red Squirrel (*Tamiasciurus hudsonicus mogollensis*)**

The Forest Plan designates the red squirrel as a MIS for late seral stage mixed conifer and spruce-fir forests. Red squirrels are generally found at higher elevations in stands of spruce or a mixture of spruce and Douglas-fir. They are cavity nesters and feed on Engelmann spruce, Douglas-fir, white fir, fungi, buds, and fruits. They harvest the cones from trees to get to the seeds. Dwarf mistletoe creates witches broom, which may be helpful for nesting purposes. Approximately 12 percent of mixed conifer and spruce fir habitat on the Forest has shifted to early seral stages due to wildfires, and aspen and pine within mixed conifer is being replaced by

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<sup>423</sup> Id.

<sup>424</sup> Id.

<sup>425</sup> AGFD, 2003

<sup>426</sup> Arizona Game and Fish Department Wildlife Manager, pers. comm. 2003

<sup>427</sup> Id.

<sup>428</sup> Id.

white fir and Douglas-fir.<sup>429</sup> As pine is replaced by fir, the future trend of mixed conifer will be towards smaller and younger forests, which could affect red squirrels. Snags are probably increasing due to wildlife, insect, and disease, but the longevity of these snags is uncertain. Overall, the forest-wide trend for late seral stage mixed conifer and spruce-fir forests for red squirrels has probably declined somewhat. Due to the importance of mast producing trees, red squirrel populations probably fluctuate due to weather and cone crops.<sup>430</sup>

A query of the NatureServe database in 2002 showed a heritage rating in Arizona of S5, indicating a secure population in the state.<sup>431</sup> On the Forest, the population trend for red squirrels is inconclusive, due to lack of information on populations.<sup>432</sup>

### **Red-naped (Yellow-bellied) Sapsucker (*Sphyrapicus nuchalis*)**

The red-naped sapsucker is a MIS for the late seral stage and snag component of aspen. Red-naped sapsuckers nest primarily in aspen, or in deciduous/mixed conifer forest, often near water. Live trees are preferred although dead trees (usually spruce or other conifers) are used at times. This species excavates a new hole each year. They extricate sap and the soft cambium layer around willows, cottonwoods, aspens, and walnuts. Nest trees are a minimum DBH of 10 inches with a minimum height of 15 feet. They favor groups of large aspens near heads of higher elevation canyons during the summer.

On the Forest, mid- to late-seral stage aspen are declining, due to both natural causes and management actions to regenerate stands. Some early seral stage stands are being created through wildfire and management activities, but recruitment is limited primarily due to grazing by animals. The Forest-wide snag distribution of aspen has been declining throughout the Forest Plan implementation period. Currently, most aspen on the Forest is in the older age classes, providing habitat for sapsuckers, but future Forest-wide trends are of concern, since aspen regeneration remains a on-going problem.

Available population data on the Forest comes from Christmas Bird Counts, Breeding Bird Surveys, and long-term research conducted along the Mogollon Rim. Collectively, these data indicate that red-naped sapsucker populations fluctuate over time, but are stable overall on the Coconino National Forest.<sup>433</sup>

### **Mule Deer (*Odocoileus hemionus*)**

The mule deer was selected as an MIS of early-seral stages of aspen and pinyon-juniper woodlands. Early-seral stages of ponderosa pine, mixed-conifer, and chaparral habitats are also important for this species. Mule deer are primarily browsers on green shoots and fruits of shrubs and trees, but also feed on grasses and forbs. Mule deer populations have not done well on the

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<sup>429</sup> Id.

<sup>430</sup> Id.

<sup>431</sup> Id.

<sup>432</sup> Id.

<sup>433</sup> Id.

CNF since Forest Plan implementation, due to many factors, such as disease, poaching, climatic conditions, and habitat changes, resulting in a declining Forest-wide trend.<sup>434</sup>

Although age class distribution has remained relatively stable in pinyon-juniper, the vigor of understory components, such as grasses, forbs, and browse species, continues to be affected in areas with numerous young pinyon-juniper trees. In aspen, mid- to late-seral stages are declining due to both natural causes and management actions to regenerate stands, and successional processes continue to convert aspen stands to pine or mixed conifer. Creation of early seral aspen and pinyon-juniper through wildfire or management actions has not occurred at a sufficient scale to positively influence browse production that would benefit mule deer.<sup>435</sup> Consequently, the Forest-wide habitat trend for mule deer has declined somewhat overall.

The project area occurs within a portion of Game Management Unit (GMU) 7. There appears to be population interchange with the herd in GMU 9 on the adjacent Kaibab National Forest.<sup>436</sup> The highest densities of mule deer are found in previously burned areas north of the San Francisco Peaks and project area.<sup>437</sup> AGFD data for GMU 7 shows a decline in number of mule deer seen per hour and the number of fawns per 100 does.<sup>438</sup>

### **Pronghorn Antelope (*Antilocapra americana*)**

Pronghorn antelope is the only MIS identified for mountain grassland, and grassland and sparse pinyon-juniper. Populations are declining, although not equally, on the CNF. Arizona Game and Fish Department surveys of GMUs suggest declining trends in number of observed animals in most areas of the CNF and most areas have remained below the break even point of 20 to 35 fawns per 100 does in many years. Since the implementation of the Forest Plan, the amount of grassland Forest-wide has generally remained stable, with the exception of about a four percent increase in seral grasslands due to fuelwood treatments and fire. Forest-wide habitat trend is stable to declining due to tree encroachment, fire suppression, long and short-term climate shifts, and ungulate grazing. Establishment of woodland and pine seedlings and saplings in meadows and previously treated openings decreases habitat quality.<sup>439</sup> A number of factors have been identified that affect pronghorn, including: severe weather; amount and timing of precipitation; long-term climatic trends; habitat fragmentation; diet overlap with other grazers; reductions in fawn hiding cover; woody vegetation encroachment; fences; human disturbance and development; water availability; predators; parasites and diseases; and nutritional concerns.

Forest-wide grassland condition trends vary from downward to upward and the overall trend is stable to declining. Cool season grasses and species diversity have increased since the 1950s in probable response to climate change and a recovery from land abuses near the turn of the century. Tree encroachment, increasing canopy cover, fire suppression, long-term climatic

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<sup>434</sup> Id.

<sup>435</sup> Id.

<sup>436</sup> Id.

<sup>437</sup> AGFD, 2003

<sup>438</sup> USDA Forest Service, 2002

<sup>439</sup> Id.

changes, drought, and ungulate grazing are mainly responsible for downward trends. GMU 7 shows the most stable population of pronghorn.<sup>440</sup>

Little pronghorn habitat occurs in the analysis area. Grassland areas are limited and there is no pinyon-juniper woodland. Pronghorn are not expected to use high elevation subalpine grasslands near the SUP. Montane grassland associated with Fort Valley provides very limited pronghorn habitat due to the degree of human development and fencing.

## **MIGRATORY BIRDS**

Executive Order 13186 was signed on January 10, 2001, placing emphasis on conservation of migratory birds. This order requires that an analysis be made of the effects of Forest Service actions on Species of Concern listed by Partners in Flight, the effects on Important Bird Areas (IBAs) identified by Partners in Flight, and the effects to important overwintering areas.<sup>441</sup>

There are no IBAs or important wintering areas within the analysis area. The closest IBA exists at Mormon Lake. The following describes each habitat type found within the analysis area and the associated bird species of concern.

### **Habitat Types**

#### **Alpine**

Alpine habitat occupies about 20 acres above timberline in the SUP area and covers an estimated 1,600 acres on the San Francisco Peaks, generally above 11,500 feet. Only the water pipit is known to breed in this habitat type.

#### **Spruce-fir**

Four species of concern have been identified for spruce-fir habitat types: Swainson's thrush, pine grosbeak, golden-crowned kinglet, and three-toed woodpecker. Spruce-fir forest covers the majority of the SUP area, adjacent areas within the Kachina Peaks Wilderness, and the upper mile of the Snowbowl Road.

#### **Mixed Conifer**

Three species of concern have been identified for mixed conifer habitat types: northern goshawks, Mexican spotted owls, and olive-sided flycatchers. Mixed conifer forest occupies approximately 21.7 acres in the southwestern portion of the SUP. It also occurs along the upper portion of Snowbowl Road above 8,000 feet in elevation and on adjacent Forest lands.

#### **Pine**

Ponderosa pine habitat types occur along Snowbowl Road below 8,000 feet and along forested portions of the reclaimed water pipeline alignment from Fort Valley to Flagstaff. Four species have been identified as species of concern in pine habitats. They are northern goshawks, olive-sided flycatchers, Cordilleran flycatchers, and purple martins.

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<sup>440</sup> USDA, 2002

<sup>441</sup> Latta, et al. 1999

## High Elevation Grassland

High elevation grassland habitat types include the upper portion of Hart Prairie in and near the SUP (subalpine grassland), Fort Valley (montane grassland) along the reclaimed water pipeline alignment. Four species have been identified as species of concern for high elevation grasslands. They are ferruginous hawks, Swainson's hawks, burrowing owls, and grasshopper sparrows.

Northern goshawk and Mexican Spotted owl are discussed in the TES section of the Wildlife section. Table 3K-4 lists migratory bird species considered, but not taken through detailed analysis because no habitat occurs and/or the analysis is outside the geographic range of the species.

### Species

#### Water Pipit (*Anthus spinoletta alticola*)

The water pipit breeds above timberline in the San Francisco Peaks and White Mountains of northern and eastern Arizona.<sup>442</sup> The water pipit is one of only two vertebrate species known to breed in Alpine Tundra habitats in the state. Recreation is the greatest potential threat to habitat for this species.<sup>443</sup>

#### Swainson's Thrush (*Catharus ustulatus*)

Swainson's thrush is described as a rare summer resident in the cork-bark fir forest of the San Francisco Peaks and the White Mountains. At times it may be locally common. Important habitat components in fir forest are dense herbaceous and shrub vegetation, multiple forest layers, and downed logs.<sup>444</sup> Management recommendations for this species include incorporating of irregular thinning, leaving random clumps of dense saplings or vegetation in the lower or middle forest layers.<sup>445</sup>

#### Pine Grosbeak (*Pinicola enucleator*)

Pine grosbeaks are uncommon permanent residents of high elevation conifer forests in the White Mountains. This species prefers stands of spruce-fir with large trees and intermediate canopy cover, near edges. They forage both in trees and in open grass areas on seeds, buds, mast, and insects. Pine grosbeaks flock outside the breeding season, preferably in juniper habitats. Pine grosbeaks are not known to breed on the San Francisco Peaks, although there are a few reports of wintering flocks.<sup>446</sup> Species-specific surveys conducted during the breeding season in 1995 failed to detect any pine grosbeaks.<sup>447</sup> Management recommendations for this species are no large-scale removal of overstory Engelmann spruce and promotion of activities that reduce fire risk.<sup>448</sup>

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<sup>442</sup> Monson and Phillips, 1981

<sup>443</sup> Latta et al., 1999

<sup>444</sup> Monson and Phillips, 1981 and Latta, 1999

<sup>445</sup> Latta et al., 1999

<sup>446</sup> Monson and Phillips, 1981 and Latta, 1999

<sup>447</sup> SWCA, 1996b

<sup>448</sup> Latta et al., 1999

**Table 3K-4  
Migratory Bird Species Considered But Eliminated from Detailed Analysis**

Species	Habitat/Elimination Rationale
Swainson's Hawk	High Elevation Grassland. Not known to occur regularly in higher elevation montane and subalpine grasslands.
Burrowing Owl	High Elevation Grassland. Not known to occur regularly in higher elevation montane and subalpine grasslands.
Grasshopper Sparrow	High Elevation Grassland. Breeding range generally restricted to southeastern Arizona and at lower elevations.
Gray Flycatcher	Pinyon-juniper
Pinyon Jay	Pinyon-juniper
Gray Vireo	Pinyon-juniper
Black-throated Gray Warbler	Pinyon-juniper
Juniper Titmouse	Pinyon-juniper
Elegant Trogon	High Elevation Riparian
McGillivray's Warbler	High Elevation Riparian
Red-Faced Warbler	High Elevation Riparian

Golden-crowned Kinglet (*Regulus satrapa*)

In Arizona, golden-crowned kinglets breed in spruce-fir, mixed conifer, deciduous and single species stands in mountainous areas from the Kaibab Plateau eastward. They prefer to nest in dense stands of conifers, often near the edges of clearings. Nesting stands have both open and closed canopy and density of understory vegetation is not thought to be important. Management recommendations are to avoid large-scale removal of overstory and larger trees, manage forests to reduce fire risk, and minimize recreational activity around breeding sites in April through June.<sup>449</sup>

Three-toed Woodpecker (*Picoides tridactylus*)

Three-toed woodpeckers breed and forage preferentially in spruce-fir forest, particularly where insect populations are high due to tree disease or fire. They are also found in ponderosa pine and Douglas-fir forests. This woodpecker plays an important role in the control of bark beetles, which may comprise up to 65 percent of its diet. It is thought to be the only woodpecker capable of excavating cavities in the dense wood of living spruce trees. Three-toed woodpeckers typically nest in dead or dying trees, showing a preference for trees with 75 percent of the bark and 10-80 percent of the limbs remaining, but no dead needles left on branches. Snags dead for less than three years are thought to be an important habitat component. Management recommendations include retention of snags greater than 12 inches DBH for nesting and trees averaging 25 inches DBH for foraging, maintenance of 75-acre minimum patches of diseased trees for foraging, and limiting salvage logging after insect kills in spruce-fir forest.<sup>450</sup>

Olive-sided Flycatcher (*Contopus borealis*)

Olive-sided flycatchers prefer forest edges and natural or human-made openings in spruce-fir, mixed conifer, and ponderosa pine forest types. They nest high in coniferous trees and forage

<sup>449</sup> Latta et al., 1999

<sup>450</sup> Id.

primarily on flying insects. Management recommendations include maintenance or creation of openings, management for uneven-aged forest structure, and retention of tall snags or dead-topped trees during salvage operations.<sup>451</sup>

### Cordilleran Flycatcher (*Empidonax occidentalis*)

Cordilleran flycatchers breed predominantly in pine, but also in spruce, fir, aspen forests. They prefer moist and shaded forest. This species is a facultative secondary cavity-nester that also uses rock crevices, tree roots, and forks in small branches. Numbers of birds have been found to be positively correlated with canopy cover, within stand variability of trees sizes (most abundant in stands with five to 20 percent of pine basal area comprised of one to five inch DBH stems), and snag density. Management recommendations target their preferred habitat, ponderosa pine forest. They include management for greater than or equal to two snags per acre, manage for greater than 383 ponderosa pine/acre with high variability in size classes, and avoid mechanical thinning of canopy and snags.<sup>452</sup>

### Purple Martin (*Progne subis*)

In Arizona pine forests, purple martins prefer areas with high snag density adjacent to or in open areas. They are secondary cavity nesters and forage primarily on flying insects. Management recommendations include the creation and retention of large snags.<sup>453</sup>

### Ferruginous Hawk (*Buteo regalis*)

Ferruginous hawks historically nested in open scrublands, woodlands, and grasslands in southeastern and northern Arizona. The current distribution of breeding birds is restricted to Plains and Great Basin Grasslands in northern and northeastern Arizona. Ferruginous hawks range more widely in winter and are found throughout the state, often in agricultural areas and other open habitats.<sup>454</sup> Ferruginous hawks forage regularly in montane grasslands in the Flagstaff vicinity and have been observed hunting prairie dogs in the upper portion Hart Prairie within the SUP area. Management recommendations include the reduction of chemical control of prairie dogs, particularly in suitable nesting habitat and treatment to control exotic species encroachment of grasslands.

## **GAME AND NON-GAME WILDLIFE**

The analysis area is located within Game Management Unit (GMU) 7. Large game species managed by the Arizona Game and Fish Department are the pronghorn antelope, black bear, elk, mule deer, and wild turkey. Mountain lions are also known to occur in the analysis area. A number of smaller game animals and fur bearers also occur, including Abert and red squirrel, gray-collared chipmunk, mantled ground squirrel, Gunnison's prairie dog, coyote, and bobcat. Several species of bats have been documented in the Fort Valley area, west of the Snowbowl Road. The analysis area supports habitat for a number of neotropical migrant and resident breeding birds. Bird species observed in the SUP area include band-tailed pigeon, broad-tailed

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<sup>451</sup> Latta et al., 1999

<sup>452</sup> Id.

<sup>453</sup> Id.

<sup>454</sup> Monson and Phillips, 1981; Glinski, 1998; Latta et al., 1999

hummingbird, northern flicker, hairy woodpecker, northern three-toed woodpecker, Steller's jay, Clark's nutcracker, common raven, mountain chickadee, red-breasted nuthatch, white-breasted nuthatch, pygmy nuthatch, house wren, golden-crowned kinglet, American robin, yellow-rumped warbler, chipping sparrow, vesper sparrow, dark-eyed junco, western tanager, and pine siskin.

## **ENVIRONMENTAL CONSEQUENCES**

### **SUMMARY OF ENVIRONMENTAL CONSEQUENCES AND CONCLUSIONS**

Major conclusions and determinations of this Wildlife analysis are summarized below. A more detailed analysis of the direct and indirect environmental consequences – from which this summary was derived – follows.

#### **Alternative 1 – No Action**

In conclusion, Alternative 1 would result in no changes to existing ski area operations or to forest management activities within the SUP area. As a result, there would be no effects to wildlife TES or MIS. Additionally, there would be no effects to migratory birds as a result of Alternative 1.

#### **Alternative 2 – The Proposed Action**

Alternative 2 would not adversely affect threatened or endangered species within the analysis area. Regarding sensitive species, this alternative may impact individuals of the Navajo Mountain Mexican vole and habitat for the northern goshawk but is not likely to result in a trend toward Federal listing or loss of viability.

The importance of trees to be removed to MIS is limited by their relatively small size and young age, and their location adjacent to roadways and cleared utility easements. Based on these factors, tree removal would not substantially alter habitat for the Abert squirrel, pygmy nuthatch, wild turkey, elk, hairy woodpecker, red squirrel, red-naped sapsucker, mule deer, or pronghorn antelope. The alternative would have no effect to the Forest-wide habitat or population trend for these MIS. Under Alternative 2, some species of migratory birds may be affected by tree removal, construction, and increased recreation use.

Overall, some game and non-game species would experience both positive and negative effects as a result of the Proposed Action. These potential effects would be primarily the result of additional moisture and nutrients from snowmaking, noise, and recreation activities within the SUP area, and forest fragmentation due to tree clearing for proposed developed ski terrain.

#### **Alternative 3**

Alternative 3 would not adversely affect threatened or endangered species within the analysis area. Regarding sensitive species, this alternative may impact individuals of the Navajo Mountain Mexican vole and habitat for the northern goshawk but is not likely to result in a trend toward Federal listing or loss of viability.

This alternative would not alter habitat for management indicator species along Snowbowl Road or the reclaimed water pipeline alignment and therefore would have no effect to the Forest-

habitat or population trend for these species. Habitat modifying activities within the SUP area would not affect habitat for management indicator species outside of the SUP area.

Effects of this alternative on the water pipit, Swainson's thrush, three-toed woodpecker, cordilleran flycatcher, purple martin, and ferruginous hawk would be the same as those described under Alternative 2 (Proposed Action). Effects on pine grosbeaks, golden-crowned kinglets, and olive-sided flycatchers would be similar to the Proposed Action, except that there would be no increase in arthropod prey base related to snowmaking.

Effects to game and non-game species as described above would be similar to those disclosed under Alternative 1, with the exception of the effects of recreational use of the summer trail and increased fragmentation or loss of forested habitat on birds and large carnivores, which would be the same as those described under the Proposed Action.

## **DETAILED ANALYSIS OF DIRECT AND INDIRECT EFFECTS**

### **Terrestrial Species Habitat**

*The Proposed Action may result in the alteration and/or removal of habitat for terrestrial wildlife species within the SUP area.*

Indicator:

Disclosure/Quantification of Anticipated Effects to Threatened, Endangered, and Sensitive; Management Indicator Species, and Other Wildlife Species and Habitats Within the Analysis Area.

### **Alternative 1 – No Action**

#### **Threatened, Endangered, and Sensitive Species**

Habitat conditions for wildlife would remain in their current condition, notwithstanding natural processes. The CNF would continue existing treatment of spruce-fir stands in the SUP infected by spruce bark beetles. This alternative would have no effect on any threatened, endangered, or sensitive species.

Additional disclosure of the effects of historic ski area activities on threatened, endangered, and sensitive species can be found in the Cumulative Effects analysis.

#### **Management Indicator Species**

Habitat conditions for wildlife would remain in their current condition, notwithstanding natural processes. Because there would be no habitat altering activities this alternative would have no effect on MIS Forest-wide habitat or population trends.

Additional disclosure of the effects of historic ski area activities on MIS species can be found in the Cumulative Effects analysis.

### Migratory Birds

Under this alternative, there would be no changes in the analysis area. Habitat conditions for birds would generally remain the same, notwithstanding natural processes. This alternative would have no effect on migratory birds.

Additional disclosure of the effects of historic ski area activities on migratory birds can be found in the Cumulative Effects analysis.

### Game and Non-Game Wildlife

Under this alternative, there would be no changes in the analysis area. Habitat conditions for wildlife would remain in their current condition, notwithstanding natural processes. This alternative would have no effect on game and non-game wildlife.

Additional disclosure of the effects of historic ski area activities on game and non-game wildlife can be found in the Cumulative Effects analysis.

## **Alternative 2 – The Proposed Action**

### Threatened, Endangered, and Sensitive Species

As further detailed within the Biological Assessment prepared for the project, the Proposed Action is not likely to adversely affect the threatened Mexican spotted owl or its habitat. As required by the Endangered Species Act, the USFWS has reviewed and concurred with this determination. There would be eleven trees removed along the Snowbowl Road, within the Snowbowl PAC. There will be no tree removal in restricted areas and all construction activities within ½-mile of active nest sites would be restricted to periods outside the breeding season, which extends from March 1 to August 31. Helicopter over flights would be restricted around PACs. Helicopter use and other construction noise within the SUP would not adversely affect PACs in the analysis area. These restrictions have been specifically detailed in the required mitigation measures listed in Chapter 2.

The Proposed Action would have “No Effect” on the threatened bald eagle or its habitat. Bald eagles are unlikely to be found in the SUP area. Construction activities along the proposed reclaimed water pipeline may result in eagles avoiding construction zones, although construction would predominantly take place outside the period when wintering eagles are present. Construction activities and removal of trees along the reclaimed water pipeline alignment would not affect any known winter or summer roosts and would not affect foraging or perching opportunities for bald eagles.

The Proposed Action would have “No Effect” on the endangered black-footed ferret or its habitat. This alternative would result in the temporary disturbance of approximately 17 acres and permanent disturbance of less than ½ acre of the active Gunnison’s prairie dog colony within the SUP area. This disturbance is associated with the development of the snowplay area and associated facilities, relocation/realignment of the Aspen and Hart Prairie chairlifts, and the recontouring of the lower end of the *Hart Prairie* (trail #3). Prior surveys have found no black-footed ferrets in this area and the prairie dog town and associated complex are too small to provide potential habitat for this species.

The Proposed Action may impact individual Navajo Mountain Mexican voles (a Forest Service sensitive species), but is not likely to result in a trend toward federal listing or loss of viability of the species. Nine of the 13 locations where evidence of voles has been found would be temporarily disturbed by recontouring, rock/stump removal, or widening of existing ski trails. The number of individual voles potentially affected is not known. Recolonization of temporary disturbance areas would likely occur. Widening of existing ski trails and clearing of new trails would create more potential habitat for this species. Snowmaking would increase grass and forb density and cover on ski trails and could result in a local increase in the population of Navajo Mountain Mexican voles.

The Proposed Action may affect habitat for the northern goshawk, but is not likely to result in a trend toward federal listing or loss of viability. An estimated 54 pine trees would be removed in the Mars Hill PFA. The largest tree to be removed is approximately 18 inches DBH. All of these trees are adjacent to existing forest roads. Four of these trees would be removed from CNF lands; the remaining 50 would be removed from private land. Construction activities associated with installation of the reclaimed water pipeline would not affect nesting northern goshawks. Timing restrictions on construction activities within the Snowbowl PAC would largely prevent potential effects on nesting northern goshawks in the Viet Spring PFA. These restrictions would be extended to September 30 within ½-mile of any active nest site (i.e., no construction from March 1 to September 30) in the Viet Spring PFA to avoid impacts to nesting northern goshawks. Construction related traffic is not expected to affect northern goshawks nesting within this PFA. Northern goshawks using the Viet Spring PFA are likely habituated to traffic on Snowbowl Road. Timing restrictions on construction activities within ½-mile of any active nest site within the Mars Hill PFA (i.e., no construction from March 1 to September 30) would prevent disturbance to nesting northern goshawks.

As stated previously, there is no habitat in the analysis area for the Region 3 Forest Service sensitive peregrine falcon.

#### Management Indicator Species

The Proposed Action would result in the removal of approximately 156 trees (134 pine and 22 aspen trees) along approximately 14.8 miles of the Snowbowl Road and the reclaimed water pipeline alignment. All trees are immediately adjacent to roadways and previously cleared utility easements. Trees that would be removed are generally eight to 10 inches DBH; the largest tree removed would be about 18 inches DBH. Fifty-two of the 136 trees are located along Snowbowl Road. No snags or old-growth trees would be removed. Neither late seral stage aspen nor its associated snag component would be affected. Trees to be removed occur sporadically along Snowbowl Road and the remainder of the reclaimed water pipeline alignment. Therefore, their removal would not alter overall stand characteristics.

The importance of trees to be removed to management indicator species is limited by their relatively small size and young age, and their scattered locations adjacent to existing roadways and cleared utility easements. Based on these factors, tree removal would not substantially alter habitat for the Abert squirrel, pygmy nuthatch, wild turkey, elk, hairy woodpecker, red squirrel, red-naped sapsucker, or pronghorn antelope. Habitat impacts would be minor and would not alter overall stand structure; therefore there would be no impacts to Forest-wide habitat or population trends for these MIS.

This alternative would disturb some potential foraging habitat for mule deer. Tree removal along Snowbowl Road and the proposed reclaimed water pipeline alignment would include the removal of 22 smaller-sized aspen trees, some of which may provide browse for deer. Construction of the reclaimed water pipeline would result the temporary removal of forbs, shrubs, and other potential forage species along Snowbowl Road and the remainder of the water pipeline alignment. Some of the aspen trees to be removed are within aspen stands located adjacent to the Snowbowl Road and would have localized impact to stand structure. Despite the small, localized impact to habitat this alternative would not considerably alter or change the declining Forest-wide habitat and population trends for mule deer.

Habitat modifying activities within the SUP area (overstory spruce-fir removal to create new ski trails, thinning of stands to treat a spruce bark beetle infestation, and developed uses) would not alter habitat for management indicators species outside of the SUP area.

### *Migratory Birds*

Effects of this alternative on migratory birds would occur primarily within the SUP area. Effects of tree removal along Snowbowl Road and the reclaimed water pipeline alignment on migratory birds would be negligible because these activities would involve a relatively small number of younger trees located at the edges of previously cleared areas, such as roadways and utility easements, and therefore provide limited resources for wildlife. Within the SUP area, proposed activities may affect these species directly through habitat removal or modification, or indirectly through changes in prey populations. Effects of noise, recreational activities, and habitat fragmentation on birds in general are discussed in the Game and Non-game Wildlife section below.

This alternative would have little effect on breeding habitat for the water pipit. Approximately ½-acre of alpine tundra would be disturbed to increase the landing area at the top at the Agassiz chairlift top terminal. This area consists of a steep and rocky talus slope that supports little vegetation. The potential suitability of this area for nesting pipits is already diminished by ongoing recreational activity associated with operation of the Scenic Sky Ride.

This alternative may affect the Swainson's thrush. This alternative would remove 76.3 acres of spruce-fir forest, representing potential habitat, within the SUP area for the construction of new ski trails and other improvements. Thinning of 47.4 acres of spruce-fir to address a localized spruce bark beetle outbreak would improve habitat conditions for the Swainson's thrush by creating a greater diversity of vegetation age classes and openings for the growth of grasses, forbs, shrubs, and tree saplings. Establishment and use of the summer hiking trail in this area would reduce habitat suitability for potentially breeding thrushes because of disturbance from human recreational activity.

The Proposed Action would have both negative and positive effects on habitat for pine grosbeaks and golden-crowned kinglets. Negative effects are related to the removal of overstory vegetation and disturbance from recreational use of the summer trail. Positive effects would be the creation of additional edge habitat, an increase in biomass of vegetation, and increased arthropod prey on cleared ski trails.

Thinning of 47.4 acres of spruce-fir forest within the Agassiz and Sunset pods would negatively affect the three-toed woodpecker by reducing preferred prey populations (spruce bark beetles) and by removing larger trees and snags that may serve as potential nesting habitat. Due to the pervasiveness of wildfire and bark beetle infestation on both a local and regional scale, activities under this alternative would not affect the overall population viability of this species.

The Proposed Action would improve habitat for olive-sided flycatcher by creating additional openings and enhancing arthropod prey populations due to snowmaking activities.

This alternative would have little effect on habitat for the cordilleran flycatcher and the purple martin. These species occur primarily in ponderosa pine forest. Effects on this vegetation type would be limited to tree removal along Snowbowl Road and the reclaimed water pipeline.

This alternative would have a negative effect on the ferruginous hawk through the disturbance of the prairie dog colony at the upper reach of the Hart Prairie within the SUP area. Proposed activities there would reduce prey availability for wintering or migrating hawks, but they would not affect breeding individuals. Since prairie dogs would likely recolonize the disturbed areas, effects on prey base for ferruginous hawks would be temporary in nature.

#### *Game and Non-Game Wildlife*

This alternative would have positive effects on some game and non-game wildlife species, and negative effects on others. Effects of tree removal along Snowbowl Road and the reclaimed water pipeline alignment would be negligible because these activities would involve a relatively small number of younger trees located at the edges of previously cleared areas, such as roadways and utility easements, and therefore provide limited resources for wildlife. This analysis therefore focuses on potential effects of proposed activities on wildlife in the SUP area and in the adjoining Kachina Peaks Wilderness. These include the potential effects of (1) additional moisture and nutrients from snowmaking on plants as a source of food for wildlife, (2) noise and recreational activities on wildlife use patterns, and (3) habitat removal and fragmentation on habitat suitability.

#### *Increased Moisture and Nutrients*

The effects of snowmaking and additional nitrogen loading on plants are discussed in detail under the Vegetation section of this chapter. In general, additional moisture and nutrients would favor early successional and weedy species which may reduce overall plant species diversity, and could result in limited tree mortality along the edges of ski trails. Based on patterns of surface and groundwater hydrology, these effects would be largely limited to the areas directly affected by snowmaking (i.e., the cleared ski trails). These areas currently support a predominantly non-native plant community consisting of commercially seeded grasses and forbs. Almost all of the seeded species are also early successional species, and their cover and biomass would therefore increase with added moisture and nutrients. Greater dominance of early successional plant species as a result of wastewater enrichment has been correlated with increased arthropod density and diversity in pine forest and short-grass prairie habitats. It is postulated that C3 plants (which include virtually all seed mix species) are more palatable or digestible for generalist

herbivores.<sup>455</sup> Increased biomass of plants on cleared ski trails would therefore directly benefit larger herbivores, such as elk and mule deer, and would directly or indirectly benefit granivorous and insectivorous birds through greater seed and invertebrate prey production, respectively. Reduced plant species diversity would reduce habitat quality for wildlife that specialize on particular native plant species.

### *Noise*

Construction noise within the SUP area and along Snowbowl Road and the reclaimed water pipeline alignment may affect some wildlife species. Noise would result primarily from the operation of equipment for clearing, grading, and smoothing of ski trails and installation of the snowmaking water pipeline; construction of new lift lines and realignment of existing lift lines, including the use of a helicopter for setting lift towers; improvement of existing guest service and maintenance facilities and utilities; and construction of the reclaimed water pipeline. These activities would generally take place during late spring, summer, and early fall and would coincide with, or overlap, the breeding period for many wildlife species. Wildlife most likely affected would be those whose breeding habitat overlaps the analysis area (i.e., primarily birds and small mammals) or wildlife who use the area for foraging and/or resting (elk and mule deer). Over the long term, these effects would be temporary in nature and would be limited to the construction phase of the improvements. Over the short term, these types of effects may occur over a number of consecutive years, representing the implementation phase of the project.

Construction activities would likely result in some disruption of wildlife breeding and foraging activities in and around the work areas. Studies on both diurnal and nocturnal raptors have documented few responses to noise (including helicopters and blasting) and few adverse effects on nesting success beyond 400 m (¼-mile). Maximum noise levels at this distance would not exceed 65 dBA and would be well below threshold levels at which responses in raptors have been documented ( $\pm 90$  dBA or greater). Assuming that responses of raptors are representative, construction noise may interrupt breeding and foraging activities of birds and small mammals up to about ¼-mile from work areas. It would also preclude or reduce foraging, movement, and/or resting behavior of larger wildlife, such as deer and elk, in the area. At a maximum, this would affect the entire SUP area and up to a ¼-mile zone of influence in the adjacent Kachina Peaks Wilderness and adjacent Forest, private, and Arizona Game and Fish Lands along Snowbowl Road and the reclaimed water pipeline alignment. A number of species of birds and small mammals are likely more tolerant of noise than the larger raptor species. Wildlife in the analysis area have likely habituated to noise to some degree due to regular traffic on Snowbowl Road, year-round recreational and maintenance activities in the SUP, and recreational activity (hiking) along the Humphreys Trail. Since construction would occur in phases, only a portion of the analysis area would be affected in any one year. Also, construction activities would be limited in duration and would not extend over the entire breeding season for birds or small mammals. In most cases, adjacent undisturbed habitats would become suitable for wildlife after completion of construction activities. Since construction activities would be limited to daylight hours, movement and foraging activities of deer and elk would not be affected during the nighttime hours. In contrast to improvements within the SUP area, construction of the reclaimed water

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<sup>455</sup> Hunt and Shure, 1980; Kirchner, 1977

pipeline from Flagstaff would likely take place over the course of one summer construction season.

Additional noise in the analysis area from operation of the snowmaking system (pumping facilities and snowmaking guns) and increased use of snowcats would have limited effects on wildlife. Within the SUP area, these activities would primarily take place during nighttime hours, and outside the breeding periods for most, if not all wildlife species, and would result in relatively low and sustained noise levels. Snowmaking and associated snowcat use would take place primarily during nighttime hours in winter. Noise output from snowmaking guns is estimated at 84 dBA at 15 m (30 feet) from the source. Noise from the pump stations would be inaudible at approximately 30 m (100 feet) from the source. Snowcat use occurring within the SUP area would not change substantially from the existing condition. These activities may continue to affect roosting birds or other wildlife that remain in the SUP year-round and which occur in the direct vicinity of the activities. However, due to the high metabolic demands at high elevations and cold temperatures, relatively few birds or other wildlife species likely remain in the SUP overnight during the winter period.

### *Recreation*

Increased recreational activity may result in disturbance of some game and non-game wildlife. Proposed improvements would not increase the average number of skiers per day in the SUP area, but would introduce snowplay activity and potentially extend the period when recreationists are present during winter affecting the distribution of recreational use in the winter. Snowmaking under this alternative would extend the ski season in winter, which currently has a short or highly variable duration in some years. Extended and increased recreation use relative to current conditions would occur during the winter period, outside the breeding season for most, if not all, wildlife species. Day-time activities associated with skiing may interrupt foraging activities of some bird species, such as nuthatches and woodpeckers, and may result in increased stress levels and metabolic demands. These effects would be extended over a longer average period during the winter. They would affect birds foraging in the vicinity of the existing ski trails and the proposed 73.7 acres of new ski trails in the SUP area. Increased recreational activity in the SUP area may result in greater abundance of nest scavengers, such as crows, ravens, and Steller's jays (corvids) and higher rates of nest predation.<sup>456</sup>

The proposed summer hiking trail would affect wildlife by changing recreational use patterns within the SUP area. The proposed trail would provide a pedestrian route through the SUP area for Scenic Sky Ride users in summer. This trail would switchback through a stand of spruce-fir forest between the Agassiz Chairlift top terminal and the mid-station and would subsequently follow an existing unimproved access road to the base of the ski area. Use of this trail by hikers would result in some disturbance to wildlife. Repeated human intrusions in songbird territories can decrease singing, change nest defense behavior, increase predation, and result in local declines of songbirds.<sup>457</sup> Outdoor recreational activities such as hiking can result in energetic costs, impacts to behavior and fitness, and avoidance of otherwise suitable habitat. In open grassland habitat in Utah, mule deer generally took flight when hikers on established trails

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<sup>456</sup> Marzluff, 1997

<sup>457</sup> Id.

approached within 100 m ( $\pm 300$  feet) in perpendicular distance, although these effects would be less in forested areas with substantially more cover.<sup>458</sup> Assuming a 100 m ( $\pm 300$  feet) zone of influence on both sides of the  $\pm$ two mile pedestrian route (one mile of new trail, one mile existing unimproved road), recreational use of the summer trail would reduce the habitat suitability for wildlife by up to 15 acres within the SUP area.

### *Forest Fragmentation*

Fragmentation of forested habitat within the SUP area may affect some wildlife species. Habitat loss coupled with fragmentation of remaining habitats is cited as the cause of declines in forest bird species through loss of breeding areas, detrimental edge effects such as increased nest predation and brood parasitism, and limitations on movement between habitat patches.<sup>459</sup> A number of studies have reported a direct correlation between habitat patch size and the density, diversity, and reproductive success of forest birds. A number of these studies were based on woodlots of various sizes within cleared agricultural fields in the eastern North America.<sup>460</sup> Results of studies from other areas and habitat types are more variable. A study found that predation rates were higher in forested landscapes compared with habitats fragmented by agriculture, presumably due to higher abundance of predatory red squirrels.<sup>461</sup> These researchers also found that corvids (jays, crows, ravens) increased only at very high levels of habitat fragmentation. Another review of 25 studies on the relationship between habitat patch size and population density for birds, mammals, and insects throughout the world. Based on their results, these researchers concluded that (1) generalist species are affected only by direct habitat loss, (2) interior species would be affected more by fragmentation than edge species, unless only small patches are removed from the landscape, and (3) resident interior species are most vulnerable, while migrant edge species are least vulnerable to the effects of fragmentation.<sup>462</sup>

This alternative would result in additional fragmentation of the remaining forested habitat within the SUP area. A total of 76.3 acres of overstory spruce-fir forest would be removed to create new ski trails. Most of this would be associated with development of the new Humphreys pod in the north central portion of the SUP area. This activity would open up a stand that currently has more or less continuous forested cover. This ski trail would be designed with a network of small forested islands to create a less continuous break in the landscape. Most of these patches are small in size and would potentially be subject to higher predation risk from corvids, reducing and potentially eliminating their suitability for nesting birds. This activity may also result in higher nest predation rates at the periphery of the cleared ski trail. Based on a 100 m ( $\pm 300$  feet) zone of influence, these edge effects may extend up to a distance of 75 m into the Kachina Peaks Wilderness at the north end of this proposed new ski trail. Although removal of overstory vegetation would increase the risk of predation by corvids, it would decrease predation rates by red squirrels.

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<sup>458</sup> Taylor and Knight, 2003

<sup>459</sup> Beslisle et al., 2001

<sup>460</sup> Wilcove, 1985; Weinberg and Roth, 1998; Burke and Nol, 2000; Doherty and Grubb, 2001

<sup>461</sup> Tewksbury et al., 1998

<sup>462</sup> Bender et al., 1998

Removal of overstory vegetation may potentially affect larger and more wide-ranging mammals, such as mountain lions and black bears. Clearing of new ski trails would further reduce hiding cover within the SUP area for large carnivores potentially traveling through the area. Although movement may be restricted, it is unlikely that movement of these animals through the SUP area would be precluded. Retention of small forested islands would mitigate the reduction of hiding cover along the proposed new Humphreys pod. Mountain lions and black bear are most likely to travel at night and are unlikely to use the SUP area regularly in winter months. Both species are known to travel through or near areas with various levels of human development.<sup>463</sup> Increased recreational use and upgraded guest service facilities within the SUP area may result in a greater frequency of encounters between humans and bears, particularly in drought years.<sup>464</sup>

### **Alternative 3**

#### **Threatened, Endangered, and Sensitive Species**

As detailed discussion of the potential affects to threatened and endangered species is contained within the Biological Assessment prepared for the project.

This alternative is not likely to adversely affect the Mexican spotted owl or its habitat. Construction activities within the SUP area would not adversely affect Mexican spotted owls.

This alternative would have no effect on the bald eagle or its habitat.

This alternative would have no effect on the black-footed ferret or its habitat. Like the Proposed Action, this alternative would result in the temporary disturbance of approximately 17 acres of the active Gunnison's prairie dog colony within the SUP area. This disturbance would be due solely to recontouring of the lower end of the *Hart Prairie* (trail #3), and the relocation/realignment of the Aspen and Hart Prairie chairlifts. No black-footed ferrets have been found in this area and the prairie dog colony is too small to provide potential habitat for this species.

The effects of this alternative on the Navajo Mountain Mexican vole would be the same as described under the Proposed Action, except that existing grass and forb densities would not increase due to seasonal snowmaking.

The effects of this alternative on the northern goshawk would be the same as described under the No Action Alternative, except that there would be an increase in traffic on Snowbowl Road through the Viet Spring PFA due to construction activities in the SUP. Construction-related traffic along Snowbowl Road is not expected to impact nesting in this PFA.

#### **Management Indicator Species**

This alternative would not affect habitat for management indicator species because there would be no habitat altering activities outside of the SUP area along Snowbowl Road or the reclaimed water pipeline alignment. Habitat modifying activities within the SUP area would not affect

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<sup>463</sup> Foster and Humphrey, 1995; Zack et al., 2003; Clevenger and Waltho, 2000

<sup>464</sup> Zack, et al., 2003; Arizona Game and Fish Department, 2003

habitat for management indicator species outside of the SUP area. Therefore, this alternative would have no effect on management indicator species' Forest-wide habitat or population trends.

### Migratory Birds

Effects of this alternative on the water pipit, Swainson' thrush, three-toed woodpecker, cordilleran flycatcher, purple martin, and ferruginous hawk would be the same as those described under Alternative 2 (Proposed Action). Effects on pine grosbeaks, golden-crowned kinglets, and olive-sided flycatchers would be similar to the Proposed Action, except that there would be no increase in arthropod prey base related to snowmaking.

### Game and Non-Game Wildlife

Under this alternative, there would be no removal of trees along Snowbowl Road or the reclaimed water pipeline alignment. There would be no increase in biomass of vegetation or arthropods related to additional moisture and nutrients from snowmaking. Overall construction noise would be less due to the elimination of the snowmaking system, its associated pipeline, and the snowplay facilities. There would be no additional noise in the SUP area from snowgun and pump station operation. Operation of snowcats and recreational use by skiers would likely occur over a shorter ski season, on average, resulting in fewer potential impacts on wildlife. The effects of recreational use of the summer trail and increased fragmentation or loss of forested habitat on birds and large carnivores would be the same as those described under the Proposed Action (Alternative 2).

### Longer Duration Snowpack

*Effects of a longer-duration snowpack, and water storage on wildlife within the SUP area.*

Indicator:

Acres of Proposed Snowmaking Coverage, Comparison of Natural Snowpack Duration With the Extended Snowpack Due to Snowmaking, and the Effects of Both Longer-Duration Snowpack and Water Storage (Impoundment) on Wildlife.

### **Alternative 1 – No Action**

Under this alternative, there would be no snowmaking or associated water impoundment in the SUP area. Habitat conditions for wildlife, including threatened, endangered, and sensitive species; management indicator species; migratory birds; and game and non-game wildlife would remain in their current condition, notwithstanding natural processes.

### **Alternative 2 – The Proposed Action**

Proposed snowmaking under this alternative would cover approximately 205 acres within the SUP area. Snowmaking would generally extend the duration of snowpack in the SUP area. Snow grain (crystal) size of machine-produced snow is typically smaller than that of natural snow. This would result in denser snow that typically takes longer to melt than natural snow. Observational studies in Colorado have indicated that artificial snowpack persists about two

weeks longer than natural snowpack, although this is dependent on physical factors, such as aspect and slope.<sup>465</sup>

A 10-million gallon water impoundment reservoir would be constructed within the SUP area to provide storage for snowmaking operations. This impoundment would receive water from the City of Flagstaff, via the reclaimed water pipeline, through the end of February of each year. This reservoir would remain at least partially filled outside the ski season to protect the integrity of the impoundment lining and to provide an emergency water source. This impoundment would be surrounded by a fence that would exclude big game wildlife. Final fence specifications would be determined during final design of the impoundment.

### *Threatened, Endangered, and Sensitive Species*

The Proposed Action would have no effect on any threatened or endangered wildlife species, but may affect some sensitive wildlife species. Bald eagles, black-footed ferrets, Mexican spotted owls, and peregrine falcons either do not occur or don't occur regularly in the SUP area and would therefore be unaffected by either the longer duration snowpack or the water impoundment. Northern goshawks have been observed foraging occasionally in the SUP area including the vicinity of the proposed water impoundment. Fencing of the impoundment would exclude larger wildlife, but the presence of surface water would attract birds. Northern goshawks occasionally foraging in the area may respond to the increased concentration of potential prey around the impoundment. Orange netting incorporated into the fencing would reduce, but not completely eliminate the potential for northern goshawk collisions with the fence. Extended snowpack duration would not affect the Navajo Mountain Mexican vole, other than potentially improving the forage base.

### *Management Indicator Species*

The effects of the extended snowpack duration and the snowmaking water impoundment are limited to the SUP area. Because the SUP area is managed as a developed recreational site, impacts to MIS are not analyzed. However, effects on some of these species are addressed in the Game and Non-game Wildlife section below.

### *Migratory Birds*

Extended snowpack duration and the snowmaking water impoundment would have no effect on the water pipit, Swainson's thrush, or the three-toed woodpecker. Pine grosbeaks, golden-crowned kinglets, olive-sided flycatchers, and cordilleran flycatchers may benefit from enhanced arthropod prey populations due to extended moisture availability. Purple martins may benefit from the water impoundment as an additional surface water source and an area of higher arthropod prey densities. These benefits may be offset by increased potential for collisions with the fence surrounding the impoundment. Extended moisture availability would enhance the growth of grasses and forbs in the upper portion of Hart Prairie, increasing forage availability for prairie dogs. This in turn may benefit ferruginous hawks foraging in this area.

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<sup>465</sup> Williams, 2003

### Game and Non-Game Wildlife

Greater moisture availability from snowmaking and an extended snowpack would generally enhance the growth of grasses and forbs on cleared ski trails within the SUP area. This would locally increase forage conditions for deer and elk and result in higher densities of these game species in the SUP area. The snowmaking water impoundment would have no effect on most game and non-game wildlife because access would be excluded by fencing. These species would continue to rely on natural surface water sources, in addition to waters (stock tanks) that have been placed specifically for wildlife in the SUP area. Some game and non-game birds would benefit from this additional surface water source offered by the snowmaking impoundment. Orange netting incorporated into the fencing would reduce, but not completely eliminate the potential for bird collisions with the fence.

### **Alternative 3**

The effects of this alternative on threatened, endangered, and sensitive species; management indicator species; migratory birds; and game and non-game wildlife would be the same as those described under the Alternative 1 (No Action).

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### Temporal Bounds

The temporal bounds of the cumulative effects analysis for wildlife extend from the initial development of Snowbowl as a winter recreational area into the foreseeable future during which recreation-related activities may affect wildlife.

#### Spatial Bounds

The physical extent of this cumulative effects analysis comprises mainly the Snowbowl SUP area, the proposed reclaimed water pipeline alignment between the City of Flagstaff and the SUP area, and adjacent public lands to the extent they would be potentially affected. These adjacent lands include a portion of the Kachina Peaks Wilderness, areas adjacent to the reclaimed water pipeline alignment, and areas downslope of the SUP area (primarily Hart Prairie). Other projects in the Peaks area that affect wildlife are also included in the cumulative effects analysis.

### **Past, Present, and Reasonably Foreseeable Future Actions**

1. Kachina Peaks Wilderness Designation
2. White Vulcan Mine Settlement and Reclamation
3. San Francisco Mountain Mineral Withdrawal
4. Development and Maintenance of the SUP as a Recreational Area
5. Spruce Bark Beetle Control within the SUP
6. Fort Valley Restoration Project
7. Transwestern Lateral Pipeline Project
8. Peaks Segment of the Arizona Trail
9. Private Land Development
10. Miscellaneous/ongoing Recreational Uses

11. Power Line Maintenance
12. Various Aspen Regeneration and Exclosure Fences
13. Inner Basin Waterline Pipeline Maintenance
14. Snowbowl Road Paving

Appendix C includes the full list of past, present and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

### **Alternative 1 – No Action**

#### **Threatened, Endangered, and Sensitive Species**

Past development of the SUP area as a winter recreational area, associated maintenance activities, and measures implemented to control a spruce bark beetle outbreak affect primarily spruce-fir forest and subalpine grassland within the SUP area. These areas do not provide breeding habitat for the threatened Mexican spotted owl, the threatened bald eagle, the endangered black-footed ferret, or the sensitive peregrine falcon. The SUP area provides occasional foraging habitat for the sensitive northern goshawk. Since this species forages in both forested stands and along the edges of openings, initial development of the ski area and subsequent maintenance activities are unlikely to have had a substantially positive or negative effect on this species. Development of approximately 139 acres of skiing trails has increased the amount of potential habitat for the sensitive Navajo Mountain Mexican vole within the SUP area. Maintenance of existing ski trails may periodically impact some vole habitat and/or individuals.

Some of the past, present, and reasonably foreseeable future actions identified above have cumulative affected habitat for threatened, endangered, or sensitive species. Designation of the Kachina Peaks Wilderness provides conservation of potential habitat for the Mexican spotted owl, the northern goshawk, and the Navajo Mountain Mexican vole. Maintenance activities along the Transwestern Lateral Pipeline and the power line between the SUP area and Snowbowl Road may result in the occasional removal of hazard trees from within goshawk PFAs in the area. Proposed construction and use of the Peaks Segment of the Arizona Trail will result in recreational impacts to the Viet Springs goshawk PFA. A portion of the Snowbowl Road is located within the Snowbowl PAC. This roadway supports year-round traffic associated with winter sports, as well as other traffic related to the Scenic Sky Ride and other recreational events staged within the SUP area. Consistent presence and reproductive success suggest that traffic on Snowbowl Road has had little if any effect on Mexican spotted owls nesting in this PAC.

#### **Management Indicator Species**

Establishment of the Snowbowl SUP classified a total of 777 acres for recreational use, precluding the management of this area for indicator species. Establishment of the ski area in 1938 has likely had little effect on management indicator species beyond the SUP.

Other the past, present, and reasonably foreseeable future actions have affected management indicator species in the Peaks area. Closure and reclamation of the White Vulcan Mine and withdrawal of the Peaks from mineral extraction will benefit some management indicator species in the future. Designation of the Kachina Peaks Wilderness provided 18,963 acres for management as Wilderness. As such, forest management activities are precluded and habitat

conditions are predominantly the result of natural events, such as fire, succession, insect pest outbreaks. The Fort Valley Restoration Project will restore 9,100 acres of ponderosa pine forest to pre-settlement conditions and will likely improve habitat conditions for species indicative of late seral ponderosa pine forest. Private lands in the Fort Valley and Baderville area, including portions of Lower Hart Prairie, are mostly zoned at one unit per two to 2.5 acres; however, some are zoned at one unit per five or ten acres for lands undergoing development for rural residential uses.<sup>466</sup> Increased human presence and development reduces the amount of habitat for elk and mule deer in the analysis area. Construction and maintenance of the Transwestern Lateral Pipeline resulted in the clearing of approximately four acres of ponderosa pine forest which probably improved foraging habitat for elk and mule deer.

### Migratory Birds

Initial development of the Snowbowl ski area affected habitat for migratory birds within the SUP area. Clearing of ski runs and construction of associated facilities affected roughly 160 acres of predominantly spruce-fir forest and to a lesser degree subalpine grassland. Of this total, 21.4 acres were developed as roads, parking lots, and permanent structures which no longer serve as habitat for migratory birds. The remaining 138.6 acres was predominantly spruce-fir forest that was converted to open areas comprising the existing ski runs. This resulted in a corresponding loss of potential habitat for the Swainson's thrush. Potential habitat for pine grosbeaks and golden-crowned kinglets was negatively affected through the removal of overstory vegetation and positively affected by the creation of more edge habitat and more open areas for foraging. Potential habitat for olive-sided flycatchers likely increased through the creation of more openings. Construction of the Hart Prairie Lodge, lifts, and ski trails has likely reduced habitat quality for foraging ferruginous hawks. Removal of spruce-fir trees to control spruce bark beetles will reduce habitat quality for three-toed woodpeckers, which feed preferentially on these insects. Construction of the Agassiz Lift (to the original top terminal location) affected roughly two acres of habitat for the water pipit.

Designation of the Kachina Peaks Wilderness has conserved 18,705 acres of high elevation montane conifer forest and grassland. To some extent, this has benefited most or all of the migratory birds discussed above. Withdrawal of the Peaks from mineral extraction also provides conservation of these species or their potential habitats. The Fort Valley Restoration project will likely improve habitat conditions for the olive-sided flycatcher while private land development in Lower Hart Prairie is reducing foraging habitat for the ferruginous hawk.

### Game and Non-game Wildlife

Initial development of the Snowbowl has affected game and non-game wildlife primarily through disturbance from recreational and other human activities and from fragmentation or disruption of continuous forest cover within the SUP area. The highest levels of human activity occur during the ski season; the presence of skiers primarily results in the disturbance of diurnally foraging birds and other wildlife outside the breeding season. Use of the SUP as a recreational area has likely increased the local abundance of potential nest scavengers, such as jays, crows, and ravens and other nuisance wildlife, such as bears. Summer recreational use is in large part related to the Scenic Sky Ride. This activity may cause disturbance to foraging or potentially breeding birds

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<sup>466</sup> Coconino County Community Development, 2003

and other wildlife in the direct vicinity of the Agassiz Chairlift. Initial development of the ski area converted 138.6 acres of spruce-fir forest to ski trails, creating a mosaic of forested and open areas within the SUP area. This has resulted in direct habitat loss, limitations on movement between forest patches, and potential edge effects such as greater nest predation rates for some wildlife species.

Designation of the Kachina Peaks Wilderness, closure and reclamation of the White Vulcan Mine and withdrawal of the Peaks from mineral extraction will conserve habitat for game and non-game wildlife in the area. Removal of bark beetle infected trees opens up target stands of spruce-fir and affects wildlife through disturbance or direct habitat removal. Maintenance activities related to pipelines, power lines, and roads cause temporary disturbance to wildlife. Establishment of the Peaks segment of the Arizona Trail will contribute to recreational impacts on game and non-game wildlife. Areas adjacent to the Trail may become unsuitable or may be avoided by some species. Construction of a loop trail would likely reduce use of the area by wild turkey. Development of private lands in the Fort Valley/Baderville, Hart Prairie/White Horse Hill areas, and recreational use of the Peaks Segment of the Arizona Trail may increase the local abundance of scavengers, such as corvids, and may result in higher rates of nest predation in passerine birds. Greater human presence from recreational use of the Arizona Trail and from development of private lands in the Fort Valley/Baderville, Hart Prairie/White Horse Hill areas will further restrict, but not impede, movement of large carnivores through the analysis area. These activities would also result in a cumulative increase in the frequency of encounters between humans and bears in the analysis area.

## **Alternative 2 – The Proposed Action**

### **Threatened, Endangered, and Sensitive Species**

Cumulative effects of the Proposed Action on threatened, endangered, and sensitive species are the same as those described under Alternative 1, with the following exceptions.

Clearing of new ski trails under the Proposed Action would increase the area of potential habitat for the sensitive Navajo Mountain Mexican vole from approximately 138.6 to 233.1 acres. Snowmaking would increase grass and forb density and cover and may result in an increase in vole populations on both the existing and new ski trails. A correspondingly larger area would be subject to maintenance activities, which may temporarily disturb vole habitat and/or affect individuals. This alternative would result in the removal of 54 pine trees from the Mars Hill northern goshawk PFA.

### **Management Indicator Species**

The Proposed Action would not change the boundaries or the total acreage associated with the Snowbowl SUP area. As such, it would not affect the total acreage managed as a recreational area and excluded from management for forest indicator species. Due to their location, number, and size, the removal of approximately 156 trees from along Snowbowl Road and the reclaimed water pipeline alignment would not affect most management indicator species. Associated ground disturbance and removal of approximately 22 smaller aspen trees may temporarily reduce potential foraging habitat for mule deer. Otherwise, cumulative effects are the same as those described under Alternative 1.

### Migratory Birds

Cumulative effects of the Proposed Action on migratory birds are the same as those described under Alternative 1, with the following exceptions.

Cumulative effects under this alternative would relate to the removal, disturbance, or modification of a total of approximately 305.6 acres of montane conifer forest and grassland within the SUP. This consists of approximately 160 acres affected as a result of past ski area development and proposed improvements that would remove an additional 76.3 acres of spruce-fir forest, remove 2.7 acres and temporarily disturb 18.2 acres of subalpine grassland, and thin 48.4 acres of spruce-fir forest within the SUP area. Approximately 150 trees have already been removed from the SUP area and an additional 800 are planned to be removed for the control of spruce bark beetles. This alternative would result in a corresponding cumulative increase in the amount of potential habitat lost or modified for the Swainson's thrush, pine grosbeak, golden-crowned kinglet, ferruginous hawk, and three-toed woodpecker. This alternative would contribute an additional one-half-acre loss of potential habitat for the water pipit but would result in a cumulative increase in the amount of potential habitat for the olive-sided flycatcher.

### Game and Non-Game Wildlife

Cumulative effects of the Proposed Action on game and non-game wildlife are the same as those described under Alternative 1, with the following exceptions.

This alternative would cumulatively increase the amount of open area dominated by forbs and grasses from roughly 138.6 acres to approximately 233.1 acres and would increase the productivity of the predominantly introduced plant species in these areas. This would further improve habitat conditions for elk, mule deer, other generalist herbivores, and edge species but would reduce habitat for specialist herbivores and forest interior species.

This alternative would result in a cumulative increase in the area subject to disturbance effects. Maintenance activities would be extended from approximately 138.6 to 233.1 acres and most of the existing and new trails would be subject to noise from snowmaking and grooming operations. Establishment and use of the proposed hiking trail would result in potential disturbance of an additional 15 acres during the summer period. This alternative would extend the ski season and would increase the total duration over which potential disturbance of wildlife occurs. This increased human presence would affect primarily diurnally foraging birds and other wildlife outside the breeding season. An extended ski season may cumulatively increase the local abundance of potential nest scavengers, such as jays, crows, and ravens and other nuisance wildlife, such as bears.

Removal of approximately 76.3 acres of spruce-fir forest would result in a cumulative decrease in continuous forest cover and an increase in the total amount of edge between open and forested areas. Creation of additional edge may cumulatively increase nest predation rates by corvids. The Proposed Action would result in greater patchiness and would further reduce cover for large carnivores.

### **Alternative 3**

#### **Threatened, Endangered, and Sensitive Species**

Cumulative effects of this alternative on threatened, endangered, and sensitive species are the same as those described under Alternative 1, with the following exceptions.

Clearing of new ski trails under this alternative would increase the area of potential habitat for the sensitive Navajo Mountain Mexican vole from approximately 138.6 to 205 acres. Grass and forb density and cover would be dependent on natural precipitation. No trees would be removed from the Mars Hill northern goshawk PFA.

#### **Management Indicator Species**

Cumulative effects on management indicator species are the same as those described under Alternative 1, except that there would be no removal of trees along Snowbowl Road and the reclaimed water pipeline alignment under this alternative, and therefore no temporary impacts to mule deer foraging habitat.

#### **Migratory Birds**

Cumulative effects of this alternative on migratory birds are the same as those described under alternatives 1 and 2, with the following exceptions.

The cumulative effect of past ski area development and proposed additional development under this alternative would be the removal, disturbance, or modification of approximately 274.9 acres of montane conifer forest and grassland within the SUP area. This consists of 160 acres affected as a result of past ski area development and proposed improvements that would remove an additional 66.4 acres of spruce-fir forest, remove 0.1 acre of subalpine grassland, and thin 48.4 acres of spruce-fir forest within the SUP area. This alternative would result in a corresponding cumulative increase in the amount of potential habitat lost or modified for the Swainson's thrush, pine grosbeak, golden-crowned kinglet, ferruginous hawk, and three-toed woodpecker. Like the Proposed Action, Alternative 3 would contribute an additional one half-acre loss of potential habitat for the water pipit but would result in a cumulative increase in the amount of potential habitat for the olive-sided flycatcher.

#### **Game and non-Game Wildlife**

Cumulative effects of this alternative on game and non-game wildlife are the same as those described under Alternative 1, with the following exceptions.

This alternative would cumulatively increase the amount of open area dominated by forbs and grasses from approximately 138.6 acres to 205 acres and would expand the amount of foraging habitat for elk, mule deer, other generalist herbivores, and edge species. It would result in a corresponding reduction in the amount of habitat for specialist herbivores and forest interior species.

This alternative would result in a cumulative increase in the area subject to disturbance effects. Maintenance activities would be extended from approximately 138.6 to 205 acres and most of

the existing and new ski run would be subject to noise from nighttime snow grooming operations.

Removal of approximately 66.4 acres of spruce-fir forest would result in a cumulative decrease in continuous forest cover and an increase in the total amount of edge between open and forested areas. Creation of additional edge may cumulatively increase nest predation rates by corvids, would result in greater patchiness, and would further reduce cover for large carnivores.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

There could be some irretrievable effects on small acreages from overstory removal of spruce-fir and/or conversion to additional ski runs. In alternatives that include the following actions there could be irreversible commitments of resources affecting small acreages from: the construction of additional parking, snowplay/tubing facility, the snowmaking reservoir, realignment of chairlifts and contouring new ski terrain.

## 3L. GEOTECHNICAL

In conjunction with this EIS, a geotechnical report was prepared by Myers Design Engineering, Inc. to analyze the feasibility and potential hazards of constructing a 10 million gallon, on-mountain snowmaking water impoundment. The following analysis is excerpted from the Geotechnical Report for the Arizona Snowbowl Facilities Improvement Proposed Snowmaking Pond Site,<sup>467</sup> which is contained in the project file.

Appendix A provides a conceptual design of the snowmaking water impoundment, which was necessary in order to complete a proper stability analysis and dam breach model. The reader is referred to Appendix A for specifics of the impoundment. A summary of the impound design follows.

The snowmaking water impoundment is proposed to be located just below (and to the south of) the ridgeline along the southern edge of the SUP area – near the top terminal of the existing Sunset Chairlift. The proposed impoundment is to be a geosynthetic lined pond with an earthen embankment. The conceptual design assumes a 15-foot wide embankment crest and a 15-foot wide access road around the perimeter of the pond for maintenance access. The impoundment would be constructed with 2:1 (horizontal to vertical) side slopes. Although the Proposed Action calls for a 10 million gallon capacity, maximum possible storage (to the embankment crest) would be approximately 12.6 million gallons (38.8 acre feet). This makes the structure a non-jurisdictional dam in the State of Arizona (less than 25-foot crest to toe embankment height and less than 50 acre feet of storage).

### SCOPE OF THE ANALYSIS

Detailed field mapping of geologic hazards over the entire ski area was determined to be unnecessary in relation to the scope of this analysis. This hazard assessment is limited to the review of available published information, site-specific topographic maps, available aerial photography, and a field inspection of the proposed snowmaking water impoundment site.

### EXISTING CONDITIONS

#### TOPOGRAPHY AND SOILS

The Snowbowl (and the proposed snowmaking water impoundment site, specifically) is located in the San Franciscan Volcanic Field of northern Arizona, north of Flagstaff, near Latitude 35° 19' 49" North, Longitude 111° 42' 30" West. The proposed snowmaking pond is proposed near the upper terminal of the existing Sunset Chairlift, at an elevation of approximately 9,990 feet. This area drains south and east into the Rio de Flag near US Highway 180. The area is in the south/central portion of the Colorado Plateau physiographic province.

Site topography is steep with slopes below the snowmaking pond site ranging from 15 to 50 percent. Bedrock at the site consists of extrusive igneous rock, specifically blocky lavas of medium gray to pinkish gray andesite containing phenocrysts of plagioclase feldspar,

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<sup>467</sup> Myers, 2003

hornblende, hypersthene, and augite of Quaternary age. Materials of similar mineralogic composition can also exist in the form of ashflow tuff, tuff breccias, and flow breccias. The formation present at the snowmaking impoundment site is designated “Younger andesite of Agassi Peak” (Qaay). The formation common to higher elevations is designated “Older andesite of San Francisco Mountain” (Qao). Outcrops are relatively uncommon except along the ridge tops at higher elevations. Other commonly observed materials include colluvium, alluvium, and avalanche/debris flow deposits.

A soil survey prepared by the CNF is available for the area. The predominant soil complex in the vicinity is described as having a severe erosion potential, slight cutbank stability potential, and low shrink/swell potential. Other soil units encountered along the drainage path between the proposed snowmaking water impoundment site to and along Rio De Flag are grouped according to “mountainous” and “valley” sections. Erosion hazard ranges from moderate to severe in the mountainous section, and from slight to severe in the valley floor section. Cutbank stability hazard varies from slight to moderate in the mountainous section, and slight to non-existent in the valley floor section. The severe erosion hazard, particularly in the uppermost portions of the identified flow path, indicates that flood flows are likely to carrying a high sediment load and have the potential to generate debris flows.

## **GEOLOGIC HAZARDS**

Large landslides were not observed despite the steep terrain. However, combined avalanche and debris flow chutes are relatively common in the vicinity of the Snowbowl at higher elevations. The drainage path for any significant hydrologic event at the snowmaking water impoundment site (including a dam breach flood) is southwest off the face of Agassiz Peak, then southeast along the Rio De Flag toward the City of Flagstaff. The estimated flood discharge for the Rio De Flag at the city limits of Flagstaff is 340 cubic feet per second (cfs) for a return frequency of 25 years.

Other potential geologic hazards that were considered include: avalanche; rockfall; earthquake; subsidence; and expansive soils. There is a significant avalanche risk on all slopes between 26° and 45° (approximately 50 to 100 percent) which is further aggravated in areas of significant wind loading. However, the avalanche hazard is routinely monitored and mitigated during Snowbowl’s safety operations. No significant rockfall hazard was observed anywhere within the immediate vicinity of the proposed snowmaking water impoundment area. Slopes are gentle to moderate with no exposed rock.

The total absence of carbonate rocks (limestone and dolomite) precludes the existence of any karst topography or associated sinkhole development and therefore also precludes the associated subsidence risk. Similarly, although extrusive volcanic rocks are present in the area, there is no evidence of shallow lava tubes that could create a subsidence hazard. No significant mining activity has ever existed at the site and therefore, there are no shafts or slopes that could present a subsidence risk. No groundwater pumping is carried out, and therefore subsidence associated with groundwater pumping is not an issue at the Snowbowl.

Mechanical weathering dominates over chemical weathering at this relatively high altitude. The residual and colluvial soil products that result from breaking down the andesitic rocks tend to be

fine-to-medium grained sands with little or no clay (i.e., non-plastic). Therefore, the soils are non-expansive (little shrink-swell activity).

## **SEISMICITY**

This section of the analysis describes the potential impact of earthquakes at the Snowbowl by separately addressing two distinctly different aspects of seismicity:

- Seismic hazard
- Seismic risk

*Seismic hazard* addresses the nature of and likelihood of experiencing a seismic event at sometime in the future. However, the characterization of *seismic risk* requires more than just the establishment of a hazard and necessarily requires the consideration of the potential consequences of experiencing a seismic event.

### **Seismic Hazard**

Seismic events or earthquakes have long been known to be associated strongly with tectonic movements of large masses of the earth's crust or plates. Earthquakes can and do occur virtually anywhere in the earth's crust, but tend to concentrate, both in space and time, near the boundaries of the major plates. They can be associated with magmatic movement and volcanism, with areas of crustal thinning or spreading centers (rift zones), or even from elastic crustal rebound and isostatic uplift following the removal of a great thickness of glacial ice. However, the largest earthquakes and the greatest frequency of earthquakes seem to be associated subduction zones where edge of one plate is sinking beneath the edge of an adjacent plate that is overriding it. Arizona (with the exception of the extreme southwest corner near Yuma) is not impacted by plate boundary, subduction zone tectonics. Most earthquakes are directly associated with the breaking or rupture of the crust along a fault line. The magnitude of the earthquake is a function of a number of factors including the type of rock present, the dip angle of the subduction zone, the depth of the rupture, the creep rate and magnitude of the stress drop during a rupture, the areal extent of the rupture, and so on.

The Snowbowl SUP lies in a Zone 2B seismic area in the Colorado Plateau – a region characterized by crustal uplift. A database was created of earthquake magnitude and the epicenter location of historic seismic events within a 100 km radius of the site extracted from the USGS seismic event catalog. In many areas of moderate to low seismicity, earthquakes can be considered to occur as independent, random events in space and time and can be modeled using probability models that assume a dispersed source area (such as the area of the circle defined by the arbitrary 100 km radius surrounding the site). However, in areas of high seismicity, earthquakes do not occur randomly, but are often clustered along active fault lines. For purposes of this analysis, it was assumed that the seismic source area contains the full population of historic events within a 100 km radius of the site.

The Flagstaff community has experienced several damaging earthquakes from seismogenic sources within northern Arizona. The region between Flagstaff and the Arizona-Utah border has

produced seven  $M_S$ <sup>468</sup> 5.0 historic earthquakes. The three largest occurred within a six-year period (1906-1912).

- January 25, 1906:  $M_S$  6.2
- September 24, 1910:  $M_S$  6.0
- August 18, 1912:  $M_S$  6.2

Earthquakes are felt in Flagstaff about once per year. Part of the reason for this is that the Colorado Plateau transmits earthquake energy relatively efficiently. However, the primary reason is Flagstaff's location within the Northern Arizona Seismic Belt (NASB).<sup>469</sup> The most recent strongly felt earthquakes<sup>470</sup> stemmed from the 1993 Cataract Creek earthquake sequence of April and May. This sequence included both a  $m_b$  4.9<sup>471</sup> foreshock and  $m_b$  5.4 mainshock that were both widely felt in Flagstaff. More recently, earthquakes ranging up to  $M_L$ <sup>472</sup> 3.7 struck the Red Mountain and Lake Mary regions. These later events were only slightly felt in Flagstaff. In addition, earthquakes centered at the South Rim of the Grand Canyon ranging up to  $M_L$  4.0 have occasionally been felt in Flagstaff.

Earthquakes no larger than magnitude seven would be expected in the seismic source area, and no larger than 6.5 in the vicinity of the site.

### Design Earthquake

Analysis of the historic earthquake record as described above, and detailed in the Geotechnical Report prepared for this analysis, shows the following characteristics for the design earthquake (the event which should be used for the design of important facilities) for a facility design life of 100 years:

- Magnitude = 6.2
- Maximum On-Site Bedrock Acceleration (6.2 at 22 km) = 0.15g
- Annual Exceedance probability = 1.0 percent
- Probability of Occurrence During Design Life of 100 years = 63.21 percent
- Idealized Length of Fault Slip (Rupture Length) = 6.6 miles
- Probable Maximum Offset = .39 meters (1.3 feet)
- Expected Duration of Strong Ground Motion = 15 seconds

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<sup>468</sup> Surface Wave Magnitude. A relationship can be established between estimates of any of the various wave types that can be observed on a seismogram (P waves, S waves, and Rayleigh waves [also called surface waves]).  $M_s$  is estimated using the surface waves and is particularly useful for shallow focus earthquakes.

<sup>469</sup> The NASB is composed of a northwesterly trending belt of seismicity beginning southeast of Flagstaff, trending through the Grand Canyon, and apparently joining with a northward trending belt of seismicity at the Arizona-Utah border.

<sup>470</sup> MMI V-VI in Flagstaff.

<sup>471</sup> Body Wave Magnitude. This magnitude is estimated using the P wave amplitude.

<sup>472</sup> Local Magnitude (also known as the Richter Magnitude) is a procedure developed by Charles Richter in 1935 in California, specifically for the Wood-Anderson Seismograph instrument and was intended for use in characterizing California earthquakes (although it has seen much wider usage). It uses the difference in arrival time between the P wave (compression wave) and the S wave (shear wave) along with the maximum height (or amplitude) of the shear wave on the seismogram to determine the magnitude.

- Expected Duration of Acceleration greater than 5%g = 14 seconds
- Expected Duration of Acceleration greater than 10%g = 10 seconds

The above event could occur anywhere within the seismic source area defined by the 100 km radius around the site. However, the effects of earthquake shaking (acceleration and particle velocity) attenuate quickly with distance. Therefore, the worst-case conditions are likely to come from a nearby source, even if the magnitude of that event is less than the magnitude of the design event from within the entire seismic source area.

### Maximum Credible Earthquake

The concept of Maximum Credible Earthquake (MCE) uses the characteristics of a specific fault system to set a practical limit on the magnitude of the event it can generate. It is based primarily on the length and character of the mapped fault rupture. The most likely source of large seismic events in the vicinity of the site is the neotectonic fault system located to the southeast of Flagstaff. This fault system has been assigned a MCE magnitude of 7.3.

Worst Case Event Characteristics are as follows:

- Maximum Credible Earthquake Magnitude = 7.3
- Maximum On-Site Bedrock Acceleration (7.3 at 22 km, 25 km rupture on Lake Mary fault system, Baush and Brumbaugh, 1997) = 0.27g
- Annual Exceedance probability = 0.17 percent
- Probability of Occurrence During Design Life of 100 years = 15.32 percent
- Idealized Length of Fault Slip (Rupture Length) = 40 miles
- Probable Maximum Offset = 1.3 meters (4.3 feet)
- Expected Duration of Strong Ground Motion = 28 seconds
- Expected Duration of Acceleration greater than 5%g = 29 seconds
- Expected Duration of Acceleration greater than 10%g = 14 seconds

### Seismic Risk

Seismic risk must necessarily consider the potential consequences of the seismic hazard on facilities, equipment, and personnel associated with the project. The nature of the potential impacts varies depending on whether facilities are considered temporary, have a fixed life, or are considered permanent. Facilities can be impacted in a number of ways including surface ground rupture, strong shaking, liquefaction, and seismically induced instability.

All fixed structures at the site would be impacted by strong ground motion independent of their position at the site. For most facilities, the magnitude threshold at which some level of damage might be expected is about 5.0 with the severity of damage increasing with increasing magnitude. Probability of impact is simply the probability of the occurrence of the event.

Liquefaction, or the sudden loss of strength in the foundation soils supporting structures, typically begins at a magnitude threshold on the order of 6.0. However, the phenomenon requires not only strong ground motion, but also the presence of loose, saturated, non-cohesive soil. Although these conditions can exist locally where deeply weathered pockets in the bedrock have been filled with loose granular soil, the conditions are rare and isolated. The snowmaking

water impoundment site does rest above a pocket of residual and colluvial soil roughly eight to 10 feet thick above the volcanic bedrock. The colluvial soil in the upper one to 2.5+/- feet is relatively loose, however the density and cobble/boulder content increases with depth as the material transitions into a moderate to high-density residual soil with cobbles and boulders that becomes weathered volcanic bedrock at some depth greater than eight to 10 feet. The soils are normally dry and it is unlikely that they would fully saturate even during heavy snowmelt conditions. Based on the design 100 year return frequency earthquake (magnitude 6.2, barely above the threshold magnitude of 6.0), and an inspection of test pit excavations, it is believed that liquefaction risk at the snowmaking pond site is low.

Potential impacts from ground rupture during seismic events affect primarily permanent, fixed linear facilities such as roads, lifts, pipelines, and so on. Surface ground rupture has been documented during events as small as magnitude 3.6,<sup>473</sup> however, as a general rule, surface fault rupture requires events larger than magnitude 5.5. No known active faults exist on the site, and therefore the risk of impact from surface fault displacement is minimal.

Another potential consequence of a major seismic event is the occurrence of seismically induced instability. The most common seismically induced events include rockfalls, disrupted soil slides, and rockslides.

## **ENVIRONMENTAL CONSEQUENCES**

### **DIRECT AND INDIRECT EFFECTS**

Based on an analysis of the existing conditions within the Snowbowl SUP area, no geotechnical concerns were identified for any of the proposed project elements with the exception of the construction and on-going operation of the proposed snowmaking water storage impoundment. Because the snowmaking water impoundment is not a component of either Alternatives 1 or 3, this discussion of environmental consequences is limited to Alternative 2.

*Geotechnical feasibility and hazards associated with construction of the proposed snowmaking water impoundment must be analyzed.*

Indicator:

#### Dam Breach and Downstream Inundation Analysis

The character and potential impact of a dam breach flood was evaluated for the proposed snowmaking water impoundment using the unsteady flow modeling capabilities of the HEC-RAS program developed by the U.S. Army Corps of Engineers. HEC-RAS calculates the peak discharge through the breached dam and routes the flood wave downstream. The program uses an implicit finite difference procedure to solve the complete one-dimensional Saint-Venant equations of unsteady flow. Figure 3L-1 depicts the potential flow path.

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<sup>473</sup> Imperial, California, 1966



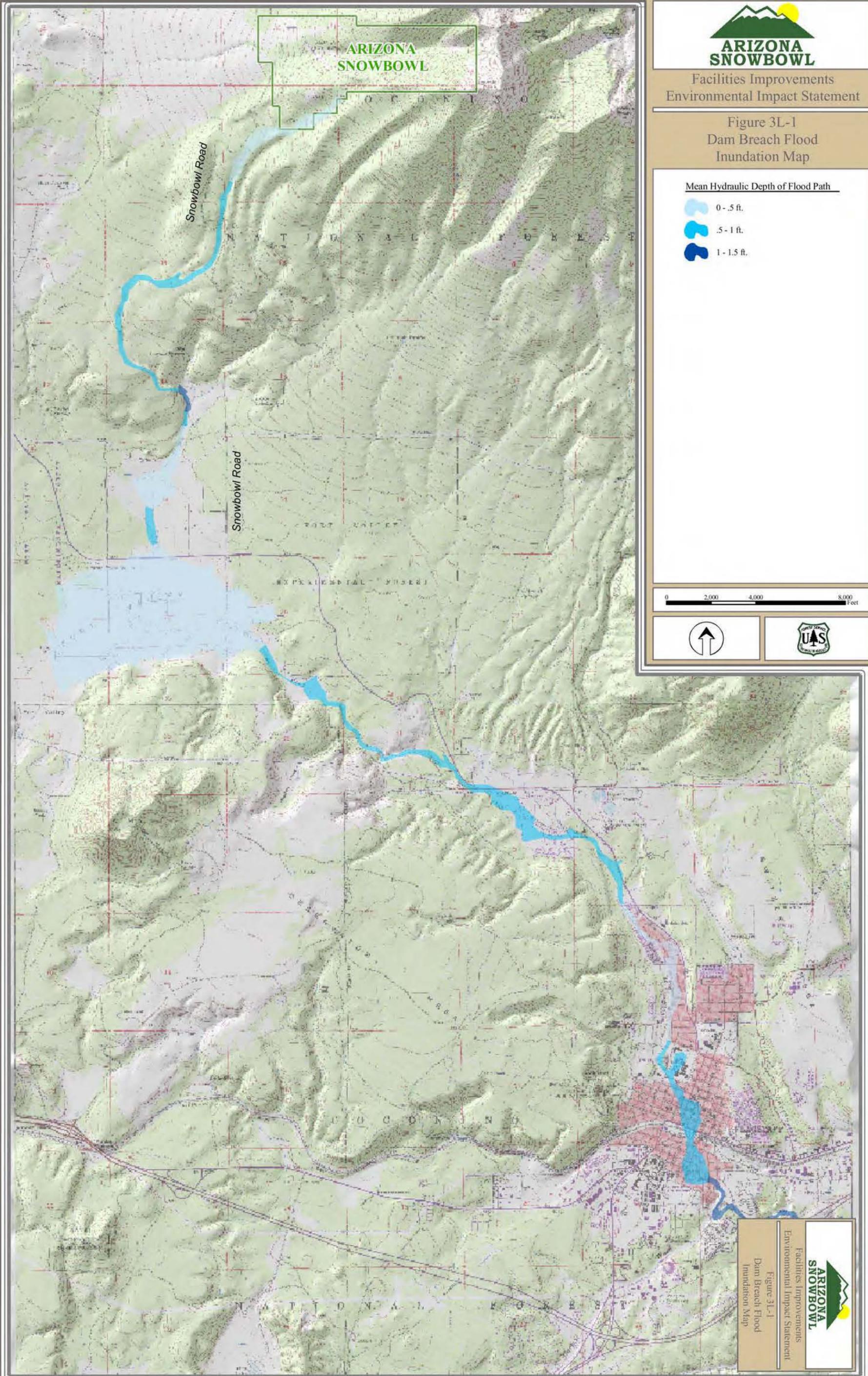
Facilities Improvements  
Environmental Impact Statement

Figure 3L-1  
Dam Breach Flood  
Inundation Map

Mean Hydraulic Depth of Flood Path

-  0 - .5 ft.
-  .5 - 1 ft.
-  1 - 1.5 ft.

0 2,000 4,000 8,000 Feet



  
 Facilities Improvements  
 Environmental Impact Statement  
 Figure 3L-1  
 Dam Breach Flood  
 Inundation Map

In the event of a snowmaking water impoundment failure, the resulting flood would flow to the southwest, away from the developed terrain within the SUP area, and further south down unnamed drainages approximately five miles to the valley floor and the Rio De Flag. Most of the flow path is steep and often narrow and supercritical flow would dominate. The upper part of the channel is steep, producing high stream power and Froude numbers often above 2.0. Such conditions can result in severe erosion and scour. However, at the base of the mountain (approximately five miles below the impoundment location), floodwaters would spread out across a wide, flat floodplain area where most of the sediment would be deposited.

The HEC-RAS program requires the input of numerous parameters. However, some of the most important parameters are those that describe the ultimate shape of the breach in the embankment, and the time required for the breach to form. Due to the nature of the snowmaking water impoundment design (a geosynthetic lined pond excavated well below the embankment height into natural ground), only a partial breach would be expected with the portion of the reservoir well below natural ground not being released. Froelich equations of were used to obtain initial estimates of the average breach width and time to failure.<sup>474</sup> Additional equations that provide estimates of the peak discharge during breach were used to provide an independent check on the reasonableness of the breach parameters.<sup>475</sup> Given the sandy, cohesionless, and erodible nature of the embankment soils, it is expected that the elapsed time from the beginning of failure to the maximum breach development would be minutes (not hours). After some attempts at optimization, the following breach parameters were selected:

- Average breach width = 44 feet
- Max width at bottom of breach = 31 feet
- Breach side slopes = 0.77:1
- Maximum breach height = 17 feet
- Time required for breach development: 10.2 minutes

Two different failure mechanisms were considered: a sunny day piping failure (internal erosion), and an overtopping failure. The overtopping failure condition would be the result of operating error (the structure overfilled and overtopped) and not be the result of a hydrologic event (i.e., no inflow flood hydrograph is being routed along with the dam breach flood).

The dam breach flood would be discharged on the south side of the ridge that bounds the Snowbowl and would not be released onto an existing or proposed trail. The maximum discharge through the breach varies among the scenarios ranging from 1,380 cubic feet per second (cfs) for the piping failure mode to 1,165 cfs for the overtopping failure mode. In the mountainous section of the modeled flow path, flow depth can be as great as 1.7 feet (although the typical depth is roughly one foot). Velocities in the steep upper reaches can be as high as 23.5 feet per second (fps). However, most of the time, the flow velocity would range between five and 14 fps.

There are three structures shown along the flood path between the snowmaking water impoundment site and Fort Valley in the vicinity of Big Leroux Spring, the first at a distance of

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<sup>474</sup> Froelich 1987, 1995

<sup>475</sup> Hagen, 1982; Fread, 1981

4.1 miles below the site and the other two at a distance of 4.3 miles. Two of the structures are outside the mapped flood limits and one is within it. At the site of the structure within the flood limits, the expected peak discharge is 830 cfs, the expected velocity is 5.1 ft/s and the expected mean depth 1.2 feet.

By the time the modeled flood wave reaches the valley floor near U.S. Highway 180 approximately 5.4 miles below the snowmaking impoundment site, there is no difference in the magnitude of the flood discharge under either scenario (between 414 cfs and 419 cfs). The expected peak discharge is 419 cfs, the expected velocity is 3.5 ft/s and the expected mean depth 0.6 feet. The model assumes an existing base flow of 180 cfs, therefore the dam breach flood produces a net increase of 239 cfs to this point. Once the flow reaches the alluvial valley floor, the depth falls to on the order of 0.6 feet just before reaching U.S. Highway 180.

A large, flat storage area exists immediately upstream of U.S. Highway 180 that would allow most of the coarse sediment load to drop out. Therefore, it is expected that existing hydraulic structures would not be plugged and would be functioning. Using existing estimates of peak flood discharges on the Rio De Flag from gaging station records, the 100-year return frequency flood in the area is estimated to be approximately 300 cfs. If the breach flood occurred while the channel is dry (the most likely scenario), then it would have approximately the same impact as a 50-year return frequency flood at the site, and the risk of overtopping the Highway would be low. If there were significant flow in the channel at the time of a breach, then it is possible that the Highway could be overtopped for a brief period of time (the period of time during which flows could exceed 300 cfs would be approximately 15 minutes). The depth of any overtopping flow on the Highway would likely be less than two inches with a velocity of less than 2.0 ft/s.

Downstream of Fort Valley the breach flood is substantially attenuated and would have impacts similar to 25-year return frequency flood or less (less than a 10-year return frequency flood in many cases further downstream). Once the flow enters the channel of the Rio De Flag, the modeled flow velocity declines from roughly 3.5 fps near the confluence to less than 0.3 fps near the first significant residential development (Fort Valley subdivision) at a downstream distance of 5.8 miles. The time required for the leading edge of the flood wave to reach U.S. Highway 180 after the start of a failure is approximately 28 minutes with the peak of the flood arriving approximately 10 minutes later (for a time to peak of 38 minutes).

Therefore, the model indicates that the flood wave attenuates substantially on its way down the mountain and dissipates almost entirely in the broad floodplain of Fort Valley. For purposes of computational stability, the model assumes an existing, minimum flow in the channel of 180 cfs (approximately the equivalent of a 25-year return frequency flood on the Rio de Flag above Flagstaff). The cumulative discharge leaving Fort Valley would be less than 210 cfs (i.e., a net contribution from the dam breach flood of 30 cfs or less). Downstream from Fort Valley, it is anticipated that existing hydraulic structures (bridges and culverts) on the Rio De Flag would accommodate the passing breach flood without impact through the Flagstaff area.

Indicator:

Hazard Classification

There is no simple, quantifiable method for the assignment of a hazard classification to a reservoir. Classification is a matter of judgment. Most systems consider two main factors:

- The potential for loss of human life
- The potential for property damage

The approach to hazard classification also varies with the administering entity (usually a state or federal agency). For example, the State of Arizona has the following guidance with respect to hazard classification:

**Hazard Potential Classification – State of Arizona**

1. The Department shall base hazard potential classification on an evaluation of the probable present and future incremental adverse consequences that would result from the release of water or stored contents due to failure or improper operation of the dam or appurtenances, regardless of the condition of the dam. The evaluation shall include land use zoning and development projected for the affected area over the 10 year period following classification of the dam. The Department considers all of the following factors in hazard potential classification: probable loss of human life, economic and lifeline losses, and intangible losses identified and evaluated by a public resource management or protection agency.
  - a. The Department bases the probable incremental loss of human life determination primarily on the number of permanent structures for human habitation that would be impacted in the event of failure or improper operation of a dam. The Department considers loss of human life unlikely if:
    - i. Persons are only temporarily in the potential inundation area
    - ii. There are no residences or overnight campsites
    - iii. The owner has control of access to the potential inundation area and provides an emergency action plan with a process for warning in the event of a dam failure or improper operation of a dam.
  - b. The Department bases the probable economic, lifeline, and intangible loss determinations on the property losses, interruptions of services, and intangible losses that would be likely to result from failure or improper operation of a dam.
2. The four hazard potential classification levels are very low, low, significant, and high, listed in order of increasing probable adverse incremental consequences. The Director shall classify intangible losses by considering the common or unique nature of features or habitats and temporary or permanent nature of changes.
  - a. Very Low Hazard Potential. Failure or improper operation of a dam would be unlikely to result in loss of human life and would produce no lifeline losses and very low economic and intangible losses. Losses would be limited to the 100 year

floodplain or property owned or controlled by the dam owner under long-term lease. The Department considers loss of life unlikely because there are no residences or overnight camp sites.

- b. **Low Hazard Potential.** Failure or improper operation of a dam would be unlikely to result in loss of human life, but would produce low economic and intangible losses, and result in no disruption of life-line services that require more than cosmetic repair. Property losses would be limited to rural or agricultural property, including equipment, and isolated buildings.
- c. **Significant Hazard Potential.** Failure or improper operation of a dam would be unlikely to result in loss of human life but may cause significant or high economic loss, intangible damage requiring major mitigation, and disruption or impact on lifeline facilities. Property losses would occur in a predominantly rural or agricultural area with a transient population but significant infrastructure.
- d. **High Hazard Potential.** Failure or improper operation of a dam would be likely to cause loss of human life because of residential, commercial, or industrial development. Intangible losses may be major and potentially impossible to mitigate, critical lifeline services may be significantly disrupted, and property losses may be extensive.”

### **Forest Service Manual 7500, Chapter 7510**

*Classify dams according to hazard potential based on the loss of human life or property damage that could occur if the structure failed.*

1. **Low Hazard.** Dams built in undeveloped areas where failure would result in minor environmental or economic loss, damage would be limited to undeveloped or agricultural lands, and significant improvements are not planned in the foreseeable future. Loss of human life would be unlikely.
2. **Moderate Hazard.** Dams built in areas where failure would result in serious environmental damage or appreciable economic loss with damage to improvement, such as commercial and industrial structures, public utilities and transportation systems. No urban development and no more than a small number of habitable structures are involved. Loss of human life would be unlikely.
3. **High Hazard.** Dams built in areas where failure would likely result in loss of human life or excessive economic loss. Generally this would involve urban or community development with more than a small number of habitable structures.”

Hazard classifications are based solely on downstream conditions and not on the design of the structure, operating procedures, or the condition of the dam. For structures assigned a low or moderate/significant hazard classification, periodic review of the hazard classification is appropriate to account for potentially changing downstream conditions. A review frequency on the order of five years is typical.

Hazard classifications affect design criteria (primarily spillway design), and the need for and nature of an Emergency Action Plan. An Emergency Action Plan defines appropriate response scenarios for all potential modes of failure and includes specific notification plans (updated at least every two years with current phone numbers), and evacuation plans. All responsible operating staff must be familiar with the Emergency Action Plan.

Given the long site distance on this section of U.S. Highway 180 and the low depths and velocities, an overtopping event of the Highway would not be life threatening. The subdivision within Fort Valley post-dates the USGS topography, and the structure base elevations are not known. However, the breach flood at the subdivision location would be less than the 100-year flood and would not be expected to impact any existing structures. However, a considerable volume of shallow water would be stored in open areas within Fort Valley during the passage of a breach flood. It is anticipated that existing hydraulic structures (bridges and culverts) on the Rio De Flag in the Flagstaff area would accommodate the passing breach flood without impact.

Based on the conditions described above in the Dam Breach and Downstream Inundation Analysis, the structure would classify as a low hazard dam using the State of Arizona criteria, and a moderate hazard dam using the Forest Service criteria. Therefore, it is recommended that the final structure be designed using design criteria associated with a moderate hazard dam.

Indicator:

Failure Risk

It is extremely important to understand the distinction between *hazard* and *risk*. A *hazard* is a condition, either natural or human-made, that poses a *potential* danger to life and/or property. Hazards exist everywhere, all around us. The existence of a hazard says absolutely nothing about the likelihood of being impacted by the hazard. *Risk* is the probability of occurrence of the event that would cause the impact. Stated another way, the hazard associated with a potential dam breach flood is exactly the same whether the dam embankment is a state-of-the-art structure in good condition or a poorly designed, sloppily constructed structure in poor condition. However, the risk or the probability that the embankment might fail, leading to the occurrence of a dam breach flood, would be dramatically different for those two extremes.

The principle determinant of the risk of experiencing a dam breach flood is the structural stability of the dam embankment. Potential failure modes were evaluated to assess failure risk along with the identification of mitigation measures that could reduce failure risk.

Potential dam embankment failure modes considered include the following:

- Overtopping of the embankment crest due to an extreme hydrologic event
- Overtopping of the embankment crest due to operator error
- Piping development in the downstream toe of the embankment or in the foundation
- Static failure of the embankment
- Embankment failure due to excessive displacement during an earthquake
- Liquefaction of the embankment foundation
- Excessive settlement

## **Overtopping of the Embankment Crest Due to an Extreme Hydrologic Event or to Operator Error**

For a moderate hazard rating, the required uncontrolled spillway design criteria is the Probable Maximum Flood (PMF). Estimation of the Probable Maximum Precipitation (PMP) and the associated PMF is beyond the scope of this study. However, based on the very limited size of the contributing basin above the proposed snowmaking pond, the design PMF is likely to be very small. The level of anticipated discharge should be easily carried through a modest sized emergency spillway placed in one of the dam abutments. The dam abutments contain an abundance of boulders and weathered volcanic rock at or very near the surface. Therefore the erosion potential in the floor of the spillway channel would be minimal. The uncontrolled emergency spillway should be checked routinely and frequently as part of normal operations for potential blockage by snow, ice, or debris and cleared if significant blockage is found.

Operator error could result in overfilling the reservoir if pumps were inadvertently left running unattended. However, using an automatic cutoff switch that would shut down pumps when the water surface in the pond reached its maximum storage level could mitigate this risk (this feature has been specified as required mitigation as detailed in Chapter 2). A pressure sensing transducer on the bottom of the pond should be used in lieu of a float device at the surface of the pond to prevent interference by ice. Even if automated systems were to experience a total mechanical failure, the uncontrolled emergency spillway would still prevent overtopping.

Due to the very low probability of occurrence of the sequence of events that might lead to an overtopping failure and the degree of redundancy possible in mitigation design, there is a very low risk of failure by overtopping.

## **Piping Development in the Downstream Toe of the Embankment or In the Foundation**

Piping involves the transport of solid particles from within an embankment or foundation soil in response to high seepage pressures or seepage velocities. The risk is greatest where certain fine-grained soil types are present and in high head dams (high embankments impounding water to great depth) that can produce high exit gradients (rapidly changing upward pressure gradients in the toe area of the dam). Fine sands and silts that are poorly graded (nearly all the same grain size) are very susceptible to piping. A particularly dangerous soil group is called “dispersive clay.” These very fine-grained soils (less than 2.0 microns) disaggregate in the presence of water and become extremely mobile. None of these high-risk soils are present at the proposed snowmaking water impoundment site. The soils observed on site consist of fine to medium grained, *well*-graded sands with gravel, cobbles, and boulders. “Well graded” refers to a wide variety of different particle sizes that impart good filtering characteristics (large particles hold back the medium sized particles which hold back the small particles and so on) creating a soil with good drainage characteristics and very limited particle mobility. These soils have a low piping potential.

The design maximum embankment height is on the order of 24 feet making the structure a small, low head structure. The impoundment area will be lined with a geo-synthetic liner to create a “bathtub” configuration that, during normal operations, would prevent any release of water to the soil and rock below the reservoir. However, any liners may leak at some point in their life

through defects in the liner or more often in the seams that that join sheets of liner. The most common defect is a small pinhole leak producing orifice flow through the liner and into the porous soil beneath. Such leaks, even if they were numerous, would not result in saturation of the foundation and embankment, but would perch and flow harmlessly beneath the structure and out on the bedrock/soil interface. A large leak (a major slice or tear in the liner or a long rip in a seam) could release enough water to saturate the foundation and embankment. Due to the shallow depth to rock, a portion of the back of the reservoir is likely to expose rock or even excavate a short distance into weathered rock. If this process were to expose any open, high continuity (long) joints, then it would be possible for water to directly enter these joints and be delivered with little head loss to the area immediately beneath the toe of the dam producing strong upward flow and high exit gradients leading to a piping risk even in the well graded sands.

This risk can be mitigated in a number of ways. A composite liner system consisting of HDPE liner above a minimum six inch thick bedding of compacted clay would restrict the flow volume sufficiently to prevent saturation of the foundation and embankment soils and create enough head loss to reduce high exit gradients in the toe area of the dam. However, there is no local source of clay soil and the importation of clay liner/bedding material would be very expensive. Another approach would be to grout any open fractures exposed during excavation prior to covering with the local sand bedding and the HDPE liner. The process of filling open fractures from the surface is sometimes referred to as “dental” grouting or “slush” grouting. The plugging of these fractures would either prevent the entry of water into the fractures or at least create enough head loss to reduce exit pressures at the embankment site. A third option would be injection grouting beneath the embankment foundation. Again, the plugging of fractures in the foundation below the embankment would create enough head loss to reduce exit pressures beneath the downstream toe of the embankment.

In summary piping does represent a risk to the stability of the structure, but the piping risk can be mitigated to a low risk by taking appropriate measures during final design and construction.

### **Static Failure of the Embankment**

Slope stability failure in the embankment can cause a loss of crest height and an associated risk of overtopping. The risk of instability is increased in the presence of saturated soil conditions and high pore pressure. Under normal operating conditions the embankment and foundation would be expected to be dry. Even in the presence of small to moderate leakage through the liner, the embankment would be expected to remain dry. Slope stability models were developed and analyzed for the downstream embankment of the snowmaking water impoundment. Rapid drawdown conditions were not analyzed for the upstream embankment slopes because the embankment soils are expected to be relatively free draining and incapable of preserving excess pore pressure following a reduction in impoundment water levels, and under normal operating conditions, there is no connection between impoundment water levels and pore water pressures in the embankment soils. Using an embankment slope of 2:1, the factor of safety (FOS) under the normal dry condition is 2.75, and under a moderate leakage condition 2.71 indicating a very low risk of instability.<sup>476</sup> Under worst-case conditions of major leakage through the liner, the

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<sup>476</sup> For static failures, most structures are designed to a minimum FOS of 1.5. An FOS exceeding 1.5, therefore, has a low likelihood of failure.

embankment soils would saturate and establish a steady state seepage profile. The FOS under this condition is 2.13 indicating a low risk of instability.

For the proposed embankment slope of 2:1, the risk of static instability is low.

### **Embankment Failure Due to Excessive Displacement During an Earthquake**

Strong ground motion during an earthquake can cause displacements in the embankment that in turn can cause a loss of crest height and an associated risk of overtopping. The potential for unacceptable displacements during an earthquake is checked in a hierarchy of analyses beginning with a pseudostatic limit equilibrium analysis. If the pseudostatic analysis indicates a factor of safety equaling or exceeding 1.15,<sup>477</sup> then there is no need for any additional analysis. For the condition of no leakage the FOS is 2.32, and for small to moderate leakage through the liner 2.28, indicating a low risk of excessive displacement and no need for further analysis. The combined conditions of major leakage with the development of a steady state seepage profile, and the occurrence of a major earthquake would produce a FOS of 1.79, again exceeding normal design criteria. In addition, the probability of a large leak going undetected and unmitigated coinciding with the timing of a large earthquake is extremely low (i.e., it is not a reasonable worst case design condition for this structure).

The risk of excessive displacement during an earthquake is low.

### **Liquefaction of the Embankment Foundation**

Liquefaction is a phenomenon that causes loss of shear strength during the strong ground motion accompanying an earthquake. Liquefaction requires two conditions:

1. Loose cohesionless soils
2. Saturated conditions

Test pits revealed loose, cohesionless soils in the upper 2.0+/- feet of the soil profile, however these soils would not be saturated for the condition of no leakage or even small to moderate leakage through the liner and therefore not subject to liquefaction. The combined conditions of major leakage with the development of a steady state seepage profile, and the occurrence of a major earthquake would have an extremely low probability for the same reasons described in the earlier section on excessive displacement. Test pits indicate that the cohesionless soils densify with depth transitioning into dense residual soils and weathered rock at a depth of less than 10 feet. However, the lower portion of the soil profile could be saturated with only a small to moderate level of leakage through the liner. Based on observations in the test pits, these deeper soils are too dense to be liquefiable. However, it would be prudent to check the relative density of the entire soil profile and quantify the liquefaction potential of the deeper soils through a site-specific drilling program at the time of final design. If a liquefaction risk is identified at the time of final design, it can be easily mitigated. Loose soil can simply be removed and replaced with compacted, densified soil, or deep layers can be stabilized with grout.

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<sup>477</sup> For seismic-induced failures, most structures are designed to a minimum FOS of 1.15. An FOS exceeding 1.15, therefore, has a low likelihood of failure during a seismic event.

In summary, the liquefaction risk is believed to be low, but needs to be verified by site-specific investigation at the time of final design.

### **Excessive Settlement**

Excessive settlement can lead to a loss of crest height and an associated risk of overtopping. Large settlements are typically associated with low-density clay soils. The soils in the foundation area are low cohesion silty sand and gravel becoming progressively denser with depth and terminating against boulders and weathered rock at depths of 10 feet or less. Settlement movements in such soils are small, elastic in nature, and immediate. Therefore, little or no settlement movement would be expected after completion of construction.

The risk of excessive settlement is very low.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

The temporal bounds of the cumulative effects analysis for geotechnical issues extends from the point at which the water impoundment would be constructed until it is no longer necessary.

#### **Spatial Bounds**

The physical extent of this cumulative effects analysis is confined to the flood inundation path, as identified in Figure 3L-1.

### **Past, Present, and Reasonably Foreseeable Future Actions**

No past, present or reasonably foreseeable future activities have been identified which could cumulatively affect geotechnical resources. Appendix C includes the full list of past, present and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

### **Alternatives 1, 2 and 3**

Because no past, present or reasonably foreseeable future activities have been identified that could cumulatively affect geotechnical resources, no further cumulative effects analysis is warranted.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

No irreversible or irretrievable commitments of resources were identified in association with this geotechnical analysis.

# 3M. AIR QUALITY

## INTRODUCTION

Neither public nor agency scoping identified potential effects to air quality as a key issue within this analysis. The two action alternatives include the same level of selective tree removal but each has a varying degree of ground disturbance due to the inclusion of snowmaking under Alternative 2.

## SCOPE OF THE ANALYSIS

The air quality analysis for this analysis focuses on the Snowbowl SUP area (NFS lands), the adjacent base area, and a proximate Class I airshed.<sup>478</sup>

## FEDERAL AND STATE AIR QUALITY REGULATIONS

### FEDERAL

The Clean Air Act (CAA) was enacted in 1955, but it contained few requirements for reducing air pollutant emissions. It was amended numerous times from 1963 through 1990 to address reductions in vehicular and stationary source emissions and to establish national air pollution concentration limits. It also established several programs, including: the National Ambient Air Quality Standards (NAAQS), which limited air concentrations to protect public health and welfare; the New Source Performance Standards, which set emission standards for major sources; and the State Implementation Plan (SIP) procedures, which were designed to bring areas that exceeded NAAQS levels (non-attainment areas) to within the standards. Table 3M-1 lists the state and Federal Ambient Air Quality Standards.

**Table 3M-1  
State and Federal Ambient Air Quality Standards**

Pollutant	Averaging Period	Primary Standard	Secondary Standard
Carbon Monoxide (ppm)	1 hour	35	--
	8 hour	9	--
Nitrogen Dioxide (NO <sub>2</sub> ) (ppm)	Annual	0.05	0.05
Particulate Matter (PM <sub>10</sub> ) (micrograms/m <sup>3</sup> )	24 hour	150	150
	Annual	50	50
Ozone (ppm)	1 hour	0.12	0.12
	3 hour	--	1300 (0.5)
Sulfur Dioxide (SO <sub>2</sub> ) (ppm)	24 hour	365 (0.14)	--
	Annual	80 (0.03)	--
Lead (Pb) (micrograms/m <sup>3</sup> )	Calendar Quarter	1.5	1.5

Source: ADEQ 2003

<sup>478</sup> The nearest Class I airshed is Sycamore Canyon Wilderness. The Kachina Peaks Wilderness is not classified as a Class I airshed, though it is treated as if it were.

In its amended form, the CAA designates two separate air quality areas receiving differing levels of protection. Class I areas generally include National Parks, Congressionally designated Wildernesses that are in excess of 5,000 acres and which were created prior to 1977,<sup>479</sup> National Monuments, National Seashores, and other areas of special national or regional value. Class I designation warrants the highest level of protection afforded to an area. Class II designation typically applies to all non-Class I areas.

Class I and II areas are either designated as attainment, non-attainment, or unclassifiable areas. Unclassifiable designations apply where pollution is not anticipated to exceed national standards and where insufficient information is available to either substantiate or reject this assumption. Unclassified areas generally have little, if any, industrial development and comparatively sparse populations. The low likelihood of air quality problems makes these areas a lower priority for expensive monitoring programs.

In addition to the NAAQS discussed above, the EPA has created regulations to protect and enhance air quality. The Prevention of Significant Deterioration (PSD) regulations are intended to help maintain good air quality in areas that attain the national standards and to provide special protections for national parks, Congressionally wildernesses, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historical value.<sup>480</sup> These regulations stipulate that new sources must not cause a decline in ambient air quality and must use best available control technology to limit emissions.

PSD permits are required for “major emitting facilities” which emit, or have the potential to emit, 100 tons or more per year of any air pollutant.<sup>481</sup> EPA regulations specifically list the sources that are considered “major emitting facilities” – this list does not include ski areas.<sup>482</sup> However, the regulations note that the term “major emitting facilities” also includes “any other source with the potential to emit two hundred and fifty tons per year or more of any air pollutant.”<sup>483</sup> A PSD permit is not required for Snowbowl because the ski area does not have the potential to emit over 250 tons of any regulated air pollutant.

In an effort to eliminate or minimize the severity and number of violations of the NAAQS and to achieve expeditious attainment of these standards, the EPA promulgated the Conformity Rule in 1993. Conformity regulations apply to Federal actions and environmental analyses in non-attainment areas completed after March 15, 1994. The conformity regulations do not apply to Snowbowl area because it is classified as an area in attainment for all criteria pollutants.

## **VISIBILITY**

Visibility is the maximum distance that an object can be perceived against the background sky; it also includes the clarity with which the form and texture of objects can be seen. Visibility impairment in Arizona is most often related to fine particulates in the atmosphere; these particulates either scatter or absorb light, obscuring vision. The most common anthropogenic

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<sup>479</sup> The Kachina Peaks Wilderness was designated by Congress in 1984.

<sup>480</sup> 42 USC 7470-7479, 1997

<sup>481</sup> 42 USC 7475(a) and 7479(1), 1997

<sup>482</sup> 42 USC 7479(1), 1997

<sup>483</sup> Id.

sources for these particulates are vehicular emissions, fugitive dust from unpaved roads, and wildfires. Topographic features, wind patterns, and humidity are all related to effects on visibility.

Prevention of visibility impairment to Class I areas is required by the EPA's CAA implementing regulations.<sup>484</sup> The Forest Service has also created visibility standards called Limits of Acceptable Change to determine sensitive receptors within the Wilderness and how much air pollution is acceptable. As previously stated, the Kachina Peaks Wilderness is not technically classified as a Class I airshed, though it is treated as if it were. The Kachina Peaks Wilderness is the only protected airshed proximate to the Snowbowl area which has relevance to this analysis.

## **STATE**

The EPA retains oversight authority for air quality but has delegated enforcement of the CAA to the states. In Arizona, the Air Quality Division of the Arizona Department of Environmental Quality (ADEQ) acts as the lead agency. The state is required to develop and administer air pollution prevention and control programs; state standards must be either the same as, or more stringent than, Federal CAA standards. Table 3M-1 lists the State and Federal Ambient Air Quality Standards.

## **EXISTING CONDITIONS**

### **CLIMATE AND METEOROLOGY**

Snowbowl has a climate monitoring station at the Hart Prairie Lodge, which is at 9,300 feet in elevation. This station shows average total snowfall over a period of 22 years (1981/82 season through 2002/03 season) to be 232.5 inches per year, with a maximum of 460 inches during the 1992/93 season and a minimum of 76 inches during the 1983/84 season.

The average daily temperature for the past three winter operating seasons (November through March of 2000/01, 2001/02, and 2002/03) has been 27.6, 29.9, and 30.1 degrees Fahrenheit, respectively. The average low temperatures for the same time periods were 24.7, 22.2, and 23.1 degrees Fahrenheit, respectively. With moisture in the air, Snowbowl has sufficient temperatures to produce and maintain snow on the mountain throughout the winter operating season.

Due to its desert locale, humidity is low and diurnal temperature fluctuations are high at Snowbowl. Prevailing winds are generally from the northwest, and the region receives the majority of its winter precipitation from Pacific storms. Average winter wind speed, (based on 12 winter months of data) measured at the Hart Prairie Lodge, is 3.4 mph, with gusts up to 43 mph.

### **CLIMATE CHANGE**

An increasing body of evidence supports the collective majority view within the scientific community that the average global climate of the earth is warming, and that this trend is giving rise to a variety of "ripple-through" changes in the inter-connected climate system.<sup>485</sup> The IPCC

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<sup>484</sup> 40 CFR 51.300-51.307, 1999

<sup>485</sup> IPCC, 2001.

(Intergovernmental Panel on Climate Change) concludes that "... concentrations of atmospheric greenhouse gases ... have continued to increase as a result of human activities... [and] ...emissions of greenhouse gases and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate."<sup>486</sup> The issue of global warming is an area of significant concern to the ski industry and to ski area operators throughout North America.<sup>487</sup>

The potential implications of climate change for the Arizona Snowbowl may include:

- Shorter winters
- Warmer winter temperatures
- Increased incidence of winter snowpack melt and sublimation loss
- Earlier spring snowmelt
- An increase in the elevation at which seasonal snowpack can be maintained

## REGIONAL CLIMATE CHANGE IN THE SOUTHWEST

Many of the predictions regarding the range of possible effects of global warming rely upon general circulation models (GCMs). However, there are limitations to the abilities of GCMs to predict regional climate trends, due to the complex interactions of orography and topography, combined with the relative coarseness of the computational grid used in global-scale models.<sup>488</sup> Within a GCM, each grid area, or cell, represents a single temperature and precipitation state-value within the model, yet a grid area may represent tens of square miles of area on the earth's surface.<sup>489</sup>

Region-specific climate scenarios are commonly developed by "nesting" a finer-scale model, which is more sensitive to regional variations in topography and climatology, within a global-scale GCM.<sup>490</sup> For application to the Southwestern United States, researchers at NCAR (National Center for Atmospheric Research), have developed and applied a model called RegCM (Regional Climate Model).<sup>491</sup> The regional model estimates a temperature increase of approximately seven degrees Fahrenheit in the Southwest United States by the year 2060, which is similar to the predictions of two different GCMs.<sup>492</sup> In contrast with GCM predictions, which generally indicate regional winter precipitation *increases* for the Southwest, the regional model indicates a *decrease* in winter precipitation of approximately 1.2 inches by the year 2060, with correspondingly less high-elevation snowfall accumulation, and less springtime and early summer re-charge or runoff.<sup>493</sup>

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<sup>486</sup> Id.

<sup>487</sup> National Ski Areas Association 2004a.

<sup>488</sup> Merideth 2001.

<sup>489</sup> Id.

<sup>490</sup> Id.

<sup>491</sup> Id.

<sup>492</sup> Doherty and Mearns, 1999; Giorgi et al. 1998.

<sup>493</sup> Merideth 2001.

## EL NIÑO – SOUTHERN OSCILLATION

Superimposed on the anthropogenic climate change signal are natural cycles or oscillations that tend to cause variability in regional climate. The El Niño cycle is a quasi-periodic warming of surface waters in the central and eastern equatorial Pacific Ocean, recurring every two-to-seven years, with each event's duration lasting anywhere from six-to-eighteen months.<sup>494</sup> The corresponding episodic cooling of central and eastern equatorial Pacific waters, also occurring every two-to-seven years, is referred to as La Niña.<sup>495</sup> These oceanic events are paired with the Southern Oscillation, which is a broad change in atmospheric circulation patterns across the southern Pacific Ocean. Together, the irregular cycle of this coupled ocean-atmospheric heat circulation system is referred to as the El Niño – Southern Oscillation (ENSO).<sup>496</sup> A variety of studies have revealed a relationship between ENSO and climate variability in the Southwest.<sup>497</sup> Although winter precipitation patterns can range from wet to dry for any given El Niño event, in general, El Niño winters are associated with higher than average winter precipitation.<sup>498</sup> Indeed, the greatest winter precipitation amounts observed within the available instrumental climate record have occurred during El Niño years.<sup>499</sup> Meanwhile, La Niña years are usually associated with drier winters in Arizona.<sup>500</sup>

## PACIFIC – DECADAL OSCILLATION

In Arizona's semi-arid climate, winter precipitation is highly variable from year-to-year. However, within the long-term climatic record, there are phases of generally lower than average and higher than average precipitation spanning time frames that last several decades.<sup>501</sup> Within the instrumental climate record extending from approximately 1895 to the present, there have been three distinct multi-decadal trends observed in Arizona precipitation:<sup>502</sup>

- 1925 – 1946: Wet
- 1947 – 1976: Dry
- 1977 – 1998: Wet

At the decadal time frame, this observed variation in precipitation has been linked by climate researchers to an occurrence known as the Pacific Decadal Oscillation (PDO).<sup>503</sup> Although the PDO is similar to ENSO in that it describes an oscillation in Pacific sea-surface temperatures (SSTs), it is misleading to describe the phenomenon as a multi-decadal version of ENSO. In contrast to ENSO, the SST oscillations of the PDO are strongest in the northern Pacific Ocean,

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<sup>494</sup> McPhee, et al 2004.

<sup>495</sup> Id.

<sup>496</sup> Id.

<sup>497</sup> Id.

<sup>498</sup> Id.

<sup>499</sup> Id.

<sup>500</sup> Id.

<sup>501</sup> Id.

<sup>502</sup> Id.

<sup>503</sup> Mantua et al. 1997, Mantua and Hare 2002.

while ENSO events tend to be concentrated in the equatorial zones of the Pacific.<sup>504</sup> The PDO appears to be linked to a somewhat regular pattern of high and low air pressure systems over the northern Pacific Ocean, which correlate to SSTs in that region.<sup>505</sup>

In general, the warm phase of the PDO correlates with trends of wetter winters in Arizona, while the cool phase correlates with multi-decadal periods of drier than average conditions.<sup>506</sup> Because the causal atmospheric and oceanic processes of the PDO are not well understood, using PDO indices to forecast long-term climatic shifts is subject to some uncertainty.<sup>507</sup> Nonetheless, many researchers believe that the PDO circulation pattern shifted to a cool phase in the late 1990's, indicating that winter precipitation may exhibit below average trends in the Southwest for the next several decades.<sup>508</sup> However, it may be some time before researchers develop a level of certainty whether or how such a PDO shift might have occurred.<sup>509</sup>

## ONGOING OPERATIONS

Snowbowl maintains one air quality permit through the state of Arizona; permit number 1000934 is a class 2 permit for a Detroit V92 diesel engine with turbo that provides auxiliary power for the Agassiz Lift at Snowbowl. Auxiliary power is for backup in the event of an electric power outage only. As a result this engine operates less than 25 hours per year on average. This is also the case for the auxiliary power sources at all other lifts at Snowbowl; which each run less than 25 hours per year.

Emergency generators used to provide backup power to lifts could produce occasional, short-term emissions. Some fugitive dust may result from the operation of ski area vehicles on the mountain road network during the summer for ski area maintenance; however, this is minor because of the limited extent of road use. These potential sources are not considered to substantially contribute to air quality related values and are therefore not discussed further in this analysis.

Most day-to-day pollutant sources in the Snowbowl area are assumed to result from mobile sources rather than stationary point sources. Potential mobile sources of air pollution include automobiles, trucks, buses, snowmobiles, slope grooming equipment, and emergency power generators. Of these, only automobiles are thought to contribute to substantial pollutant emissions. Automobile emissions, like other mobile sources, can occur over a broad geographic area. The effects of automobile emissions are likewise dispersed over an equally large area, and dispersal is highly dependent on topographic and climatic conditions.

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<sup>504</sup> NOAA-NWS 2004.

<sup>505</sup> Id.

<sup>506</sup> McPhee, et al 2004.

<sup>507</sup> Id.

<sup>508</sup> Id.

<sup>509</sup> Id.

## SUMMARY

Air quality in the project area meets both Arizona air quality regulations and Federal CAA standards, and Snowbowl is currently in attainment with the state and Federal regulations for all six criteria pollutants.

## ENVIRONMENTAL CONSEQUENCES

*Snowplay activities at Snowbowl could increase vehicular traffic and may negatively impact air quality in the region.*

Indicator:

Compliance with Local, State, and Federal Regulations Regarding Air Quality

Air quality effects of greatest concern as related to implementation of the Proposed Action are fugitive dust during construction, vehicular emissions as a result of skier and snowplay visitation, and smoke emissions from burning slash.

## DIRECT AND INDIRECT EFFECTS

### Alternative 1 – No Action

Under the No Action alternative, no new construction of trails or lifts would occur nor would the installation of snowmaking infrastructure occur. The area would maintain its permit for the auxiliary diesel engine and would likely continue to emit for short durations over the course of the winter, as disclosed above. No change in fugitive dust from traffic on dirt roads would be anticipated because no additional up-mountain maintenance traffic would be expected. Neither snowmobile nor slope grooming equipment use would increase because no additional terrain would be serviced.

With the selection of Alternative 1, there would be no increase in visitation. There would also be no change in current trends to air quality in and around Snowbowl. The area would remain in attainment for all six criteria pollutants and the visibility of the Kachina Peaks Wilderness would remain unimpaired.

### Alternative 2 – The Proposed Action

Under the Proposed Action, the CCC of the Snowbowl would increase from 1,880 to 2,825 guests-at-one-time. However, because the ski area is already servicing in excess of 3,400 guests on peak days, this would not constitute an increase in daily visitation. The proposed snowtubing facility would be developed to accommodate 600 tubers-at-one-time. The snowplay guests would be supported by the construction of a 400 space parking lot. The snowtubing facility is anticipated to receive average daily use of approximately 420 guests; with peak day visitation approaching 1,680 visitors.<sup>510</sup> Assuming average vehicle occupancy of three persons per car this would equate to 143 and 560 additional vehicles on average and peak days, respectively. Although the development of the proposed snowplay facility would result in a net

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<sup>510</sup> Refer to the Recreation section for additional detail pertaining to the proposed snowplay facility and estimated useage.

increase in total vehicles at Snowbowl, it is implicit that a large portion of these vehicles are currently traveling the Snowbowl Road and to the ski area seeking snowplay opportunities.

Under existing conditions, average annual skier visitation is approximately 98,000 guests. At 2.5 people per vehicle, this equates to approximately 39,200 vehicles at Snowbowl each year. In ten years, at full build-out of the Proposed Action, visitation would increase to approximately 215,000 skiers and 42,000 snowplayers. Using a factor of 2.5 skiers per vehicle and three snowplayers per vehicle, this would equate to approximately 100,000 vehicles at Snowbowl each year.

As detailed in the Recreation section of this chapter, parking has recently been prohibited along the Snowbowl Road approaching the ski area. As a result, dispersed snowplay activities are effectively prohibited as well. On peak days during the 2002/03 ski season, as many as 300 to 500 vehicles per day arrived at the ski area in search of snowplay opportunities and were turned away due to lack of parking or overselling of tickets. As a result, it appears that many of the additional vehicles anticipated to result from the operation of the snowplay facility are accounted for in traffic numbers and ADEQ air quality monitoring. These snowplay seekers would not necessarily constitute a net increase in average daily traffic or result in substantial additional vehicular emissions in the area.

Other effects to air quality under Alternative 2 would be an increase in particulate matter during construction as fugitive dust escapes specific project construction areas (including construction of the reclaimed water pipeline) and enters the atmosphere. Overall, Alternative 2 proposes approximately 245.4 acres of temporary and permanent ground disturbances. However, ground disturbing activities would be implemented over the course of several summers with total areas disturbed at a given time being relatively confined.

The temporary effects to air quality as a result of construction activities would be minimized by precipitation and/or the required watering of disturbance areas during construction. Additionally, areas of proposed disturbance would be reseeded and replanted promptly after the disturbance occurs to reduce the duration and extent of soil exposure. Refer to the mitigation measures listed in Table 2-2 for more information on these requirements.

Selection and implementation of proposed project elements in Alternative 2 would entail the removal of approximately 76.3 acres of permanent overstory vegetation. In areas where access is difficult, trees would be lopped and scattered. In more accessible areas of vegetation removal, merchantable timber volumes would be assessed prior to project implementation. It would then be removed and sold (or given to the tribes) as required by the Forest Service. Prescribed burning of the remaining slash would involve hand or machine piling to insure the slash is burned in distinct piles rather than broadcast burning. Snowbowl would obtain all necessary burn permits from the Forest Service and ADEQ prior to any burning to ensure compliance with all local, state, and Federal regulations. Prescribed burning of slash would result in short-term, temporary increases to  $PM_{2.5}$ ,  $PM_{10}$ <sup>511</sup> in the vicinity of Snowbowl. Because winds are primarily from the northwest, smoke from the prescribed burning may affect visibility in the southeastern

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<sup>511</sup> Particulate matter less than 2.5 or 10 microns (respectively) in diameter.

portion of the Kachina Peaks Wilderness; however, the effects would be short-term and temporary.

As a result of implementation of Alternative 2, Snowbowl would remain in attainment for all six criteria pollutants. It would also maintain the integrity of the visibility in the nearby Kachina Peaks Wilderness. Snowbowl would maintain compliance with all local, state, and Federal air quality regulations.

### **Alternative 3**

Under Alternative 3, the CCC of the Snowbowl would increase from 1,880 to 2,825 guests-at-one-time. However, because the ski area is already servicing in excess of 3,400 guests on peak days, this would not constitute and increase in daily visitation. The proposed snowtubing facility would not be developed. As stated previously, parking has recently been prohibited along the Snowbowl Road approaching the ski area; as a result, dispersed snowplay is also prohibited. Many vehicles have approached Snowbowl seeking snowplay opportunities and have returned home without finding access to these activities. As a result of Alternative 3, this level of dispersed snowplay traffic would likely continue and would likely not result in an increase in average daily traffic or result in additional vehicular emissions in the area.

Because Alternative 3 does not include the installation of any snowmaking infrastructure, the overall amount of temporary and permanent ground disturbance within the SUP area is reduced to approximately 131.4 acres. As stated previously, the temporary effects to air quality as a result of construction would be minimized by precipitation and/or watering of disturbance areas during construction. Additionally, areas proposed for disturbance would be reseeded and replanted promptly after the disturbance occurs to reduce the duration and extent of soil exposure. Refer to the mitigation measures listed in Table 2-2 for more information on these requirements.

Selection and implementation of proposed project elements in Alternative 3 would entail the removal of approximately 64.4 acres of permanent overstory vegetation. As disclosed under Alternative 2, in areas with difficult access, trees would be lopped and scattered. In more accessible areas, merchantable timber would be assessed prior to project implementation. It would then be removed and sold (or given to the tribes) as required by the Forest Service. Prescribed burning of the remaining slash would involve hand or machine piling to insure the slash is burned in distinct piles rather than broadcast burning. Snowbowl would obtain all necessary burn permits from the Forest Service and ADEQ prior to any burning to ensure compliance with all local, state, and Federal regulations. As stated previously, prescribed burning of slash would result in short-term, temporary increases to PM<sub>2.5</sub>, PM<sub>10</sub> in the vicinity of Snowbowl. Because winds are primarily from the northwest, smoke from the prescribed burning may affect visibility in the southeastern portion of the Kachina Peaks Wilderness; however, the effects would be short-term and temporary.

As a result of implementation of Alternative 3, Snowbowl would remain in attainment for all six criteria pollutants with a net reduction of direct and indirect effects as compared to those disclosed under the Proposed Action. It would also maintain the integrity of the visibility in the nearby Kachina Peaks Wilderness. Snowbowl would maintain compliance with all local, state, and Federal air quality regulations.

## **CUMULATIVE EFFECTS**

### **Scope of Analysis**

#### **Temporal Bounds**

The temporal bounds of the cumulative effects analysis for air resources extends from the initial development of the Snowbowl in 1938 into the foreseeable future for which this and other projects can be expected to continue in and around the Snowbowl SUP area.

#### **Spatial Bounds**

The physical extent of this cumulative effects analysis comprises the Snowbowl SUP area, the surrounding Kachina Peaks Wilderness, approximately 600 acres in the lower Hart Prairie area, and 9,100 acres in the lower south and west slopes of the Peaks.

### **Past, Present, and Reasonably Foreseeable projects relevant to a discussion of Cumulative Effects**

No past activities having potential to cumulatively affect air quality resources were identified for this analysis. Present and reasonably foreseeable projects with potential to cumulatively affect air quality include:

1. Bebbs Willow Restoration Project
2. Fort Valley Restoration Project

Appendix C includes the full list of past, present, and reasonably foreseeable future actions analyzed in this document, as well as background information on each of them.

### **Alternative 1 – No Action**

The past, present, and reasonably foreseeable actions identified above will not dramatically affect the air quality of the Peaks region. Activities in the vicinity of the project area that are likely to contribute to airborne particulates and visibility impairment in the analysis area include wildfires and other prescribed burn operations conducted in the area. Construction and prescribed burns are anticipated to be short-term and relatively small in scope. The tree thinning/prescribed burning projects listed above will consist of 9,700 acres of such activity, and remaining amounts of timber not removed and sold as required by the Forest Service will be transferred by hand and/or machine into distinct piles to be burned. Prescribed burning of slash will result in short-term, temporary increases to PM<sub>2.5</sub>, PM<sub>10</sub> in the vicinity of lower Hart Prairie and the lower south and west slopes of the Peaks.

### **Alternative 2 – The Proposed Action**

The Proposed Action would result in 76.3 acres of permanent overstory vegetation removal within the Snowbowl SUP area, and remaining amounts of timber not removed and sold as required by the Forest Service will be transferred by hand and/or into distinct piles to be burned. The 76.3 acres of vegetation removal combined with the 9,700 acres of present and reasonably foreseeable projects within the vicinity would possibly result in the general treatment of

approximately 9,776 acres of Forest. The prescribed burning of slash would have the same effect as stated in Alternative 1.

### **Alternative 3**

Alternative 3 would result in 64.4 acres of permanent overstory vegetation removal within the Snowbowl SUP area. The 64.4 acres of vegetation removal combined with the 9,700 acres of present and reasonably foreseeable projects within the vicinity would possibly result in the general treatment of approximately 9,764 acres of Forest. The prescribed burning of slash would have the same effect as stated for alternatives 1 and 2.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Temporary, reversible reductions in air quality would be experienced in the area as a result of construction activities. Although these impacts are irretrievable, they would only be anticipated to occur for a short duration.

# 3N. ENVIRONMENTAL JUSTICE

## EXECUTIVE ORDER 12898

In 1994, President Clinton issued Executive Order (EO) 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”,<sup>512</sup> to ensure such populations are not subject to disproportionately<sup>513</sup> high levels of environmental risk. EO 12898 provides that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” EO 12898 makes it clear that its provisions apply fully to programs involving Native Americans. *EO 12898 does not carry the force of law.*<sup>514</sup>

In the memorandum to heads of departments and agencies that accompanied EO 12898,<sup>515</sup> President Clinton specifically recognized the importance of the procedures under NEPA for identifying and addressing environmental justice concerns. The memorandum particularly emphasizes the importance of NEPA’s public participation process, directing that “each Federal agency shall provide opportunities for community input in the NEPA process.” Agencies are further directed to “identify potential effects and mitigation measures in consultation with affected communities, and improve the accessibility of meetings, crucial documents, and notices.”

While the Council on Environmental Quality (CEQ) has oversight of the Federal government’s compliance with EO 12898 and NEPA, EO 12898 established a Federal Interagency Working Group chaired by the Environmental Protection Agency (EPA) and comprised of 11 Federal departments and agencies, as well as several White House Offices. EPA’s Office of Environmental Justice, while overseeing the integration of environmental justice into EPA’s policies, programs and activities, serves as the lead on the Federal Interagency Working Group to incorporate environmental justice into all Federal agencies.<sup>516</sup>

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<sup>512</sup> 59 Federal Register 7629, 1994

<sup>513</sup> *Disproportionately* is a generic term used to define the adverse effects of environmental actions that burden minority and/or low income populations at a higher rate than the general public.

<sup>514</sup> This is stated in Section 6-609 of EO 12898 *Judicial Review*, and echoed in the USDA’s Departmental Regulation 5600-2 – Environmental Justice, as well as in the Council on Environmental Quality’s Environmental Justice Guidance Under the National Environmental Policy Act.

*This order is intended only to improve the internal management of the executive branch and is not intended to , nor does it create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, it agencies, it officers, or any person. This order shall not be construed to create any right to judicial review involving the compliance or noncompliance of the United States, its agencies, its officers, or any other person with this order.*

<sup>515</sup> Memorandum from the President to the Heads of Departments and Agencies. Comprehensive Presidential Documents No. 279 (February 11, 1994)

<sup>516</sup> Environmental Protection Agency, 2004

## COUNCIL ON ENVIRONMENTAL QUALITY ENVIRONMENTAL JUSTICE GUIDANCE

As mentioned, the CEQ has oversight of the Federal government's compliance with EO 12898 and NEPA. The CEQ, in consultation with the EPA and other affected agencies, has developed guidance - Environmental Justice Guidance Under the National Environmental Policy Act (CEQ EJ Guidance)<sup>517</sup> - to further assist Federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed. EO 12898 requires the development of agency-specific environmental justice strategies<sup>518</sup> and to the extent practicable and permitted by law, agencies may supplement CEQ guidance with more specific procedures tailored to particular programs or activities of an individual department, agency, or office. To that end, the United States Department of Agriculture (USDA) issued Departmental Regulation #5600-2<sup>519</sup> to provide direction to its agencies (of which the Forest Service is one) for integrating environmental justice considerations into USDA programs and activities in compliance with EO 12898. Departmental Regulation #5600-2 is discussed in more detail later in this analysis.

The CEQ EJ Guidance reflects a general consensus based on Federal agencies' experience and understanding of the issues presented. The guidance is meant to be applied with flexibility, and its terms may be considered a point of departure rather than conclusive direction in applying the terms of EO 12898.<sup>520</sup> As indicated by the CEQ EJ Guidance, environmental justice issues may arise at any phase within the NEPA process and agencies should consider these issues at each step of the process, as appropriate. Environmental justice encompasses a broad range of impacts covered by NEPA, including impacts on the natural or physical environment and interrelated social, cultural and economic effects. In preparing an EIS or an EA, agencies must consider both impacts on the natural and physical environment and related social, cultural and economic impacts. Environmental justice concerns may arise from impacts on the natural and physical environment, such as human health or ecological impacts on minority populations, low-income populations, and Indian tribes, or from related social or economic impacts.<sup>521</sup>

Agencies should recognize that the question of whether agency action raises environmental justice issues is highly sensitive to the history or circumstances of a particular community or population, the particular type of environmental or human health impact, and the nature of the proposed action itself. However, *there is no standard formula for identifying or addressing environmental justice issues.*<sup>522</sup> CEQ identifies six principles that provide general guidance, which are discussed later in this analysis.

EO 12898 does not change the prevailing legal thresholds and statutory interpretations under NEPA and existing case law. Under NEPA, the identification of a disproportionately high and adverse *human health* or *environmental* effect on a low-income population, minority population, or Indian Tribe does not preclude a proposed agency action from going forward, nor does it

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<sup>517</sup> Council on Environmental Quality, 1997

<sup>518</sup> Executive Order No. 12898, Section 1-101

<sup>519</sup> USDA 1997

<sup>520</sup> Council on Environmental Quality, 1997. page 5

<sup>521</sup> Council on Environmental Quality, 1997. page 8

<sup>522</sup> Council on Environmental Quality, 1997. page 8

necessarily compel a conclusion that a Proposed Action is environmentally unsatisfactory. Rather, the identification of such an effect should heighten agency attention to alternatives (including alternative sites), mitigation strategies, monitoring needs, and preferences expressed by the affected community or population.<sup>523</sup> *Human health* and *environmental* effects, as defined by the EO 12898, are defined here.

## **HUMAN HEALTH EFFECTS**

1. Whether the health effects, which may be measured in risks and rates, are significant (as employed by NEPA), or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death; and
2. Whether the risk or rate of hazard of exposure by a minority population, low-income population, or Indian tribe to an environmental hazard is significant (as employed by NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group; and
3. Whether health effects occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

## **ENVIRONMENTAL EFFECTS**

1. Whether this is or will be an impact on the natural or physical environment that significantly (as employed by NEPA) and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment; and
2. Whether environmental effects are significant (as employed by NEPA) and are or may be having an adverse impact on minority populations, low-income populations, or Native Americans that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group.
3. Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

In addition, neither EO 12898 nor CEQ guidance prescribes any specific format for examining environmental justice, such as designating a specific chapter or section in a NEPA document. Agencies are encouraged to integrate analyses of environmental justice concerns in an appropriate manner so as to be clear, concise, and comprehensible within the general format suggested in 40 CFR §1502.10.<sup>524</sup>

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<sup>523</sup> Council on Environmental Quality, 1997. page 10

<sup>524</sup> Id.

## U.S. DEPARTMENT OF AGRICULTURE ENVIRONMENTAL JUSTICE REGULATIONS

As noted previously, USDA Departmental Regulation #5600-2 provides direction to its agencies for integrating environmental justice considerations into USDA programs and activities in compliance with EO 12898. All existing and future USDA programs and activities are subject to this regulation. The USDA goals in implementing EO 12898 are as follows:<sup>525</sup>

1. To incorporate environmental justice considerations into USDA programs and activities and to address environmental justice across mission areas.
2. To identify, prevent, and/or mitigate, to the greatest extent practicable, disproportionately high and adverse human health or environmental effects of USDA programs and activities on minority and low-income populations.
3. To provide, to the greatest extent practicable, the opportunity for minority and low-income populations to participate in planning, analysis, and decision-making that affects their health or environment, including identification of program needs and designs.

According to this departmental regulation, an environmental justice issue arises where conduct or action may involve a disproportionately high and adverse environmental or human health effect on an identifiable low-income or minority population. The determination of whether a particular program or activity raises an environmental justice issue depends on an evaluation of the totality of the circumstances.

In determining whether there are disproportionately high and adverse environmental or human health effects, including social and economic effects, on an identifiable low-income or minority population, agencies should consider, as appropriate, such effects as: bodily impairment, infirmity, illness or death; air, noise and water pollution and soil contamination; destruction or disruption of man-made or natural resources; destruction or diminution of aesthetic values; destruction or disruption of community cohesion or a community's economic vitality, destruction or disruption of availability of public and private facilities and services; displacement of persons, businesses, farms, or nonprofit organizations; isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community; and the denial, reduction in, or significant delay in the receipt of, benefits of USDA programs or activities. In determining if an effect on a minority and/or low-income population is disproportionately high or adverse, agencies should consider whether the adverse effect is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.<sup>526</sup>

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<sup>525</sup> USDA, 1997. page 3

<sup>526</sup> USDA, 1997

## CULTURAL AND DEMOGRAPHIC INFORMATION RELATED TO THE ARIZONA SNOWBOWL

In an effort to reduce repetitive discussions and to minimize bulk without impeding agency and public review of the analysis,<sup>527</sup> the reader is referred to Section 3A – Heritage and Cultural Resources, as well as Section 3E – Social and Economic Resources (particularly, the “Population” subheading and Table 3E-2). “Existing Conditions” in Section 3A provides detailed information on the numerous tribes, and their backgrounds, who presently and have historically lived in the Flagstaff region.

The racial distribution of Arizona, Coconino County, and Flagstaff is summarized in Table 3E-2. As evidenced, the population of Coconino County has a substantially higher percentage of American Indians than either the State or the City of Flagstaff. American Indians comprised almost 27 percent of the overall County’s population in both 1990 and 2000.

## DETERMINATION OF ENVIRONMENTAL JUSTICE ISSUES

In reaching a conclusion as to whether an environmental justice issue(s) exist as directly related Alternatives 1, 2, or 3, the Forest Service made the following critical assumption: EO 12898 was created in response, and intended to apply, to *quantifiable* environmental hazards (e.g., a chemical, biological, physical or radiological agent, situation or source) with the potential for deleterious effects on human health and/or the physical environment. *However*, it is clear that Environmental Justice has been further interpreted to apply to a broad range of physical, social, cultural, and economic effects that are addressed through the NEPA process, as evidenced by CEQ:<sup>528</sup>

*“Environmental justice encompasses a broad range of impacts covered by NEPA, including impacts on the natural or physical environment and interrelated social, cultural and economic effects. In preparing an EIS or an EA, agencies must consider both impacts on the natural and physical environment and related social, cultural and economic impacts. Environmental justice concerns may arise from impacts on the natural and physical environment, such as human health or ecological impacts on minority populations, low-income populations, and Indian tribes, or from related social or economic impacts.”*

Tribal “culture” is defined by a complex interaction of many components, including spirituality, tradition, and the natural environment. The concepts of *spirituality* and *culture* are repeatedly used throughout Cultural Section 3A of this FEIS. These terms are used both interchangeably and independently, depending on the context being conveyed. While the terms “culture” and “social impacts” are found in the EO 12898, CEQ EJ Guidance and USDA Departmental Regulation #5600-2, the reader will note that the concept of “spirituality” is not specifically mentioned. The published DEIS relied upon a strict interpretation of the intent of EO 12898, interpreting that it was created in response to, and intended to apply, to *quantifiable*

<sup>527</sup> As per 40 CFR §1502.20 and 21

<sup>528</sup> Council on Environmental Quality, 1997. page 8

environmental hazards with the potential for deleterious effects on human health and/or the physical environment. The DEIS did not specifically recognize the interrelatedness of *culture*, *society*, and *spirituality* within the confines of the Heritage and Cultural Resources analysis, nor did it recognize these within the Environmental Justice analyses. The Environmental Justice analysis in the FEIS acknowledges that the San Francisco Peaks are of traditional cultural and spiritual significance to a number of Native American Tribes, and that the spiritual connections that many Native Americans have with the Peaks cannot be separated from their cultural identities, traditions, or societies. For the purposes of this analysis, “culture” is used to encompass the complex interaction of tribal traditions, spirituality, beliefs, and societies.

It is likely not possible for non-Native Americans to fully comprehend or appreciate the complex natures of the multiple tribes who hold the Peaks sacred, although the Cultural Section of the FEIS attempts to characterize this to the extent possible. While no standard formula exists for identifying or addressing environmental justice issues,<sup>529</sup> this Environmental Justice analysis relies on information presented in the Cultural Section, and intentionally errs on the side of full disclosure by making a determination that each of the alternatives carries with it some level of disproportionately high and adverse *environmental* effects to Native Americans who hold the Peaks sacred.<sup>530</sup> It is important to note that the FEIS discloses no adverse effects (as defined by NEPA) to *human health* stemming from selection of any of the alternatives. Therefore, there exists no risk or rate of hazard of exposure by a minority population, low-income population, or Indian tribe to an environmental hazard that exceeds or is likely to exceed the risk or rate to the general population or other appropriate comparison group. With that being said, this environmental justice analysis identifies no disproportionate effects to human health regarding the tribes pertaining to Alternative 1, 2, or 3. Also, it is noted that none of the alternatives discriminates among, or precludes, members of the public who wish to recreate at the Snowbowl – all members of the public (tribal and non-tribal) may use the NFS lands within the SUP area for developed winter recreation in the same manner.

In determining whether disproportionately high and adverse human health or environmental effects could result to Native American communities in relation to the Arizona Snowbowl Facilities Improvements EIS, multiple factors were taken into consideration. This environmental justice analysis heavily tiers to information presented in the Section 3A - Heritage and Cultural Resources – of the FEIS to provide context for the complex issues that surround the sacred nature of the Peaks and historic and future projects on them. EO 12898 and accompanying guidance provided in both USDA Department Regulation #5600-2 and the CEQ EJ Guidance served as the basis for this analysis. In addition, particular emphasis was placed on the following six principles for identifying and addressing environmental justice issues offered by CEQ.<sup>531</sup>

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<sup>529</sup> Council on Environmental Quality, 1997. page 8

<sup>530</sup> This determination is consistent with the analysis presented in Section 3A, as well as guidance offered by CEQ and USDA Departmental Regulation #5600-2.

<sup>531</sup> Italicized text included after each of the six principals applies to alternatives 1 through 3.

**1. Consider the composition of the affected area to determine whether minority populations, low-income populations, or Indian tribes are present in the area affected by the proposed action.**

Demographic data is presented in the Social and Economic Resources analysis presented in Section 3E, with additional information presented in the Heritage and Cultural Resources analysis in Section 3A. The composition of the affected area was considered to determine whether minority populations, low-income populations, or American Indian tribes are present in the area affected by the alternatives. As indicated, the population of Coconino County has a substantially higher percentage of American Indians than either the State or the City of Flagstaff.

**2. Consider relevant public health data and industry data concerning the potential for multiple or cumulative exposure to human health or environmental hazards<sup>532</sup> in the affected population and historical patterns of exposure to environmental hazards.**

The anticipated environmental impacts of all three alternatives are discussed throughout Chapter 3 of this FEIS, with particular emphasis on Section 3H – Watershed Resources. The reclaimed water produced at the Rio de Flag Water Reclamation Plant meets all pertinent state and federal water quality standards for the proposed use. The proposed use of reclaimed water for snowmaking represents a low risk of adverse environmental impact to wildlife and/or humans. Given the lack of existing research on the potential effects of endocrine disrupting compounds (EDCs) and pharmaceuticals and personal care products (PPCPs) on vegetation, there is insufficient information to judge the possible effects of these compounds upon plant life, although due to the hydrogeologic characteristics of the site (which result in rapid infiltration with little run-off), these effects would largely be limited to the ski trails that are already dominated by introduced grasses and forbs and the areas immediately adjacent to them.

**3. Recognize the interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical environmental effects of the proposed agency action. These factors should include the physical sensitivity of the community or population to particular impacts; the effect of any disruption on the community structure associated with the proposed action; and the nature and degree of impact on the physical and social structure of the community.**

The San Francisco Peaks are sacred to at least 13 formally recognized tribes that are still actively using the Peaks in cultural, historic, and religious contexts. A central underlying concept to all tribes for whom the Peaks are especially important is the recognition that the San Francisco Peaks are a source of water in the form of rain, springs, and snow. It is believed that the Peaks were put there for the people and it is therefore the peoples' duty to protect them for the benefit of the world. Native American religions often emphasize the natural world in its entirety; every part of nature contains sacred knowledge, and the relationship of humans to every creature and place is one of kinship. The entire earth is sacred; it is seen as the source of life. Some parts of the natural world, such as the San Francisco Peaks, are accorded special reverence. These special places may be where

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<sup>532</sup> CEQ defines “environmental hazard” as a chemical, biological, physical or radiological agent, situation or source that has the potential for deleterious effects to the environment and/or human health. (See Council on Environmental Quality, 1997. page 30)

spiritual beings or forces originated, or where they reside, or where individuals or spiritual leaders communicate with them. Thus, the relationship between native people and the land is central and indispensable to their religion, culture, and way of life.

This reinforces that, in many cases, tribal members and the general public hold opposing views on the traditional versus modern cultural significance of the San Francisco Peaks. These differences trigger disagreement over how the future of the Peaks should be managed by the Forest Service. Therefore, due to the critical roles that the Peaks play in the tribes' distinct cultural identities, Alternatives 1, 2, and 3 carry with them the potential for greater, although varying, levels of impacts to Native Americans than to the general population. It is this concept that led the Forest Service to a determination that there is a potential for disproportionately high levels of environmental risk to the tribes.

**4. Develop effective public participation strategies.**

NEPA requires adequate opportunities for public participation.<sup>533</sup> Extensive tribal scoping and consultation efforts are indicated in Chapter 1. However, it was not considered practical or reasonable to hold meetings in all tribal communities. The Forest Service attempted to accommodate requests from tribes for on-site meetings. Numerous contacts were made with tribal governments, traditional practitioners and the general tribal public and include: over 200 phone calls and emails, 33 meetings (26 of which were held on reservation lands), and nearly 250 letters.

**5. Assure meaningful community representation in the process.**

See #4 above.

**6. Seek tribal representation in the process in a manner that is consistent with the government-to-government relationship between the United States and tribal governments, the federal government's trust responsibility to federally-recognized tribes, and any treaty rights.**

Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments," requires federal agencies to consider federal trust responsibilities and tribal rights and to provide meaningful opportunities for tribal participation in the policy-making process. The trust responsibility is unambiguous in that the welfare of American Indians and their land and its resources are entrusted to the United States. For the Forest Service, trust responsibilities are defined by executive orders, laws, and treaties that are directly related to NFS lands. There are no treaties tied to the San Francisco Peaks.

**Alternative 1 – No Action**

The tribes have always objected to the Snowbowl's presence, due to their belief that any disturbance of the Peaks is sacrilegious. The historic use of the Peaks for developed skiing (as well as other recreational activities), dating back to 1938, has likely had a negative impact on traditional cultural values. Per CEQ EJ Guidance for addressing environmental issues (#3, above) this analysis recognizes the interrelated cultural and social factors that may amplify the

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<sup>533</sup> 40 CFR 1503

natural and physical environmental effects of Alternative 1. Therefore, the existing condition represents a disproportionately high and adverse environmental effect to tribes.

The basis for the determination in Alternative 1 is rooted in the fact that the San Francisco Peaks have received historic visitation and have been used for developed recreation as a direct result of the Snowbowl's existence. Visitation to the Peaks, and use of them for recreational purposes, is in conflict with the tribes' sacred relationship with the mountain.

Under Alternative 1, the spiritual values of the Peaks, identified in Section 3A, would continue as they are today. The presence of the ski area, and other recreational infrastructure, on the Peaks would continue in the existing configuration. In reaching this determination, the Forest Service recognizes that the Peaks retain much of their traditional religious, cultural, natural, and social values which make them significant to the Native Americans of the region.<sup>534</sup> However, historic ground and vegetation disturbances which have occurred within the SUP area may have visually and physically impacted the Peaks. Alternative 1 represents a continuation of effects to the Peaks' spiritual character and potentially the ability for tribes to perform rituals and spiritual practices and the effectiveness of those practices.

Alternative 1 represents the baseline condition for which all resources, alternatives, and this Environmental Justice analysis, are compared. Among the three alternatives analyzed in this EIS, Alternative 1 represents the least impact from an Environmental Justice perspective.

### **Alternative 2 – The Proposed Action**

Among Alternatives 1 through 3, the Proposed Action would represent the highest degree of potential disproportionate adverse impact to Native American cultures. The obvious difference between the Proposed Action and Alternatives 1 or 3 is the initiation of the use of reclaimed water within the SUP area for the production of snow, additional ground and vegetation disturbance associated with new infrastructure, lifts and facilities, and increased visitation throughout the winter. Although the reclaimed water proposed for use in snowmaking fully meets both EPA and ADEQ water quality standards, the tribes have expressed concern that trace levels of unregulated residual constituents within reclaimed water could negatively impact the spiritual purity of the Peaks.

For example, the Hopi have expressed concern that plants that are used in ceremonies would be affected spiritually in two ways: 1) the increased water would impact the natural growth of plants, and 2) runoff from the Peaks to areas where they collect plants would not be pure, natural rainwater - thus affecting the spiritual purity of the plants. An additional concern is that reclaimed water, once passed through hospitals or mortuaries, could carry the spirits of disease, illness, and the dead with it. Those spirits, as part of the water draining from the Peaks, would then infiltrate plants, thus affecting their ritual purity.

Relevant public health data concerning the existing and proposed use of reclaimed water in Flagstaff was researched and is detailed in Section 3H. There has been no identified potential risk for multiple or cumulative exposure to human health or environmental hazards on American Indian tribes as a result of use of reclaimed water in the SUP area. Furthermore, there are no

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<sup>534</sup> Pilles, 2003

historical patterns of exposure to environmental hazards. Reclaimed water has served a crucial role in meeting public irrigation needs in the City of Flagstaff since 1992, with no demonstrated adverse public health effects.

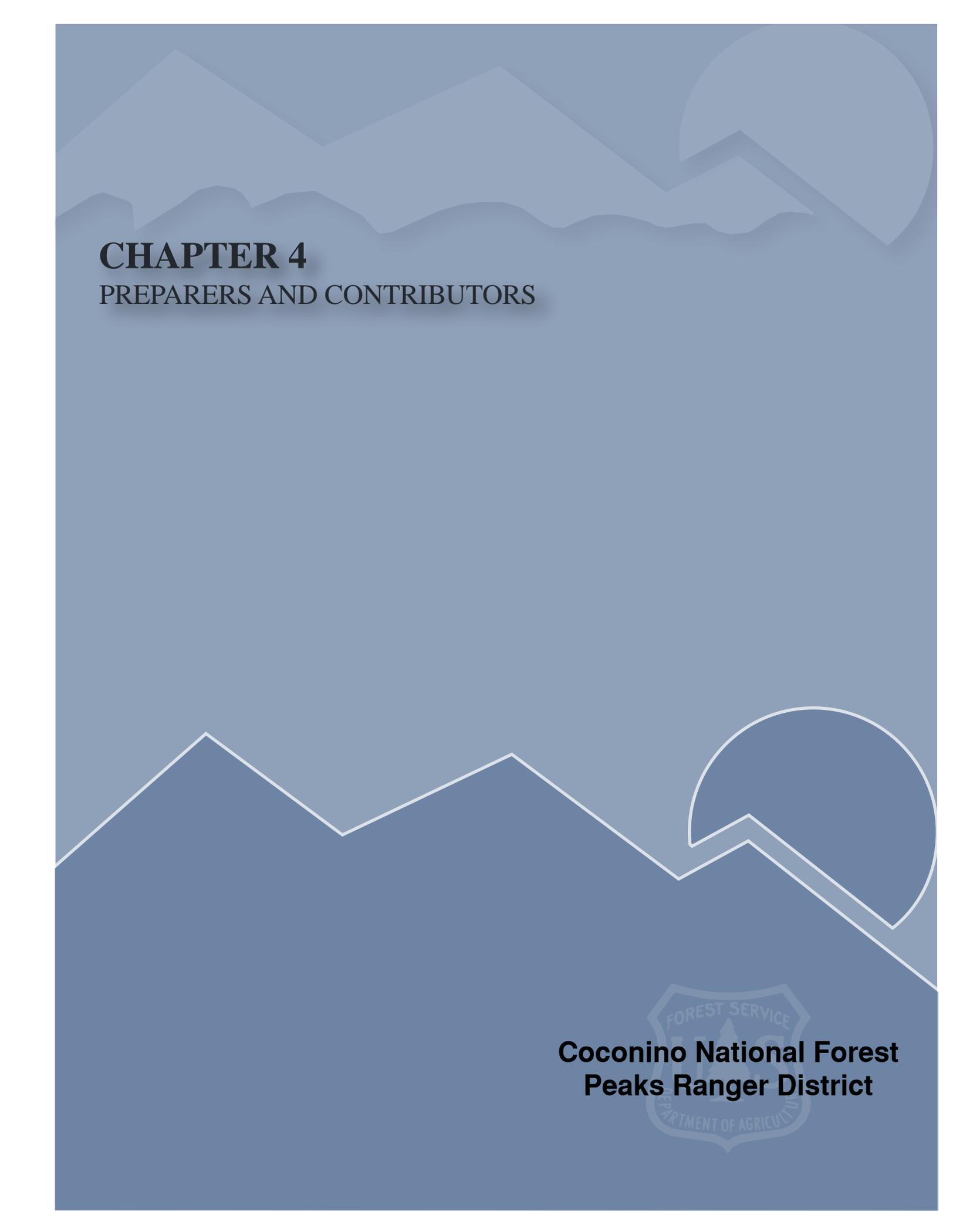
Thus, there has been no conclusive evidence presented to date that suggests that the presence of reclaimed water in the environment carries with it the potential for quantifiable and adverse effects to human health and/or the environment. However, it is not possible within the confines of this analysis to determine if the reclaimed water proposed for use in the snowmaking system is indeed spiritually pure. Therefore, this FEIS has chosen to acknowledge that use of reclaimed water within the SUP area has potential to represent disproportionately high and adverse environmental impact, with the potential for both cultural and social effects.

Direct, indirect, cumulative, irreversible, and irretrievable impacts to heritage and cultural resources are acknowledged in Section 3A, as attributable to historic and proposed ground disturbance, snowmaking, use of reclaimed water, etc. From a cultural/spiritual perspective, direct, indirect, and cumulative impacts to the San Francisco Peaks are unable to be completely mitigated. Through the Section 106 process, an MOA has been assembled (contained in Appendix D), identifying mitigation measures that attempt to address tribal concerns. All thirteen affected tribes were given the opportunity to have input in the MOA process. As of release of the FEIS, only the Yavapai-Prescott, Fort McDowell Yavapai Nation, Yavapai-Apache Nation and Hualapai have signed the MOA.

While no significant environmental effects (measured in risks and rates or hazard of exposure) on American Indians have been identified that would appreciably exceed or are likely to appreciably exceed those on the general population, cultural and social impacts have been identified in association with the Proposed Action that would not occur in the general population.

### **Alternative 3**

Alternative 3 represents a disproportionately high and adverse environmental impact to Native Americans that falls somewhere between the No Action Alternative (1) and the Proposed Action (2). Alternative 3 has additional ground and vegetation disturbance amounts over Alternative 1, but more important is the potential for increased annual visitation under Alternative 3. However, annual visitation would not be as high as under the Proposed Action (2) and Alternative 3 does not include the use of reclaimed water. Though the ground and vegetation disturbance levels both remain of a great concern to tribes, it is at a lower level of concern than the use of reclaimed water.



**CHAPTER 4**  
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- Dr. Richard Holm, Professor Emeritus, Northern Arizona University - Geology Department.
- Dr. Catherine Propper, Northern Arizona University - Department of Biological Science.
- Cameron Kern, Executive Director, Friends of Camp Colton, Inc.
- Don Bills, Bob Hart, and Margo Truini, U.S. Geological Survey. Flagstaff, Arizona

# CHAPTER 5

AGENCIES, ORGANIZATIONS, TRIBAL GOVERNMENTS, AND  
PERSONS RECEIVING COPIES OF THE FEIS

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## **5. AGENCIES, ORGANIZATIONS, TRIBAL GOVERNMENTS, AND PERSONS RECEIVING COPIES OF THE FEIS**

### **FEDERAL GOVERNMENT**

Advisory Council on Historic Preservation  
Federal Highways Administration  
US Army Corps of Engineers  
USDA National Agricultural Library  
USDA Office of Civil Rights  
USDI Office of Environmental Policy and Compliance  
US Environmental Protection Agency  
US Fish and Wildlife Service  
US House of Representatives (Arizona's 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, and 6<sup>th</sup> districts)

### **TRIBAL GOVERNMENTS**

Acoma  
Fort McDowell Mohave Apache  
Havasupai  
Hopi  
Hualapai  
Navajo  
San Carlos Apache  
San Juan Southern Paiute  
Tonto Apache  
White Mountain Apache  
Yavapai-Apache  
Yavapai-Prescott  
Zuni

### **STATE GOVERNMENT**

Arizona Department of Commerce  
Arizona Department of Environmental Quality  
Arizona Department of Transportation  
Arizona Department of Water Resources  
Arizona Fish and Game Department  
Arizona House of Representatives  
Arizona Office of Tourism

Arizona State Senate  
State Historic Preservation Officer

## **LOCAL GOVERNMENT**

City of Flagstaff  
City of Williams  
Coconino County  
Coconino County Community Development  
Flagstaff Tourism Commission

## **LOCAL MEDIA**

Arizona Daily Sun

## **ORGANIZATIONS**

Arizona Conservation Alliance	Maricopa Audubon Society
Arizona Ski Museum	National Congress of American Indians
Black Mesa Water Coalition	Native Americans for Community Action, Inc.
Center for Biological Diversity	Natural Resources Conservation Service
Community Services	Navajo Nation - Pinon Chapter
Dark Skies Group, Keep Sedona Beautiful	Page Chamber of Commerce
Dine' Medicineman's Association	Pan African Forum
Flagstaff Activist Network	Sandia National Laboratories
Flagstaff Chamber of Commerce	Sierra Club
Flagstaff Tourism Commission	Society of Environmental Communicators
Fort Valley Fire District Board	Society of Threatened Peoples and Human Rights Association
Gap-Bodaway Chapter	Southwest Forest Alliance
Grand Canyon Trust	The Nature Conservancy
Grand Canyon Wild Lands Council	US Naval Observatory Flagstaff Station
Greater Flagstaff Economic Council	Verein fur Internationale Brauchtumsforderung
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Volume 1**

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**Volume 1**

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William Calderwood	Scott Carpenter	Ted Chamberlain
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Arric Calson	Karen Carrozza	Luane Chambers
Pamela Calvin	Keith Carsella	Sheila Chambers
Christopher Calvo	Dan Carsen	James Chandler
L Cam	Cheryl Carson	Kouanhon Chang
Kim Camacho	Lene Carstensen	Tom Chang
Sal Camarillo	Karen Carswell	Robert Changose
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David Cammack	Travis & Ashley Carter	Catherine Chapman

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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Lisa Charley	Arlyn Christopherson	Kevin Coburn
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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
Volume 1**

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Preston Dan	Tom De Stories	Walter Dempsey
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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
Volume 1**

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S Dupuy  
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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
Volume 1**

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Keith Eaton	Keith Emerson	Patrick Farley
Noelle Eberz	David Emig	J.D. Farmer
John Echols	Calvin Emigh	Kevin Farnan
Susan Eckhart	Denise Endischee	Tessa Farrar
William Eckhart	Victoria Endres	Jill Farrell
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Esmee Eco	Allen England	Walter Fasching
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Ken Edes	Laura Erhart	K Faxlanger
Lynn Edgar	Margaret Erhart	E. Feasler
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Carol Edwards	Jennifer Erwin	Thor Feil
Denise Edwards	John Esmay	Bob Feit
Ernie Edwards	Henry Esplain	James Felph ?
Irene Edwards	Maria Esposito	Mechelle Felsted
Laura Edwards	Kris Estes	Chris Fennell
Wendy Edwards	Jonathan Esteve	Laura Fennerra
Judiann Edwards-Burrus	Martha Estitty	Laura Ferejohn
Monnie Efross	Della Ealtty	Kim Fergus
Debbie Efting	Duane Etsitty	Kristina Fernandez
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Paul Ehrell	K. Etsitty	Gillian Ferrell
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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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Anita Fieldman	Sharon Flying Up	Ned. B Francisco
Debbie Fields	Gerry Foley	Nelson Francisco
Eleanor Fields	Jay Foley	Lafrenda Frank
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Sarah Finger	Jenny Fontana	Mary Frank
Vickey & Steve Finger	Jw Fonte	Tera Frank
Dwayne Fink	Christy Foraker	Don Frankel
Lawrence Fink	Beth Forbes	Andrew Franklin
Kris Finn	Bill Forbes	Chelsea Franklin
Chris Finney	Gregory Forbes	Mae Franklin
Mike Finney	Steve Forbes	Ronald Franklin
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Ryan Fishel	Julie Ford	Don Frazier
Debbie Fisher	Marcus Ford	Jason Michael Frazier
Jessa Fisher	Paul Ford	Matt Frazier
Jessica Fisher	Rena Ford	Scott Frazier
Karen Fisher	Barbara & Stan Forrest	Steve Frazier
Lisa Fisher	Erin Forrest	Shirley Frederick
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Timothy Fleming	Kathleen Fox	Christopher Frost
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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
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Lenore Grover-Bullington  
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Holly Hancock Von Guilleaume  
Mark Handly  
Lisa B. Hanf  
Jeff Hankens  
Sarah Hankinson  
S. Hanna  
Amy Hannah  
Micheal Hannus  
Howard Hansen  
Jinnah Hansen  
Mark Hansen  
Robert T. Hansen  
Winnie Hanseth  
Tina Hansleben  
Don Hanson  
Eric Hanson

Erika Hanson  
Lou Hany  
Robb Hardesty  
Patrick Hardgorve  
Robin Hardie  
Jake E. Harding  
Kevin Harding  
Ruby Harding  
Dan Hardy  
Felipe Hardy  
John Hardy  
Karen Hardy  
Nathan Hardy  
Tom Hardy  
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Todd Hare  
Warren Harkey  
Natalie B. Harlan  
Pat & Jennifer Harlow  
Isabel Harmon  
Mark Harmsen  
Brad Harper  
Michael Harper  
Michelle Harrington  
Hilton Harris  
Jonathan Harris  
Kurt & Julie Harris  
Kurtis Harris  
Lucinda Harris  
Richard Harris  
Ronald Harris  
Walter E. Harris, Iii  
Marilyn Harrison  
Mary J. Harrison  
Faline Harshbarger  
Aggie Nizhonie Hart  
Gordon Hart  
Mellanie Hart  
Melody Hart  
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Brad Hartig  
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Trent Hartle  
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Rudy Hartmann  
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John Hartwick

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

Andrew Harvey  
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Laura Harwood  
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Holly Haslam  
Kent Haslam  
Gary Hassen  
Ed Hasson  
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Dorothy Hatch  
Patrick Hatch  
Carol Hathaway  
Bob Haugen  
Liz & Joe Haughey  
Joe Hauptman  
Brenda Hauser  
Kimberle Hausser  
Noreen Hautala  
Chris Haver  
Mie Hawkins  
Richard A. Hawkins  
Maureen Hawley  
Bradley Hawn  
Carly Hay  
Kristen Hayden  
Nancy Hayden  
Byron Hayes  
David Hayes  
Heather Hayes  
Larry Hayes  
Ryan Hayes  
Sara Hayes  
Charles Haynes  
Linda Haynes  
Lynn Hays  
Kelley Hays-Gilpin  
J.D. Hayworth, Congressman  
Navalene Hazbargen  
Nick Hazel  
Deborah Hazen  
Romaine Heap  
Geoffrey & Alison Heard  
James Heater  
Karen Heath  
Martin Hecht

Michael Hecht  
Shaula Hedwall  
Thomas Hedwall  
Marieke Heijdeman  
Lora Heiniemi  
Ralo Heiniemi  
Tom Heinlein  
Rob Heinrich  
Ryan Heinsius  
Dennis Heinsig  
Judy Heiser  
Don Helfrich  
Nancy Helin  
Fred Heller  
Tiffany & Dana Heller  
Ted Helmick  
Michael Hemes  
Stan Henry  
Al Henderson  
Brandon Henderson  
Merle Henderson  
Mr. And Mrs. S.R. Henderson  
Anne Hendrickson  
Floyd Henley  
Alice Henneberg  
Kirby Henningsen  
Dave Henrickson  
Andy & Bernice Henry  
Kin Henry  
Seth Henry  
Lance Henson  
Jeremy Hepworth  
Cynthia Herbert  
Phefelia Herbert  
Phyllisa Herbert  
Phillis Herbster  
Dan Herder  
Marty Herder  
Michael Heredia  
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Anne Hermida  
Lynda Aurelius Hernandez  
Ronnie Raven Hernandez  
Teresa Hernandez  
Betty Jean Herner  
Patrick Herold  
Cletus Herrera  
Dan Herrera

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Kelsey Herring  
Mark Herring  
Thomas Herring  
Els Herten  
Markus Hesselbach  
Dolores Hesselbrock  
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Melody Hicks  
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Carlton Hill  
Deb Hill  
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Lilian Hill  
Linda Hill  
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Nora M Hill  
Sally Hill  
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Jeffery Hines  
Joseph Hines  
Wendy Hines  
Irene Hinkel  
Jennifer Hinkle  
Brian Hintz  
Neil Hirsch  
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Sidney Hirsh  
Carl Hitchens  
W.J. Hitchcock  
Earline Hittel  
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Evan Hjerpe  
Joel Hobbs  
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Benjamin J. Hoey V  
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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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Adrienne Hohenberg	Joel Hornburg	Brent Hulls
Ashkii Hola	Rebecca Horniman	Deanna Hume
Lansing Holden	Leanne Horprich	Bruce Hungate
Tom & Rosie Holden	Arlenta Horse	Christopher Hunt
William Holden	Yolanda Horse	Darlene V Hunt
Kayleen Hole	Patrice M. Horstman	Janet And Gary Hunt
Joe Holgate	Larry Hoskie	Tom Hunt
Rusty Holgate	Randall Hoskie	L.D. Hunter
Debbie B. Holiday	Jody Hoskins	Jacob Hurst
Sarah M. Holiday	Steve Hossmer	Marilyn Hurst
Claude Holland	Ian Hough	Rick Hurula
Daniel Holland	Y Hough	Bryan Huskon
Hadassah Holland	Rose Houk	Joyce Huskon
Stewart Holle	Russell Houle	William Husted
Marci Hollenshead	Michael House	Todd Hutchins
David Hollingsworth	Bernie Hovden	Lois & Denis Hutchinson
Kelli Holloran	Elizabeth Howard	Les Hutchison
Debra Holloway	George Howard	Pamela Hyatt
Garrett T. Holly	Lou Howard	Wallace Hylozma
Ananda And Matthew Holmes	Ryan Howard	Mike Iacona
Jennifer A. Holmes	Matilda Howas	Lluis Escude Ibarra
Jessie Holmes	Alicia Howe	Steven Ibarra
Matthew Holmes	David Howe	Dani Iendriet
Nancy Holmes	Deb Howell	Joanna Ignace
Sylvia Holmes	David T. Howenstein	Alroy Ignacio
Amy Holt	Nick Howlett	Harald Ihmig
Louella Holter	Betty Hoyt	Tetsuaki Imai
Steve Holton	Earle Hoyt	Margaret Imhof
Jed Holtzman	James Hoyt	Robert Impellitier
Rodolfo Holz	Bob Hubbard	Shawnee Inez
Felicia Holzer	Kelsey Hubbard	John Ingersoll
Alan Holzkopf	Mark Hubbard	Donna English
Yvonne Homeyer	Terry Hubbard	Maia Ingram
Allye Honahni	Paige Hubbell	Teresa Ionmermaer
Philbert Honanie	Christopher Huck	Sharon L. Iron
Jerry Honawa	Mike Hudak	Diane Irving
G. Honson	Pat Hudak	Ivan Irving
Esther Kootswatewa Honyestewa	Denise Hudson	Charlene Isaac
Rechelle Honyumptewa	Alice Huffman	Crystal Isaac
Justin Hood	Rusty Huft	Patricia Isaac
Merlte E Hood	Valencia Hugh	Sarah Isaac
Surya-Patricia Lane Hood	Michael Hughes	Catherine Isabel
Cordelia Hooee	Ricky Hughes	Carla Ishie
Martin Hook	Kristin Huisinga	Ciyunsi Ishii
Megan Hooker	Karlynn Huling	Lomayumtewa Ishii

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

Lomayumtewa Isho  
Robert Ivens  
Mael Izsa  
Lenny J.  
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Cary Stevens Jackson  
Daria Jackson  
Dawn Jackson  
Jennifer Jackson  
Loretta Jackson  
Lorissa Jackson  
Marita Jackson  
Maryetta Jackson  
Ron Toahani Jackson  
Sara Jackson  
Steve Jackson  
Veronica Jacobi  
Adam Jacobs  
Barbra Jacobs  
Bea Jacobs  
Michael Jacobs  
Ken Jacobs & Family  
Chris And Suzy Jacobsen  
Muriel Jacobsen  
Don Jacobson  
Lyndie Jacobson  
Sylvie Jacquemin  
Carol James  
Denise James  
Eugene James  
Hazel James  
John James  
Johnny James  
Linda James  
Lorenzo James  
Lorrie James  
Lupita James  
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Marcellus James  
Michele James  
Rob James  
Sammy James  
Shylah James  
Irvin James Jr.  
Wendy James-Kerr  
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Karen Janda  
Joe Jansco

Andrea Janssi  
David Janssi  
Max Jarman  
Paul Jaroszewski  
Steven Jarvis  
Marilyn Jasper  
Andrea L. Jaussi  
David Jaussi  
Malen Jautt  
Pascal Javaloyes  
Felix Jay  
Britta Jebens  
Dana Jeffrey  
Carl Jenkins  
Thomas Jenkins  
Jean Jenks  
Schraber Jennifer  
Kyle Jennings  
Alec Jensen  
Maria Jensen  
Nancy Jensen  
Nathan Jeppesen  
Micah Jernigan  
Tom And Liz Jernigan  
Greg Jerome  
Laurel Jerry  
Matilda Jerry  
Genevieve Jervey  
Jonathan Jette  
Abigail Jhood  
J M? Jifer?  
Asdzaanaazbaa Jim  
Emerson Jim  
Fidel Jim  
Karl Jim  
Nora Jim  
Monte Jim, Jr.  
Kurt Jimenez  
Carol Jimerson  
Thelma Jimmie  
Katherine Jimson  
Keith Jiran  
Laura Jobe  
Lisa Jobin  
Alerna Joe  
Britney Joe  
Cara Joe  
Elroy Joe

La Verne Joe  
Maggie Joe  
Olivia Joe  
Paul Joe  
R. Joe  
Ryan Joe  
Tony Joe  
Cameron Joerger  
Paul Joerger  
Leslee Johanson  
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Angelina John  
Betty John  
Justin L. John  
Karen John  
Lewis John  
William John  
Efrem John Sr  
Cliff Johns  
David Johns  
David Johns  
Gloria Johns  
Johansen Johns  
Sandy Johns  
Wahleah Johns  
Alan Johnson  
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Amanda E. Johnson  
Amos Johnson  
Anne Johnson  
Blaine Johnson  
Blanche Johnson  
Bonnie Johnson  
Bruce Johnson  
Caleb Johnson  
Carlton Johnson  
Dan Johnson  
Danye L. Johnson  
D'arcy Johnson  
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Darryl Johnson  
Deric Johnson  
Derrick Johnson  
Donn Johnson  
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Geoffrey L. Johnson  
Heather Johnson  
Jake Johnson

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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
Volume 1**

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Jon Johnson	Troy Joralman	Thilo Kass
Joshua Johnson	B.J. Jordan	Alice Katoney
Karen S. Johnson	Joe Jordan	Arnold Katoney
Katie Johnson	Kym Jordan	L. Katoney
Kevin Johnson	Sharmel Jordan	Noah Katoney
Kim Johnson	Jeffrey Jorgensen	Ed Katz
Lena Johnson	Cranna Joseph	Larry Kaufman
Leta Johnson	Fran Joseph	Chelsea Kavanagh
Linda Johnson	J. Joseph	Joni Kay
Lynn Johnson	K. Josephs	Leanne Kayaani
Mandy Johnson	Val Jean Joshevama	Valeria Kayaani
Mark And Carrie Johnson	Elgean Joshevema	Janet Kaye
Matthew J. Johnson	Hoskie Juan	Janita Kaye
Mike Johnson	Relinda Juan	Robert Kaye
Misty Johnson	Richard Juan, Jr.	Ryan Kayuaya
Roabie Johnson	Niki Juarez-Cummings	Joann Kealiinohomoku
Robert Johnson	Willaim Judkins	Eugene Keams
Roderick Johnson	Jerry Juliani	Linda Keams
Ronda Johnson	Anne Jung	Candice Kearns
Russell Johnson	Scott Jurek	Eleanor Kearns
Thelma Johnson	Kayletto K.	Rodger Keeling
Theresa Johnson	Derek Kack	Dennis Keesler
Todd Johnson	Kristi Kack	Dennis Keesler
Tyler Johnson	Thomas P. Kack	Gina Keeswood
Wilmer Johnson	Dean Kaese	Reggie Keeswood
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Denver Johnston	Debbie Kaiser	Phyllis Kegley
Linda Johnston	Joshua Kaiser	Kenyon Kehl
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Dana Jolly	Elfina Kalemsa	Art Keith
Cathy Jolma	Kirk Kamburg	Elton Keith
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Barbara Jones	Ian Kanair	Kristi Kelhoyioma
Brian Jones	Douglas Kandf	Jeannie Kellam
Darci Jones	Mark Kanefsky	Byron Keller
Earnest Jones	Jon A. Kapecki	Jed Keller
Gwendolyn Jones	Laurie Kardish	Jeanette Kellett
James Jones	Brigitte Karg	Elder Walter Kelley
Jennifer Jones	Charlotte Karg	Klara B. Kelley
Lisa G. Jones	Julia Karg	Michael Kelley
Michael Jones	Petra Karg	Sarah Kelley
Rose Jones	Ulrich Karg	Sean Kelley
Russell Jones	John Karis	Kelli Kellogg
Sonjia Jones	Rozlyn Karp	Burton Kelly

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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
Volume 1**

Charles Kelly  
Dennis Kelly  
K. Kelly  
Kevin Kelly  
Marsha Kelly  
Maureen Kelly  
Mollie Kelly  
Timmy Kelly  
Tracey Kelly  
Steve Keltey  
John Kelty  
Ashley Kemper  
Brett Kencairn  
Katie Kendall  
Kristen Kendall  
Laurel Kendall  
Matthew Kendall  
Paul Kenjora  
Ashleen Kennedy  
John Kennedy  
Jonnafay Kennedy  
R Kennedy  
Marita Kennedy-Castro  
Rene Kennell  
Cleneth Kenneth  
J.J. Kenney  
Meg Keoppen  
Eric Keosky-Smith  
Mary Kephart  
Daniel Ker  
Jan Kerata  
Andrew Kerr  
Robbie Kerr  
Tom & Annette Kershner  
Joyce R Kertz  
Rafique Keshavjee  
John Kesich  
Elizabeth Ketabian  
Bryan Ketchum  
Kriss Kevorkian  
Alvina Kewanyama  
Mj Keweninyouma  
Vachel Kewenvoyouma  
Verrin Kewenvoyouma  
Charlette Keyonnie  
Marie A. Khalof  
Gurdarshan & H. Khalsa  
Mha Atma S. Khalsa

Deborah Khanjani  
Mai-Stella Khantouche  
Afonzo Kicking Wolf  
Matthew Kies  
Swen Kießwetter  
Zeynep Kilic  
Bob Kilpatrick  
Kayla Kilpatrick  
Ursula Kilz  
Kimberly Kim  
Norman Kimble  
Darrell Kinder, Jr.  
Chris King  
John King  
Michael King  
Nick King  
Peter King  
Rachel King  
Timothy King  
Wendy King  
Rayne Kingfish  
Ryan Kingfisher  
Karen Kinne-Herman  
Anita Kinney  
Patrick Kinnier  
Fern Kinsel  
Sarah Kintz  
Sophia Kinyon  
Maryann Kinzel  
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Nancy & Jim Kirk  
Randy Kirk  
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Elena Kirschner  
Edward Kirsten  
Louise Kisinger  
Adam Klatzker  
Kyle Klaus  
Betty Klause  
Greg Klause  
Sara Klause  
Tillie Klearman  
Keith Kleber  
Jeff Kleck  
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Ryan Kleck  
Sarica Klein  
Stuart And Jeanne Klein

Katie Klemenchich  
Matthew Klepc  
Alan Klilen  
Deborah & Kerry Klimes  
Brandon Kline  
James Klingelsmith  
Andrew Klootwyk  
Kimberly Klootwyk  
Luellen Klum  
Gisela Kluwin  
Ed Kmetz  
Gary Knapp  
Skip Knopke  
Bonny Knowlton  
Amy Knox  
Philip Knuth  
George Koch  
Karen Koch  
Michael Koch  
Amanda Koehmstedt  
Holly Koehmstedt  
Kaden Koffler  
Nick Kogos  
Matthew Kohberger  
Martha Kohler  
Phil Kohlmetz  
Jeff Kohn  
Angelo Kokenakis  
Fred Kolar  
Joann Kolar  
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Jed Koller  
Robert Konig  
Anastasia Konomos  
Brooke Kootswatewa  
Bev Kopecky  
Ronald Kopf  
Xenia Kopf  
Mark Koplik  
Kendra Kordes  
Brian Korn  
Preston Korn  
Ceridwen Koski  
David Kozlowski  
Nick Kraft  
Angie Krall  
Ann Kramer  
Carla Kramer

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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
Volume 1**

David Kramer  
Eldon And Janet Kramer  
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Greg Krasnow  
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Dan & Dianna Krehbiel  
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Ferenc Kreti  
Trevor Kriz  
James Krochel  
Laura Kroepel  
William Kroger  
Ali Kronebusch  
Hans Arie Kroon  
Sally & Howard Krueger  
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Bruce & Tamra Kube  
Megan Kuehe  
Amanda Kuenzi  
Marion Kuepker  
Tony Kugler  
Jane Kuhn-Pavon  
Andrew Kuhry-Hauser  
Scott Kupferman  
Edwin Kurtz  
E.F. Kusnerik  
Celia Kutcher  
Leigh Kuwanwisiwma  
Jim Kuzava  
Robert Kwint  
E. Kybartas  
Randy L  
Doug L.  
Michael Laatasch  
Jim Labelle  
Mike Lachance  
Lisa Lackey  
Myra & Larry Ladue  
Celia Lafave  
Kevin Laffey  
Christine Lafquist  
Debra Lafrance  
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Michael Lainoff  
Bob Lairson  
Helena Lake  
Howard Lake

Sophia Lake  
Alexandra Lamb  
Sloane Lamb  
Wendy Lamb  
David Lambert  
Lisa Lamberson  
Mark Lamberson  
Rosie Lamberson  
Dave And Marcia Lamkin  
Nomy Lamm  
Keith Lammerson  
Ron Lamoureux  
Linda Lance  
Marty Landa  
Bill Landau  
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Ingrid Landon  
Scott Landrith  
Catherine And Mark Landsiedel  
Donavann Lane  
Earl And Sue Lane  
Ken Lane  
Michael Lane  
Rowena Lane  
Teresa Lane  
Lynn Laney  
John Langan  
Fraser Langdon  
Brandt Lange  
William A. Lange  
Randy Langejans  
Joseph Langham  
Logan Langrack  
Sky Lank  
Megan Lannen  
Melissa Lanzrath  
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Nancy Laplaca  
Gregory Lapointe  
Jade Lara  
Jessica And Jim Larance  
Mondy Lariz  
Judith Larrye  
Fleur Larsen  
Anissa Larson  
Anissa L Larson

John Larson  
Mary Anne And Erik Larson  
Fabien Larvaron  
Cal Lash  
Nahmi Lasley  
Paul Lastayo  
Helen Lau  
Paul Lauck  
Mike Lauer  
Rebecca Laufer  
Daniel Laughlin  
Marlana Laughter  
Vincent Laughter  
Velma Laughtor  
John Lauher  
Mogk Laura  
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Rhett Lawrence  
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Adam Lawson  
Jennifer Lawson  
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Zachary Layne  
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Dian Lea  
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Jim Leathem  
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Debbie Leavitt  
Monique Lebailly  
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Frank Leblanc  
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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
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Gwen Lee  
Jarvina Lee  
Jayne Lee  
Jessica Lee  
Kevin Lee  
Kimo Lee  
Larry Lee  
Macdonald Lee  
Martha Lee  
Marty Lee  
R. Lee  
Ryan Lee  
Tanya Lee  
Vince Lee  
Wayne Lee  
Alan Leener  
Kathleen Leenerts  
Samantha Leffler  
Rachael J Leg  
Patrick Legallen  
Mike Legere  
Johnny Murphy Lehi, Sr  
Max Lehn  
Cynthia Leigh  
Ann Leighton  
Marilyn Leighton  
Steve, Josh & Aaron Leitz  
Erika Leland  
David & Melanie Lembke  
Mark Lemkin  
Steven Lemle  
Shelly Lemon  
David Lengyle  
Bobbie Lennon  
David A Lente  
Diane Lenz  
Evelyn Lenz  
Ariel Leonard  
Crystal Leonard  
Jan Leonard  
Jonathon Leonard  
Leland Leonard  
Nyana Leonard  
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Susannah Lerman  
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Vera Lesley  
E. Leslie  
Lance Leslie  
Biancarelli Letizia  
Connie Leto  
Julia Letourneau  
Monika Leuenberger  
Bambuda Leung  
Molly Leung  
Martin Levendusky  
Jill Levers  
Joe And Connie Levesque  
Michael Levin  
Mark Levine  
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Roman Lewicky  
Andrew Lewis  
Dona Lewis  
Jeff Lewis  
Kim Lewis  
Luke Lewis  
Tryphena Lewis  
Sherry Lewis And Jim Logan  
Joanne Lewis-Tsinijinnie  
Kevin Lewy  
Brigitte Leyenberger-Schiel  
Ricky Leyva  
Edgar Lickey  
Majorie J Lidalda  
Paul Liebe  
David Lien  
Erik Liepa  
David Light  
David Lind  
Deb Linda  
Tom Linda  
Wesley Lindberg  
Sydney Linden  
Mark Lindenmoyer  
Dl Lindgren

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Ed Lindstrom  
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Neva Liptay  
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Kamie Liston  
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Spencer A. Littleman  
Valerie Littleman  
Jacob Livingston  
Woody Livingston  
Kuse Ljungblad  
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Misty Locken  
Kathleen & Jeff Lockhart  
Adam Lockyer  
Econo Lodge  
Peter Loeff  
Christine Lofquist  
Robert W. Lofthouse  
Ed Logan  
Rosemary Logan  
John Lohmeier  
Kim Lohnes  
Rhonda L. Loma  
Bob Lomadafkie  
Candice Lomahaftewa  
Eric Lomahaptewa  
Donica Lomayaktewa  
Marcy Lomayalitewa  
Lee Lomayestewa  
Patricia London

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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Andrea Long	Mat Luehring	Libbe Madsen
Carly Long	Chris Luginbuhl	Loren Madsen
Frank G. Long	Reiner Luginbühl	Echo Mae
Jason Long	Nate Lujan	Susan Maeder
Jeff Long	John Luke	Katy Maehl
Kara L. Long	Angela Lukemire	Karl Maerzlulft
Kelvin Dewayne Long	Jeff Luker	Erin Magee
Regina Long	Amahete Luna	Markus Mager
Valentina Long	Cheryl Luna	Jessica Maggio
Allix Longester	Laurencita W. Luna	Marie Bernadette Magnin-Robert
Noel Longo	Mason Lurvey	Sylvan Magnus
Kevin Lonnely	Mary-Lee Lutz	Aj Magowan
Beverly J. Loomis	Martha Lynne	Elizabeth Magowan
Andrea Lopez	Kate Lyon	Omid Mahadavi
Anthony Guy Lopez	Toni Lyons	Christine Maher
Dan & Rose Lopez	Matt M.	Jason Maher
Jorge Lopez	Helga Maassdorf	Angel Mahkalayah
Laverne Lopez	J? Maayeos	Davis Maho
Rick Lopez	Tate Mabes	Shannon Maho
Sharon Masek Lopez	Frances Maccollum	Nancy Mahowald
Yvette Lopez	Hope Macdonald	Ekhart Malatkee
Michael Lopour	Imogene Macdonald	Matthew S. Malek
Carol Lorek	Wanda Macdonald	Nik Malino
Matt Loretta	John Macdonald, Sr.	Andrew Malk
Susan Loscher	Greg Mace	Wendy Malmid
Tricia Diane Loscher	Lynn Mace	Anne Malone
Kevin Lossiah	Lisa Machina	Karen Malone
Greg Lostracco	Hans Machula	Ken Maloney
Jonathon Lotz	Jose Maciel	Tyrone Maloney
Jodie Lougee	Dan Mack	Marie Malpel
Amy Louis	Malcolm Mackey	Roland Manakaja
Cyrus Louis	Mark Mackey	Jerri Manbeck
Siobhan Love	Thomas Mackin	Richard Manbeck
William Love	Tom Mackin	Pamela Manes
Matthew Lovegrace	Anne Marie Mackler	Jessica Maness
Betty Lowe	Violet Macktima	Gary Manfredi
Johnny Lowe	Ky Macktima-Borhauer	Thomas Mangano
Kimberly M. Lowe	Marc Maclean	Henri Manguy
Mike Lowe	Ivan Madar	Ti Manka
Malcolm Lowry	Bryan Madden	Henrietta Mann
Sandra Lubarsky	James P. Madden	Meaghan Manning
Robert Luberto	Steve Madden	Tom Manning
Ivo Lucchitta	Andy Mader	Helen Manning-Brown
Anthony Lucero	Lisa Madigan	Jone Mannoogian
Henry Lucero	Michael Madigan	Mark Manone
Jim & Dona Luckas	Bobby Madison	Mildred Manuel
Arleen Ludwig	Allen G. Madle, Phd	Jolene Manus

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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Facilities Improvements Final Environmental Impact Statement  
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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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Leah Taylor  
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Sandra Taylor  
Sherry Horne Taylor  
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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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Kathy Toya	Bernice Tsosie	Laura Uhlig
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Howard Tracy	David Tsosie	Bill Ulfelder
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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

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Jeronimo Vasquez  
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Alfred Watchman  
Pete Watchman  
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**Arizona Snowbowl  
Facilities Improvements Final Environmental Impact Statement  
Volume 1**

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Diane Werlinger	Rogina Whitehair	Cecelia Williams

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**Arizona Snowbowl**  
**Facilities Improvements Final Environmental Impact Statement**  
**Volume 1**

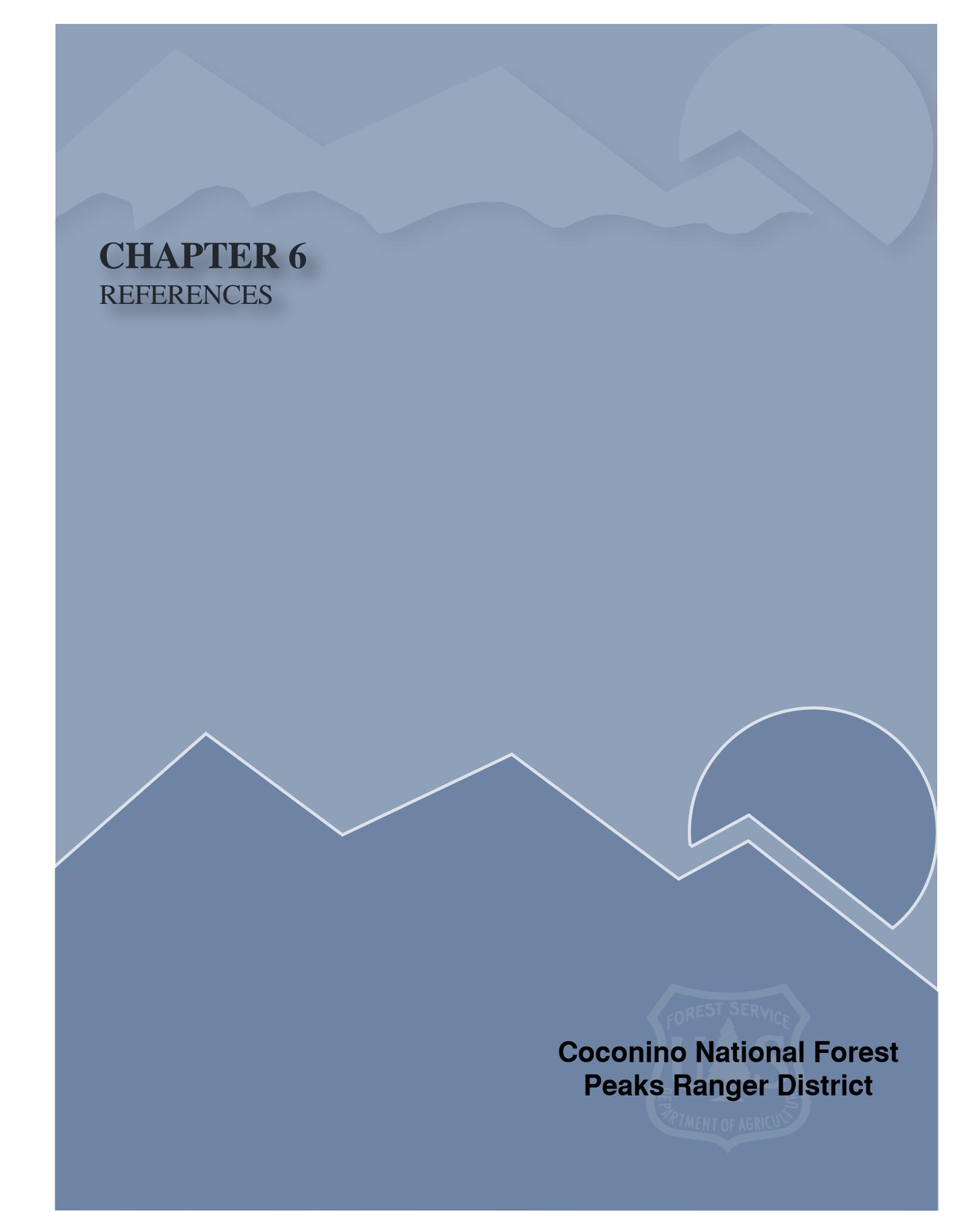
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Don Wilson  
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Graham Wilson  
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Lanky Wilson  
Raylene Wilson  
Richard & Jean Wilson  
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Ruth Wilson  
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Shirley Wilson  
John Wimberly  
Terri Wimberly  
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Anne Wolton  
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Tucker & Linda Woodbury  
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Aja Woodrow  
K. Woods  
Tanja Woods  
Kathy Woodson  
Bob Woodward  
Scott Woolbright  
Stephanie Woolbright  
Josh Wooten  
Tom Wooten  
Geof Worcester  
Maureen Worman-Kerr  
Jillian Worssam  
Nancy Worthy  
V. Woynus  
Dee Wright  
Denny Wright  
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Julia Wright  
Ruth Wright  
Dana Wullenwaber  
Rachel Wulpern  
Bonnie Wunderlich  
David Wusstig  
Brian Wyatt  
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Gregg Yazzie  
Hanson Yazzie  
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Jay Yenerich  
Thomas Yoke  
Marie Yonnie  
Stephanie Yoo  
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Eva Zaleski  
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**CHAPTER 6**  
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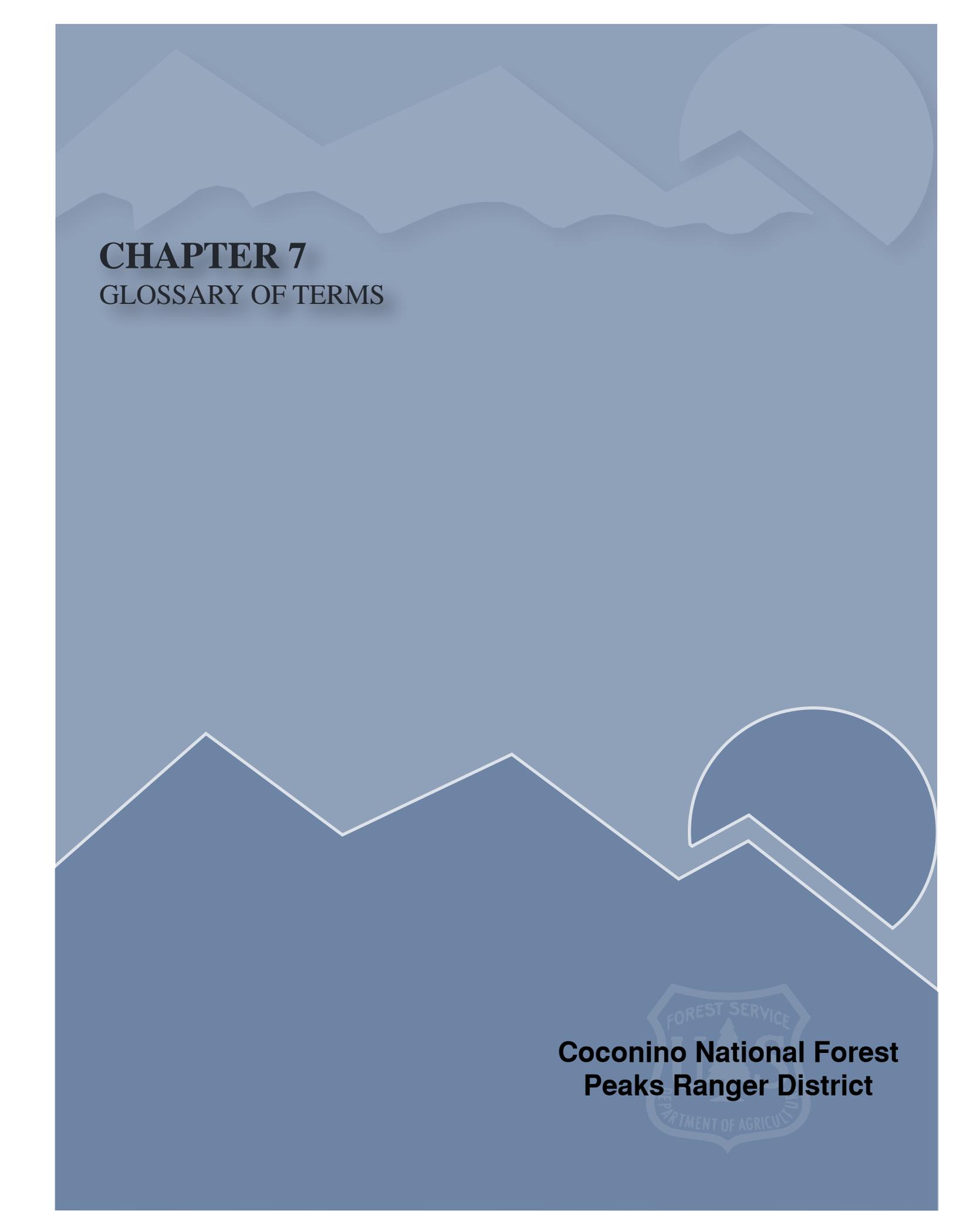
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**CHAPTER 7**  
**GLOSSARY OF TERMS**



**Coconino National Forest**  
**Peaks Ranger District**

## 7. GLOSSARY OF TERMS

**303(d)** - The section of the 1972 Clean Water Act that requires states, territories, and authorized tribes to develop lists of impaired waters – those that do not meet water quality standards that states, territories, and authorized tribes have set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters.

**Abiotic** - The non-living material components of the environment such as air, rocks, soil particles, inorganic compounds, coal, peat, and plant litter.

**Accelerated erosion** or **accelerated sediment production** - Erosion at a greater rate than natural, usually associated with human activities that either reduce vegetative cover or increase surface runoff.

**Acre-foot** - The amount of water necessary to cover one acre to a depth of one foot; equals 43,560 cubic feet or 325,851 gallons.

**Action alternatives** - Any alternative that includes upgrading and/or expansion of existing winter and summer recreational development within the area.

**Affected environment** - The physical, biological, social, and economic environment that would or may be changed by actions proposed and the relationship of people to that environment.

**Age Class** - An age grouping of trees according to an interval of years, usually 20. A single age class would have trees that are within 20 years of the same age, such as 1-20 years or 21-40 years.

**Airshed** - A geographical area that, because of topography, meteorology, and climate, shares the same air. The Clean Air Act establishes three air quality classes (I, II, and III), each with defined air quality standards.

**Class I airsheds** are areas designated for the most stringent degree for protection from future degradation of air quality.

**Class II airsheds** are areas where a moderate amount of development could occur.

**Class III airsheds** are areas where significant development could occur as long as National Ambient Air Quality Standards are not exceeded.

**Alpine tundra** - A vegetation type that occurs above treeline characterized by extreme environmental conditions, including high winds, cold temperatures, and often seasonally dry moisture regimes.

**Alternative** - One of several conceptual development plans described and evaluated in the EIS.

**Anthropogenic** - relating to or resulting from the influence humans have on the natural world.

**Army Corps of Engineers (COE)** -The federal agency charged with enforcing the Clean Water Act by regulation of dredge and fill activities in wetlands.

**Archaeological Site** - A geographic locale that contains material remains of prehistoric and/or historic human activity. Also referred to as a cultural or heritage resource site.

**Artifact** - A simple object (such as a tool or ornament) showing early human workmanship or modifications.

**Assessment area** - The geographical area and/or physical, biological, and social environments which are analyzed for specific resources in the EIS.

**Aspect** - The direction a slope faces. A hillside facing east has an east aspect.

**Backcountry** - An undeveloped area where dispersed, off-road recreation such as hiking and trail bike riding may occur. Generally describes semi-private motorized and semi-primitive non-motorized recreation opportunities.

**Background** - A landscape viewing area visible to a viewer from approximately three to five miles to infinity. Also, in economics, naturally occurring; uninduced.

**Bark Beetles** - A group of beetles that can kill live trees by boring galleries and girdling the inner bark.

**Basal Area** - The cross-sectional area of the trunk of a tree or stand of trees at breast height (4.5 feet).

**Baseline condition** - The existing dynamic conditions prior to development, against which potential effects are judged.

**Best Management Practices (BMPs)** - A practice or a combination of practices that are determined by a State or a designated planning agency to be the most effective and practicable means (including technological, economic, and institutional considerations) of controlling non-point source pollutants at levels compatible with water quality goals. (R3 Soil and Water Conservation Practices Handbook (R3 supplement to FSH 2509.22).

**Big game** - Those species defined by law which are managed as a sport hunting resource, such as mule deer, turkey, elk, bear, and mountain lion.

**Biodiversity** - The variety of biotic communities, species, and genes and their interaction with ecological processes and functions, within ecosystems and across landscapes. The number of species present is the basic unit of measurement. More complex measurements also exist.

**Biological Evaluation** -An evaluation conducted to determine whether a proposed action is likely to affect any species which are listed as sensitive (USFS), candidate (USFS), or other special designations.

**Biological Oxygen Demand** - a measure of the pollution present in water, obtained by measuring the amount of oxygen absorbed from the water by the microorganisms present in it.

**Browse** - Leaf and twig growth of shrubs, woody vines and trees available for animal consumption; act of consuming browse.

**Buffer** - A land area that is designated to block or absorb unwanted impacts to the area beyond the buffer. Buffer strips along a trail could block views that are undesirable. Buffers along streams can greatly reduce any changes or impacts to stream water quality, temperature, or channel stability.

**Candidate species** - Those plant and animal species that, in the opinion of the U.S. Fish and Wildlife Service, may become threatened or endangered. Not protected under the Endangered Species Act.

**Canopy** - The more-or-less continuous cover of leaves, needles and/or branches collectively formed by the crowns of adjacent trees in a stand or forest.

**Capability** - The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices such as silviculture or protection from fire, insects, and disease.

**Carrying Capacity** - The number of organisms of a given species and quality that can survive in, (and not cause deterioration of), an ecosystem through the least favorable environmental conditions that occur within a stated interval of time.

**Cavity** - A hole in a tree often used by wildlife, especially birds, for nesting and reproduction.

**Clean Water Act** - An act that was enacted by the U.S. Congress in 1977 to maintain and restore the chemical, physical, and biological integrity of the waters of the United States. This act was formerly known as the Federal Water Pollution Control Act (33 U.S.C. 1344).

**Coarse Woody Debris (CWD)** - Snags, fallen trees, and decaying logs and large limbs distributed across the forest floor that are larger than three inches in diameter.

**Comfortable carrying capacity (CCC)** - Comfortable Carrying Capacity (CCC) is a planning tool used to determine the optimum level of utilization that facilitates a pleasant recreational experience. This is a planning figure only and does not represent a regulatory cap on visitation. CCC is used to ensure that different aspects of a resort's facilities are designed to work in harmony, that capacities are equivalent across facilities, and sufficient to meet anticipated demand. CCC is based on factors such as vertical transport and trail capacities.

**Compaction** - A physical change in soils properties that that results when pore spaces are reduced in size and soil becomes more dense. Compaction generally occurs when a load is applied to the soil, such as when heavy equipment makes several passes that compress the soil.

**Connectivity** - The degree to which similar but separated vegetation components of a landscape are connected.

**Consumptive use** - Use of a resource that reduces the supply.

**Cooperating agency** - A federal agency, other than a lead agency, which has jurisdiction by law or special expertise with respect to any environmental impact associated with the proposed action or one of the alternatives. A state or local agency or an Indian tribe may be a cooperating agency with agreement from the lead agency.

**Corridor** - A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries. Also, a contiguous strip of habitat suitable to facilitate animal dispersal or migration.

**Council on Environmental Quality (CEQ)** - An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

**Cover** - Vegetation used by wildlife for protection from predators and weather conditions, or in which to reproduce.

**Critical habitat** - A formal designation pursuant to the Endangered Species Act which may be applied to a particular habitat that is essential to the life cycle of a given species, and if lost, would adversely affect that species. Critical habitat can have a less formal meaning when used outside the context of the Endangered Species Act.

**Cultural resource** - Cultural resources are the tangible and intangible aspects of cultural systems, living and dead, that are valued by a given culture or contain information about the culture. Cultural resources include, but are not limited to sites, structures, buildings, districts, and objects associated with or representative of people, cultures, and human activities and events.

**Cumulative effect** - The effect on the environment which results from the incremental impact of the action when added to other past, present and reasonable foreseeable future actions regardless of what agency or person undertakes such other actions. Each increment from each project may not be noticeable but cumulative effects may be noticeable when all increments are considered together.

**Demand** - The quantity of goods or services called for, given a price of other combinations of factors.

**Desired condition** - In a project analysis document, the forest-wide desired future condition as applied to a specific project area and modified to fit the site-specific conditions of that area.

**Developed recreation site** - An area with characteristics that enable to accommodate, or be used for intense recreation. Such sites are often enhanced to augment the recreational value. Improvements range from those designed to provide great comfort and convenience to the user to rudimentary improvements in isolated areas.

**Direct effect** - An effect which occurs as a result of an action associated with implementing the proposal or one of the alternatives, including construction, operation, and maintenance.

**Dispersed recreation** - Recreation that occurs outside of a developed recreation site and includes such activities as scenic driving, hunting, backpacking, and recreation activities in primitive environments.

**Distance zone** - One of three categories used in the visual management system to divide a view into near and far components. The three categories are (1) foreground, (2) middle ground, and (3) background. See individual entries.

**District Ranger** - The official responsible for administering the National Forest System lands on a Ranger District.

**Diversity** - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

**Ecosystem** - The system formed by the interaction of a group of organisms and their environment, for example, marsh, watershed, or lake.

**Edge** - The interface between landscape elements of different composition and structure, for example between an old clearcut and a closed-canopy forest.

**Effects** - Results expected to be achieved from implementation of the alternatives relative to physical, biological, economic, and social factors. Effects can be direct, indirect, or cumulative and may be either beneficial or detrimental.

**Endangered species** -An official designation for any species of plant or animal that is in danger of extinction throughout all or a significant portion of its range. An endangered species must be designated in the Federal Register by the appropriate Federal Agency Secretary.

**Environmental analysis** - An analysis of alternative actions and their predictable short and long-term environmental effects, which include physical, biological, economic, social and environmental design factors and their interactions.

**Environmental Impact Statement (EIS)** - A disclosure document required by the National Environmental Policy Act (NEPA) that documents the anticipated environmental effects of a proposed action that may significantly effect the quality of the human environment.

**Environmental Protection Agency (EPA)** - The federal agency charged with lead enforcement of multiple environmental laws, including review of Environmental Impact Statements.

**Erosion** - The detachment and movement of soil from the land surface by wind, water, ice, or gravity.

**Erosion control** - Materials, structure, and techniques designed to reduce erosion. Erosion control may include rapid revegetation, avoiding steep or highly erosive sites, and installation of cross-slope drainage structures.

**Erosion hazard** - Soil ratings to predict the erosion hazard or potential to be eroded.

**Evapotranspiration** - the water removed from our soils by soil evaporation (a direct pathway for water to move from soil to the atmosphere as water vapor) and plant transpiration (evaporation of water from leaf and plant surfaces).

**Fill** - Earth or rock moved during road construction and used to build up portions of the roadway.

**Fill slope** - The sloping earth surface on the downhill side of a road resulting from roadway excavation.

**Finding of No Significant Impact (FONSI)** - A document that is prepared if the agency finds, in an environmental assessment, that the proposed action will not significantly affect the human environment. It must set forth the reasons for such a decision.

**Forage** - All browse and non-woody plants used for grazing or harvested for feeding livestock or game animals.

**Forb** - Any non-grass-like plant having little or no woody material on it. A palatable, broadleaved, flowering herb whose stem, above ground, does not become woody and persistent.

**Foreground** - The landscape area visible to an observer from the immediate area to .5 miles.

**Forest Plan** -A comprehensive management plan prepared under the National Forest Management Act of 1976 that provides standards and guidelines for management activities specific to each National Forest. The CNF Forest Plan was approved in 1987.

**Forest Service** -The agency of the United States Department of Agriculture responsible for managing National Forests and Grasslands.

**Forest Supervisor** -The official responsible for administering the National Forest System lands in a Forest Service administrative unit who reports to the Regional Forester.

**Fragmentation** - The splitting or isolating of patches of similar habitat. Habitat can be fragmented by natural events or development activities.

**Fuel** - Any substance or composite mixture susceptible to ignition and combustion.

**Game species** - Any species of wildlife or fish for which seasons and bag limits have been prescribed and which are normally harvested by hunters, trappers, and fisherman under State or Federal laws, codes, and regulations.

**GIS** - geographic information system, a computer mapping system composed of hardware and software

**GPS** - Global Positioning System, a satellite-based surveying system

**Gradient** - The vertical distance divided by the horizontal distance, usually measured as percent. Gradient is used to describe streams and ski slopes.

**Groundwater** - Subsurface water in the part of the ground that is wholly saturated.

**Habitat** - The sum of environmental conditions of a specific place that is occupied by an organism, a population, or a community.

**Habitat type** - A classification of the vegetation resource based on dominant growth forms. The forested areas are more specifically classified by the dominant tree species.

**Hydrologic cycle** - Also called the water cycle, this is the process of water evaporating, condensing, falling to the ground as precipitation, and returning to the ocean as runoff.

**Impacts** - See effects

**IMPLAN** - An economic impact assessment modeling system.

**Indicator species** - An animal species used to represent a group of species that utilize the same habitat. For monitoring purposes, the well being of the indicator species is assumed to reflect the general health of the community.

**Indirect impact** - Secondary consequences to the environment resulting from a direct impact. An example of an indirect impact is the deposition of sediment in a wetland resulting from surface disturbance in the upland.

**Instream flow** - The volume of surface water in a stream system passing a given point at a given time.

**Interdisciplinary Team (ID Team)** - A group of individuals each representing specialty resource areas assembled to solve a problem or perform a task through frequent interaction so that different disciplines can combine to provide new solutions.

**Irretrievable commitments** - losses of production or use for a period of time. An example is suited timber land being used for a skid trail. Timber growth on the land is irretrievable lost while the land is a skid trail, but the timber resource is not irreversibly lost because the land could grow trees again in the near future.

**Irreversible commitments** - Permanent or essentially permanent resource uses or losses that cannot be reversed, except in the extreme long term. Examples include minerals that have been extracted or soil productivity that has been lost.

**Issue** - A public or agency concern about a specific action or area that is addressed in the NEPA process.

**Landscape** – A heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout.

**Lop and scatter** - When branches are cut from fallen trees and scattered over the area rather than piled for burning. This allows the slash to lie close to the ground to reduce the fire hazard and accelerate decomposition.

**Management area** - An area of land with similar management goals and a common management prescription, as described in the Forest Plan.

**Management direction** - A Forest Plan statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

**Management emphasis** - Long-term management direction for a specific area or type of land.

**Management indicator species (MIS)** - A representative group of species that are dependant of a specific habitat type. The health of an indicator species is used to gauge function of the habitat on which it depends.

**Management practice** - A specific activity, measure, course of action, or treatment.

**Mass wasting** - The movement of unstable soils and geologic formations, which can be exacerbated through construction on sites prone to movement.

**Master Development Plan (MDP)** - A document that is required as a condition of the ski area term special use permit, designed to guide resort planning and development and avoid piecemeal decision making.

**Merchantable (timber)** - Meeting standards for minimum size and soundness.

**Middle ground** - The landscape area visible to a viewer from .5 miles to about three to five miles.

**Mitigation** - Actions taken to avoid, minimize, reduce, eliminate, or rectify the adverse environmental impacts associated with the implementation of an alternative or a portion thereof.

**Modification** - See visual quality objectives.

**Monitoring** - The process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

**National Ambient Air Quality Standards (NAAQS)** - Established under the Clean Air Act of 1963, there are primary standards, designed to protect public health, and secondary standards, designed to protect public welfare from known or anticipated air pollutants.

**National Environmental Policy Act (NEPA)** - A law enacted by Congress in 1969 that requires federal agencies to analyze the environmental effects of all major federal activities that may have a significant impact on the quality of the human environment.

**National Forest Management Act (NFMA)** - A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of regulations to guide that development.

**National Forest System (NFS) lands** - National Forests, National Grasslands, and other related lands for which the Forest Service is assigned administrative responsibility.

**National Historic Preservation Act (NHPA)** - An act that was enacted by the U.S. Congress in 1966 to protect historic sites and artifacts (16 U.S.C. 470). Section 106 of the Act requires consultation with members and representatives of Indian tribes.

**National Register of Historic Places** - A listing maintained by the National Park Service of areas which have been designated as historically significant. The register includes places of local and state significance, as well as those of value to the nation in general.

**No action alternative** - The management direction, activities, outputs, and effects that are likely to exist in the future if the current trends and management would continue unchanged. Under NEPA, it means following the current approved Forest Plan management direction and guidance.

**Noxious weed** - A designated plant species that causes negative ecological and economic impacts to both agricultural and NFS lands.

**Objective** - A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals.

**Obliteration** - The treatment of a disturbed area with the objective of returning productivity and hydrologic function to as near to natural conditions as possible.

**Off-piste** - Skiable terrain that is not associate with the formal trail network, typically including gladed, open-bowl, chute, and other advance dot expert terrain types

**Old growth** - A stand that is past full maturity and showing signs of decadence; the last stage in forest succession. Although the tree age, size, height, or density will vary by timber type, trees are usually 21" or larger dbh and 150 years or older.

**Overstory** - The canopy or uppermost layer of the forest.

**Partial retention** - See visual quality objectives.

**Particulates** - Small particles suspended in the air and generally considered pollutants.

**Permit area** - See Special Use Permit Area.

**pH** - A numeric value used to represent the acidity or alkalinity of an aqueous solution. The Ph scale ranges from 0 (acidic) to 14.0 (basic); 7.0 is a neutral solution.

**Pharmaceuticals and personal care products (PPCPs)** - PPCPs comprise a very broad, diverse collection of thousands of chemical substances, including prescription and over-the-counter therapeutic drugs, fragrances, cosmetics, sun-screen agents, diagnostic agents, nutraceuticals, biopharmaceuticals, and many others. This broad collection of substances refers, in general, to any product consumed by individuals for personal health or cosmetic reasons.

**Pile and burn** - Natural or activity fuels that are piled by hand or with equipment and then burned. Fuels are piled in openings where fire spread can be controlled and heat will do minimal damage to surrounding trees.

**Pod** - The area comprising a lift and associated trails.

**Preferred alternative** - The alternative selected from the range of alternatives which is favored by the lead agency.

**Prehistoric** - The period prior to a written record, and may include emigrant exploration, trappers, miners, etc., but generally refers to the previous Native American (aboriginal) occupants of the area, who kept no written records.

**Prescribed burning** - The intentional application of fire to wildland fuels under predetermined conditions. This allows the fire to be confined to a specific area while producing the amount of heat and fuel consumption required to achieve planned objectives. These objectives are usually fuel reduction, site preparation for regeneration, or wildlife habitat management.

**Project area** - The area encompassed by the development proposal including base area and the permit area.

**Proponent** - The individual or business who is proposing the development. In this case, the proponent is Arizona Snowbowl Resort Limited Partnership, Inc.

**Proposed action** - A proposal made by the Forest Service to authorize, recommend, or implement an action to meet a specific purpose and need.

**Recreational Opportunity Spectrum (ROS)** - A means of classifying and managing recreation opportunities based upon physical setting, social setting, and managerial setting. The six different ROS classes briefly described are as follows:

- a. Primitive (P) - An area three miles or more from roads and trails with motorized use; generally 5,000 acres or more in an essentially unmodified natural environment.
- b. Semi-Primitive Non-motorized (SPNM) - An area 1/2 mile from roads and trails with motorized use; generally 2,500 to 5,000 acres with only subtle modifications to an otherwise natural setting.
- c. Semi-Primitive Motorized (SPM) - Same as semi-primitive non-motorized but with motorized use; generally 2,500 to 5,000 acres with only subtle modifications to an otherwise natural setting.
- d. Roaded Natural (RN) - An area 1/2 mile or less from roads; resource modifications range from evident to strongly dominant.
- e. Rural (R) - The setting is substantially modified with structures or other cultural modifications.
- f. Urban (U) - The setting is strongly dominated by structures, highways and streets.

**Record of Decision (ROD)** - A document prepared within 30 days after the final EIS is issued which states the agency's decision and why one alternative was favored over another, what factors entered into the agency's decision, and whether all practicable means to avoid or minimize environmental harm have been adopted, and if not, why not.

**Rational Method** - The stormflow estimation method that uses a runoff coefficient, uniform rainfall intensity and drainage area to estimate peak stormflow from a small watershed.

**Recreation visitor day (RVD)** - Twelve hours of recreation use in any combination of persons and hours (i.e. one person for 12 hours, three persons for four hours, etc.).

**Revegetation** - The re-establishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance such as seedbed preparation, reseeding, and mulching.

**Revegetation potential** - The ability or capacity of a site to be revegetated after a disturbance, which often depends on the quantity and quality of topsoil remaining in place

**Roadless area** - A National Forest area which satisfies the following criteria -a) larger than 5,000 acres or, if smaller than 5,000 acres, contiguous to a designated wilderness or primitive area, b) contains no roads and, c) has been inventoried by the Forest Service for possible inclusion in the Wilderness Preservation System.

**Scenery Management System (SMS)** - A system designed for the inventory and analysis of the aesthetic values of NFS lands. The SMS evolved from and replaces the VMS defined in Agricultural Handbook #462. The SMS provides for improved integration of aesthetics with other biological, physical and social/cultural resources in the planning process.

**Scoping process** - A process that determines the issues, concerns, and opportunities which should be considered in analyzing the impacts of a proposal by receiving input from the public and affected agencies. The depths of analysis for these issues identified are determined during scoping.

**Section 7 consultation** - Consultation required by the Endangered Species Act with the appropriate jurisdictional agency for a listed species.

**Sediment** - Solid material, both organic and mineral, that has been transported from its site of origin by air, water, or ice.

**Sensitive species** - Species which have appeared in the Federal Register as proposed additions to the endangered or threatened species list; those which are on an official State list or are recognized by the Regional Forester to need special management in order to prevent them from becoming endangered or threatened.

**Seral** - The unique characteristics of a biotic community that is a developmental, transitory stage in an orderly ecological succession involving changes in species, structure, and community processes with time.

**Significant impact** - A somewhat subjective judgement based on the context and intensity of the impact. Generally, a significant impact is one that exceeds a standard, guideline, law, or regulation.

**Silviculture** - The care and tending of stands of trees to meet specific objectives.

**Silvicultural prescription** - The method selected to manage a forest stand. Silvicultural prescriptions are broken into several broad types, including even-aged and uneven-aged.

**Sites** - Any place of past human activity.

**Skiers-at-one time (SAOT)** - A term used to measure recreation capacity which means the number of skiers that can use a facility at one time. See also Comfortable Carrying Capacity.

**Skier visit** - Skier visitor day. One visitor day equals one lift ticket sold.

**Skidding** - Dragging logs from the stump to a collective point.

**Snag** - A standing dead tree.

**Soil** - A dynamic natural body on the surface of the earth, in which plants grow, composed of mineral and organic materials and living forms.

**Soil productivity** - The capacity of a soil for producing plant biomass under a specific system of management. It is expressed in terms of volume or weight/unit area/year.

**Special Use Permit (SUP)** - A legal document, similar to a lease, issued by the U.S. Forest Service. These permits are issued to private individuals or corporations to conduct commercial operations on National Forest System lands. They specify the terms and conditions under which the permitted activity may be conducted.

**Stand** - A community of trees or other vegetation, which is sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities and to thus, form a management entity.

**Study area** - The geographical area that was analyzed to predict the possible effect that may be associated with proposed alternatives. This area varies depending on the resource, but often coincides with the special use permit boundary.

**Sublimation** - The changing from a solid to a gaseous state or from a gaseous to a solid state without becoming a liquid.

**Subwatershed** -A subdivision within a watershed.

**Succession** -The replacement in time of one plant community with another.

**Threatened species** - Any species which is likely to become an endangered species within the foreseeable future and which has been designated in the Federal Register as a threatened species.

**Understory** - Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory.

**U. S. Fish and Wildlife Service (USFWS)** - The agency of the Department of the Interior responsible for managing wildlife, including non-ocean going species protected by the Endangered Species Act.

**Viability** - The ability of a wildlife or plant population to maintain sufficient size so that it persists over time in spite of normal fluctuations in numbers; usually expressed as a probability of maintaining a specific population for a specified period.

**Visual Management System (VMS)** - As defined in Agricultural Handbook #462, provides a method for setting measurable objectives for the management of the visual resource. It provides standards for inventorying the visual resource and documenting changes in the landscape.

**Visual quality** - Describes the degree of variety in the landscape, created by the basic vegetative patterns, landform, and water forms. Landscapes with the greatest variety or diversity have the greatest potential for high scenic value or visual quality.

**Visual Quality Objective (VQO)** - A set of measurable maximum levels of future alteration of a characteristic landscape. These levels are as follows:

1. Preservation (P) - Ecological change only here.
2. Retention (R) - Human activities are not evident to the casual Forest visitor.
3. Partial Retention (PR) - Human activity may be evident but must remain subordinate to the characteristic landscape.
4. Modification (M) - Human activity may dominate the characteristic landscape, but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in the foreground or middle ground.
5. Maximum Modification (MM) - Human activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.
6. Enhancement (E) - A short-term management alternative which is done with the express purpose of increasing positive visual variety where little variety now exists.

**Visual resource** - The composite of basic terrain, geologic features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

**Water quality** - Refers to the chemical, physical, or biological characteristics that describe the conditions, of a river, stream, or lake.

**Water Rights** - The legal right to use water.

**Watershed** - The entire area that contributes water to a drainage system or stream.

**Wilderness** - Under the 1964 Wilderness Act, wilderness is undeveloped federal land retaining its primeval character and influence without permanent improvements of human habitation. It is protected and managed so to preserve its natural conditions.

**Winter Range** - That part of the home range of a species where 90 percent of the individuals are located during the winter at least five out of ten winters.

**WRENSS** - The Environmental Protection Agency's Handbook *An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources* (WRENSS).

**WRNSHYD** - The PC computerized version of Chapter III – Hydrology of the WRENSS Handbook.

**CHAPTER 8**  
**INDEX**

**Coconino National Forest**  
**Peaks Ranger District**



# 8. INDEX

## A

alpine tundra  
 Chapter 2 .....23  
 Chapter 3 ..... 134, 239, 281, 296, 304, 320

airshed  
 Chapter 1 .....24  
 Chapter 3 ..... 351, 353

Arizona Department of Environmental Quality  
 Chapter 1 ..... 14, 20  
 Chapter 2 .....5, 50, 51, 57  
 Chapter 3 ..... 17, 162, 177, 202-206, 216, 221, 351, 353, 358, 359, 370

Arizona Department of Transportation  
 Chapter 2 .....38  
 Chapter 3 .....41, 42

Arizona Pollutant Discharge Elimination System  
 Chapter 2 .....57

Average Daily Traffic  
 Chapter 3 ..... 42-51  
 Chapter 3 ..... 202-206

## B

bald eagle  
 Chapter 2 .....58  
 Chapter 3 ..... 300, 302, 318, 325, 329

Bed, Board & Booze  
 Chapter 1 .....18  
 Chapter 2 .....46, 47  
 Chapter 3 ..... 116-127

Best Management Practice  
 Chapter 2 .....21, 23  
 Chapter 3 .....257, 259, 272

Biological Assessment  
 Chapter 3 .....282, 290, 300, 318, 325

Biological Evaluation  
 Chapter 3 .....282, 300

black-footed ferret  
 Chapter 2 .....58  
 Chapter 3 .....300, 303, 318, 325-329

## C

candidate species  
 Chapter 3 .....282

Clean Air Act  
 Chapter 3 .....351-353, 357

Clean Water Act  
 Chapter 3 ..... 175, 188, 202

comfortable carrying capacity  
 Chapter 1 .....3, 8, 18  
 Chapter 2 ..... 2, 5, 17, 34, 48, 49

Chapter 3..... 40, 41, 46, 108, 129, 132-147, 152-157, 357, 359

consumptive use  
 Chapter 3..... 222

critical habitat  
 Chapter 3..... 281-290

Council on Environmental Quality  
 Chapter 2..... 1, 21  
 Chapter 3..... 1, 362-369

criteria pollutants  
 Chapter 1..... 24  
 Chapter 2..... 61  
 Chapter 3..... 352, 357, 359

critical habitat  
 Chapter 2..... 56  
 Chapter 3..... 134, 300

cultural resource  
 Chapter 2..... 22  
 Chapter 3..... 7, 13-16, 25, 371

## D

Department of Environmental Quality  
 Chapter 2..... 5, 57  
 Chapter 3..... 162, 205, 353

developed recreation  
 Chapter 1..... 4  
 Chapter 3.....3, 56, 305, 327, 370

dispersed recreation  
 Chapter 3..... 135

disproportionate effect  
 Chapter 3..... 367

## E

emissions  
 Chapter 1..... 16  
 Chapter 2..... 22, 28, 44  
 Chapter 3.....35-37, 351-359

endangered species  
 Chapter 2..... 58  
 Chapter 3..... 134, 281, 316, 325

environmental justice  
 Chapter 3..... 5, 362-367

Environmental Protection Agency  
 Chapter 1..... 24  
 Chapter 3..... 34, 175, 185-188, 200-205, 362

erosion  
 Chapter 1..... 21  
 Chapter 2..... 22, 25-27, 55  
 Chapter 3.....56, 238-259, 270-272, 296-299

evapotranspiration  
 Chapter 1..... 21  
 Chapter 2..... 54

Chapter 3 ..... 163, 164, 210, 223, 230-234,  
244, 248, 252, 336, 342, 347

## F

fire suppression  
Chapter 2 ..... 6, 37  
Chapter 3 ..... 150-155, 200, 304, 311  
Full Time Equivalents  
Chapter 3 ..... 82, 90, 93, 97, 102

## G

gray water  
Chapter 3 ..... 204  
groundwater  
Chapter 2 ..... 51, 53  
Chapter 3 ..... 16, 160-177, 190, 191, 200-223,  
225, 230, 234, 241, 266-269, 277, 292, 321, 336

## I

impoundment  
Chapter 1 ..... 23, 24  
Chapter 2 ..... 5-7, 11, 17, 22, 30, 31, 59, 60  
Chapter 3 ..... 20, 58, 59, 72, 154-157, 257, 274,  
277, 288, 326, 327, 335-350  
indicator species  
Chapter 1 ..... 23  
Chapter 2 ..... 58  
Chapter 3 ..... 300, 305, 316, 319, 325-333  
Interdisciplinary Team  
Chapter 1 ..... 11

## K

Kachina Peaks Wilderness  
Chapter 1 ..... 2, 19, 24  
Chapter 2 ..... 36, 37, 49, 61  
Chapter 3 ..... 25, 27, 31, 59-62, 69,  
135-137, 147, 148, 219, 280, 281, 287, 294-298, 300,  
312, 321-331, 351-353, 357-60

## L

Land and Resource Management Plan  
Chapter 2 ..... 32

## M

Management Indicator Species  
Chapter 1 ..... 23  
Chapter 2 ..... 58  
Chapter 3 ..... 305-319, 325-333  
migratory birds  
Chapter 2 ..... 58  
Chapter 3 ..... 300, 312-333

minority  
Chapter 3 ..... 5, 362-368  
montane grasslands  
Chapter 1 ..... 22  
Chapter 2 ..... 56  
Chapter 3 ..... 315

## N

National Ambient Air Quality Standards  
Chapter 1 ..... 24  
Chapter 3 ..... 351, 352  
National Register of Historic Places  
Chapter 1 ..... 14  
Chapter 2 ..... 44  
Chapter 3 ..... 4, 6, 7, 14, 24, 27  
Nitrogen  
Chapter 1 ..... 22  
Chapter 3 ..... 184, 211, 212, 217, 291, 293, 351  
noxious weeds  
Chapter 2 ..... 24, 25  
Chapter 3 ..... 284, 292, 297-299

## P

parking  
Chapter 1 ..... 3, 4, 8-10, 19  
Chapter 2 ..... 3, 7, 10, 11, 17, 24, 25, 28, 32-34, 49  
Chapter 3 ..... 15-30, 40-59, 72, 87, 129, 133-149,  
154-157, 281, 284, 289, 299, 303, 330, 334, 357-359  
partial retention  
Chapter 3 ..... 61  
particulate matter  
Chapter 1 ..... 24  
Chapter 2 ..... 22, 28  
Chapter 3 ..... 358  
particulates  
Chapter 3 ..... 352, 360  
pipeline  
Chapter 1 ..... 9, 10, 15, 19, 23  
Chapter 2 ..... 5, 6, 10, 24, 30, 35, 37, 38, 40, 49, 58  
Chapter 3 ..... 15-23, 35, 38, 58, 59, 69-72, 128,  
154-158, 173, 202, 271, 274, 277, 280-299, 300-306,  
312-333, 358  
potable water  
Chapter 2 ..... 3, 6, 10, 35, 38, 49  
Chapter 3 ..... 150-157, 199, 200  
power  
Chapter 1 ..... 19  
Chapter 2 ..... 6, 8, 28, 37, 49  
Chapter 3 ..... 10, 14, 150-159, 199, 221, 296,  
297, 305, 329, 331, 342, 356  
PPCPs  
Chapter 2 ..... 50  
Chapter 3 ..... 189-191, 368  
prescribed burn  
Chapter 3 ..... 220, 296, 358-361

## R

reclaimed water	
Chapter 1	9, 10, 14, 19-22
Chapter 2	5-7, 10, 17, 24, 30, 35-38, 40, 43, 49-53, 57, 58
Chapter 3	15-23, 27-29, 35, 58, 59, 69, 72, 150-156, 160, 162, 177, 187, 191, 198-223, 240, 241, 267, 269, 276, 277, 280-299, 300-306, 312-333, 358, 368-371
Rio de Flag	
Chapter 1	19-21
Chapter 2	5, 37, 50-53, 57
Chapter 3	150, 162, 167, 173-178, 184-216, 222-224, 240, 335, 343, 368

## S

San Francisco groundsel	
Chapter 1	21
Chapter 3	173
San Francisco Peaks	
Chapter 1	2, 11, 12, 14, 15, 17-19, 21, 22
Chapter 2	17, 23, 29, 32, 33, 35, 43, 44, 46, 56, 58
Chapter 3	3-28, 44, 56, 57, 63-72, 129, 133-135, 148, 225, 230-235, 271, 272, 303, 311, 312, 313, 367-371
Section 106	
Chapter 3	4, 371
sediment	
Chapter 2	22, 26, 27, 55
Chapter 3	240-246, 251-259, 271-277, 336, 342, 343
skier visit	
Chapter 1	16, 18
Chapter 2	17, 46-48
Chapter 3	80-126, 130, 140, 145, 154, 358
snowfall	
Chapter 1	6, 18
Chapter 2	5, 17, 47, 48
Chapter 3	42, 48, 83-87, 105-127, 130, 138-145, 163, 209, 242, 252, 260, 309, 353, 355
snowmaking	
Chapter 1	7-10, 14-16, 19-24
Chapter 2	2, 5-7, 9, 11, 17, 22, 28, 33, 35-37, 40, 42-46, 48, 49-60
Chapter 3	16-20, 27-29, 32-37, 46-48, 58, 59, 72, 80-87, 96-100, 104, 111, 125, 130, 139, 142-146, 149, 150-155, 160-164, 191, 198-223, 225, 230-233, 240-260, 269-279, 316-334, 335-48, 351, 357, 359, 368-371
snowplay	
Chapter 1	8-10
Chapter 2	2, 7, 10, 11, 17, 32, 33
Chapter 3	20, 23, 28, 44, 46-50, 58, 85-87, 112, 115, 133, 134, 141-149, 153-157, 318, 323, 326, 334, 357-359
soil productivity	
Chapter 3	2

sublimation	
Chapter 1	21, 162, 164, 210, 215, 222
Chapter 3	231, 354

## T

temperature	
Chapter 3	36, 209, 226, 231, 242, 252, 303, 353, 354
Threatened, endangered, and sensitive species	
Chapter 3	300, 313, 316
Traditional Cultural Property	
Chapter 2	35, 44
Chapter 3	3, 6, 7, 9, 22, 24, 25, 271
tribal	
Chapter 1	11, 13
Chapter 3	367-371
tribes	
Chapter 1	11, 12, 14
Chapter 2	29, 33, 34, 43
Chapter 3	4, 7-12, 17-29, 358, 359, 363-371
tubers-at-one-time	
Chapter 2	7
Chapter 3	47, 139, 357

## U

U.S. Fish and Wildlife Service	
Chapter 3	283, 290, 300, 318

## V

Visual Management System	
Chapter 3	52
Visual Quality Objective	
Chapter 3	52-55, 61, 63, 65, 67, 71
VMS	
Chapter 3	52-55, 69

## W

wastewater	
Chapter 1	14, 19, 20, 22
Chapter 2	49-52, 56, 57
Chapter 3	150, 153, 162, 169, 175-177, 187-191, 198-206, 216, 221, 222, 241, 260, 261, 267-269, 293, 321
Water Erosion Prediction Project	
Chapter 1	21
Chapter 2	55
Chapter 3	251-259
Water Reclamation Plant	
Chapter 1	19-21
Chapter 2	5, 50-53, 57
Chapter 3	158, 178, 184, 186, 192, 194, 240, 368

water rights  
    Chapter 1 .....20  
    Chapter 2 .....53  
    Chapter 3 ..... 162, 201

water yield  
    Chapter 3 ..... 173, 230, 233, 274-279

Wilderness  
    Chapter 1 .....19  
    Chapter 2 .....49  
    Chapter 3 ..... 135, 147

# APPENDICES

A: Conceptual Snowmaking Water Impoundment Design

B: Proposed Forest Plan Amendment

C: Cumulative Effects Table

D: Memorandum of Agreement Between the USDA Forest Service,  
Advisory Council on Historic Preservation, and the Arizona State  
Historic Preservation Officer

**Coconino National Forest  
Peaks Ranger District**



# APPENDIX A – CONCEPTUAL SNOWMAKING WATER IMPOUNDMENT DESIGN

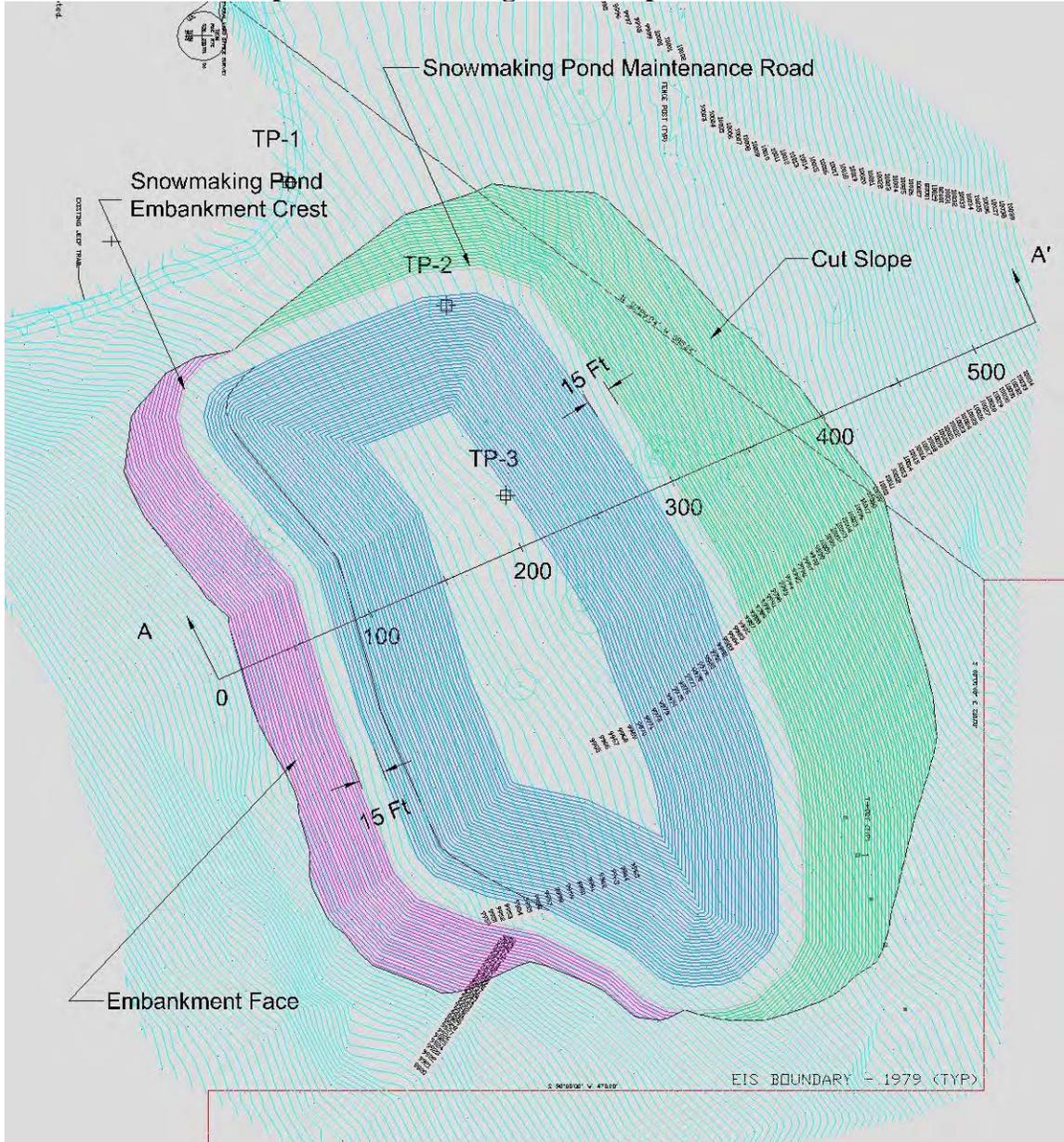
In order to complete a proper stability analysis and dam breach model, it is necessary to prepare a conceptual design layout of the snowmaking water impoundment facility.

## DESIGN LAYOUT

The snowmaking water impoundment is proposed to be located just below (and to the south of) the ridgeline along the southern edge of the SUP area – near the top terminal of the existing Sunset Chairlift. The proposed impoundment is to be a geosynthetic lined pond with an earthen embankment. Figure A-1 shows the approximate layout of the pond and embankment. The conceptual design assumes a 15-foot wide embankment crest and a 15-foot wide access road around the perimeter of the pond for maintenance access. The crest elevation is 9,957 feet above AMSL. The impoundment floor is at 9,922 feet above AMSL, with 2:1 (horizontal to vertical) side slopes. The downstream face of the embankment is also at 2:1.

Approximate dimensions of the snowmaking impoundment are 1.9 acres in surface area with a maximum depth (floor to crest of the embankment) of 35 feet.

**Figure A-1  
Proposed Snowmaking Water Impoundment Site**

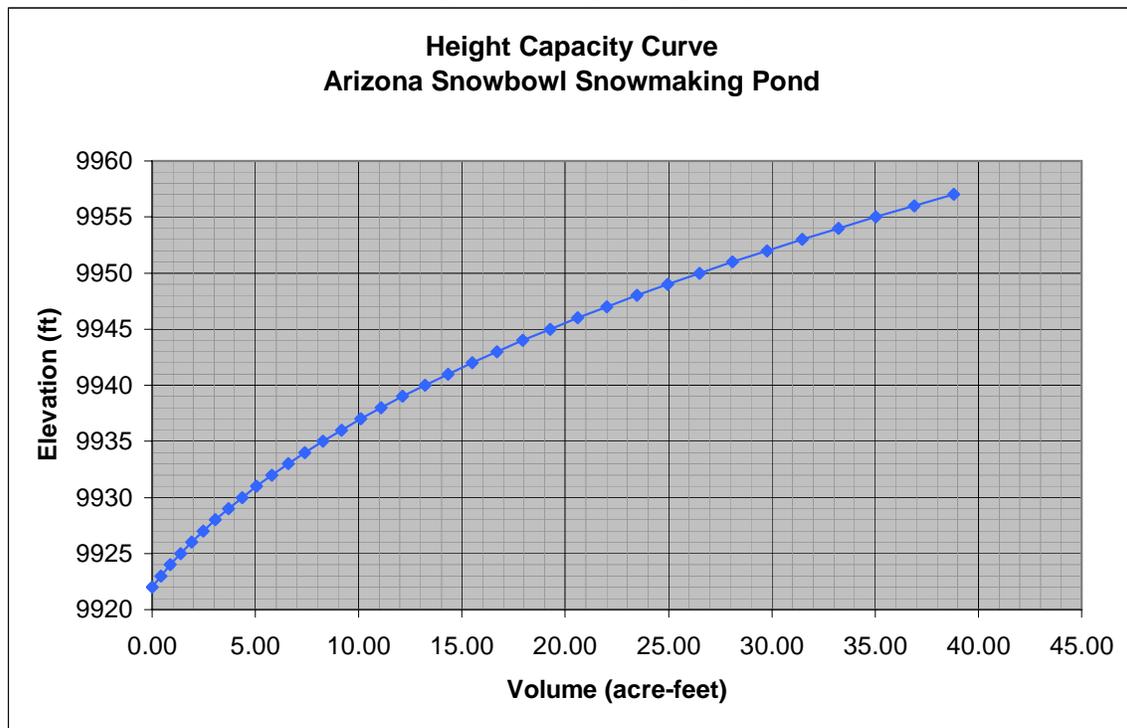


The embankment height from crest to toe is 24.5 feet. Maximum possible storage (to the embankment crest) is 38.8 acre feet. This makes the structure a non-jurisdictional dam in the State of Arizona. (less than 25-foot crest to toe embankment height and less than 50 acre feet of storage). Although the structure would not have to be permitted as a jurisdictional dam, the State of Arizona would still have a notification requirement.

It is assumed that the embankment would be a simple, homogeneous embankment and that all materials used in the embankment construction would be generated on site from excavation in

the proposed impoundment area. Based on the layout shown in Figure A-1, and the assumptions described above, the pond excavation would generate approximately 120,880 bank cubic yards (CY) of debris. Assuming a 15 percent shrinkage factor during compaction, the embankment would require approximately 12,300 CY of debris for construction. This produces an excess of cut on the order of 108,580 CY that would need to be disposed of in grading operations elsewhere – either on- or off-site. Soils encountered in the test pit excavations contained cobbles and boulders ranging from five percent to 20 percent of the excavated volume. Cobbles eight inches and larger must be excluded from any fill material used in dam embankment construction due to compaction restrictions and the overall percentage of cobbles (particles over three inches in diameter) must be such that cobbles are not allowed to nest (group together). Therefore, some processing of fill material should be anticipated during construction. Due to the large imbalance in cut to fill volumes, it is not anticipated that any difficulty would be encountered in creating a sufficient volume of fill material meeting gradation specifications for compaction. Due to the depth of excavation required to achieve storage of 10,000,000 gallons of water, it should be anticipated that excavation would encounter zones of large boulders, weathered bedrock requiring ripping for removal, and, in the deepest portions of the pond, hard, unweathered bedrock that could require blasting for removal.

**Figure A-2  
Snowmaking Pond Height Capacity Curves**



The recommended liner would be a 60 mil High Density Polyethylene (HDPE). Since the impoundment would store only clear water with no undesirable constituents, there are no environmental consequences to leakage (with respect to water quality). Therefore, a composite liner system (HDPE overlying a compacted clay bedding layer) would not be necessary and the local sand could be used as bedding for the HDPE liner. Any bedrock, boulders, or cobbles

exposed during the pond excavation should be removed and/or covered with not less than six inches of sand with not more than 30 percent by weight gravel sizes and a maximum particle size not greater than ¾-inch. It is not necessary to protect HDPE from ultraviolet light, although covering the plastic may further extend its useful life.

Exposed plastic on a 2:1 slope presents a problem for wildlife. The water in the impoundment would almost certainly attract local wildlife that would attempt to drink at the edge. The plastic is very slippery and animals can easily slip into the pond. Once they are in the water it is almost impossible for them to climb back out of the impoundment and drowning is likely. This hazard can be mitigated by fencing wildlife out (although the smaller animals are difficult to exclude in this way). An alternative to fencing is to cover the plastic with soil. However the interface friction between HDPE and soil is commonly in the range of 14° to 18° and soil will not stay on the surface of a 2:1 slope (26.5°) or even at a 3:1 slope (18.4°). An expandable geocell grid filled with the local sand and gravel would keep the soil in place and provide a surface conducive to both wildlife and operating personnel. The geocell surface would also provide a buffer against the greatest post-construction puncture risk which is ice loading.

This storage facility will require an Operation & Maintenance inspection by a qualified Forest Service engineer on an annual basis. Timing of said inspection shall be such to allow correction of discovered safety deficiencies prior to the immediately following season of operation. Inspection criteria shall be according to current safety criteria and engineering state-of-art judgment, and manual FSM 7500 direction. In addition, there shall be completed within three calendar days after any event of any unusual event; such as an earthquake of Richter magnitude 5.0 or greater within a twenty-mile radius of the event epicenter, in the event of an overtopping event, or at the discretion of the Forest Service. The Forest Service shall be notified by the facility owner/operator in the event of any unusual facility operational behavior or physical characteristic.

## **SITE INVESTIGATION**

Three test pits were excavated at the site of the proposed snowmaking water impoundment using a small backhoe. The location of each test pit (TP1, TP2 and TP3) is shown on Figure A-1. The test pits permitted inspection of the near surface soil profile and the sampling of the on-site soils for laboratory testing.

The observed soil profiles would be described as follows:

### **TEST PIT #1**

- 0 to two feet - Loose to medium dense, fine to medium grained well graded to silty sand (SM), brown, colluvial soil with root mass (scattered roots to three feet) and three to eight inches of poor topsoil.
- Two to 10 feet – Medium dense to dense, fine to medium grained well graded to silty sand (SM), brown, colluvial soil with occasional cobbles and boulders (less than five percent).
- Refusal hard silty fine sand, gray (weathered rock) at 10 feet.

## **TEST PIT #2**

- 0 to 1.2 feet - Loose to medium dense, fine to medium grained well graded to silty sand (SM), brown, colluvial soil with root mass (scattered roots to three feet) and eight to 12 inches of topsoil.
- 1.2 to 10 feet – Medium dense to dense, fine to medium grained well graded to silty sand with gravel (GC/GM), brown, colluvial soil with cobbles and boulders (15% +/-). Cobbles and boulders range from three inches to 18 inches in diameter, six inches diameter typical. Increasing clay content with depth.
- Refusal on boulders and weathered rock at 10 feet.

## **TEST PIT #3**

- 0 to 2.5 feet - Loose to medium dense, fine to medium grained well graded to silty sand (SM), brown, colluvial soil with root mass (scattered roots to three feet) and eight to 12 inches of topsoil.
- 2.5 to eight feet – Medium dense to dense, fine to medium grained well graded to silty sand with gravel (GM), brown, colluvial soil with cobbles and boulders (20 percent +). Cobbles and boulders range from three inches to 36 inches in diameter, 12 inches diameter typical. Nested boulders at four to five feet.
- Refusal on boulders and weathered rock at eight feet.

Bulk samples of the colluvial soil were obtained from each test pit and submitted for particle size analysis/plasticity testing. All samples were found to be non-plastic (no significant clay content) with the exception of TP2 which contained measurable amounts of a low plasticity clay (Liquid Limit (LL) of 23 and Plasticity Index (PI) of 6). Particle size analyses include two samples from test pits excavated at an alternate site located to the southwest and at significantly lower elevation (the glade site). Soils at this alternate site were similar but somewhat finer grained.

## **SITE HYDROLOGY**

Detailed design of spillways and other hydraulic control structures is beyond the scope of this study. The proposed snowmaking water impoundment site is located near the ridgeline and has only a very small contributing area upslope. A 15-foot wide roadway required for construction and maintenance is proposed to completely surround the impoundment. A small diversion ditch along the outside edge of this road would intercept and completely remove any flow from the very small basin upstream of the impoundment. Therefore, there is not anticipated to be a significant contribution of runoff to the impoundment from upslope areas. A small emergency spillway structure should be included in the southeastern abutment of the embankment to protect the structure against overtopping from operator errors or equipment failures during impoundment filling and from direct precipitation within impoundment limits during extreme events.

## **SLOPE STABILITY**

Slope stability models were developed and analyzed for the downstream embankment of the snowmaking water impoundment site. While site-specific laboratory testing of the on-site soils for shear strength parameters has not been performed, for this conceptual level design effort, conservative assumptions have been made for the shear strength parameters. The following shear strength characteristics have been assigned:

- For the native non-plastic sands above the weathered bedrock surface, a friction angle of 28° and cohesion of 500 pounds per square foot (psf).
- For the compacted sands in the pond embankment, a friction angle of 30° and cohesion of 800 psf.
- For zones containing nested boulders and weathered bedrock, a friction angle of 45° and cohesion of 500 psf.
- For the bedrock materials, no specific shear strength was assigned, however, failure surfaces were constrained from penetrating the bedrock surface.

Analyses were performed using a computer assisted limit equilibrium model called SLOPE/W. The slope stability analysis that was performed indicates that the required stability criteria are met by all of the conditions analyzed.

The stability results for the observed range of conditions on site (a slope range of five to 50 percent, 20 to 40 percent typical) indicate that the Snowbowl's trails are very stable, even at the upper slope range of 50 percent. High artesian pressures would be required to induce instability in the soil layer, even at a grade of 50 percent. The presence of an abundance of woody vegetation tends to increase the stability of near surface, shallow slopes due to the reinforcing effect of root structure.

# APPENDIX B – PROPOSED FOREST PLAN AMENDMENT

## FOREST SERVICE DIRECTION FOR AMENDING FOREST PLANS

Forest Service requirements for amending forest plans are included in agency regulations and policies. These require that proposed activities be consistent with forest plans and that proposed activities which may be in conflict with the Forest Plan either be denied, modified (so as to be consistent), or that the Forest Plan be amended. Regulations at 36 CFR 219.10(f) direct the Forest Service to consider whether a proposed amendment to a forest plan would be considered a significant change.

The Forest Service is authorized to implement amendments to forest plans in response to changing needs and opportunities, information identified during project analysis, or the results of monitoring and evaluation. The process to consider Forest Plan amendments, review them for significance, document results, and reach a decision is contained in Forest Service Manual (FSM) 1922 and Forest Service Handbook (FSH) 1909.12, Chapter 5. An assessment of a proposed amendment's significance in the context of the larger Forest Plan is a crucial part to the process. It is important to note that the definition of significance for amending a forest plan (36 CFR 219.10(f) and FSH 1922.5) is not the same significance as defined by NEPA. Under NEPA, significance is determined by whether a proposal is considered to be a "major federal action significantly affecting the quality of the human environment,"<sup>1</sup> or whether the relative severity of the environmental impacts would be significant based on their context and intensity.<sup>2</sup>

In contrast, the National Forest Management Act (NFMA) requires that proposed Forest Plan amendments be evaluated for whether they would constitute a significant change in the long-term goods, outputs, and services projected for an entire National Forest. Amendments that are not significant may be adopted following disclosure and notification in an environmental document, such as an EA, EIS, or a supplement to one of these documents.

The criteria to analyze the significance of a Forest Plan amendment are summarized below.<sup>3</sup> Each of the four criteria for determining significance of the proposed amendment is responded to directly later.

1. Timing. When the change in the Forest Plan would take place relative to the planning period and scheduled revisions of the plan.
2. Location and size. Location and size of the area affected compared to the size for the overall planning area.

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<sup>1</sup> 40 CFR 1502.3

<sup>2</sup> 40 CFR 1508.27

<sup>3</sup> USDA-FS, 1992, Forest Service Handbook 1909.12

3. Goals, Objectives, and Outputs. How, or to what degree, the amendment would affect the long-term relationship between levels of goods and services projected by the Forest Plan.
4. Management Prescription. Whether the change would apply only to a specific situation, or to future situations across the planning area.

## PROPOSED AMENDMENT TO THE CNF FOREST PLAN

In order to respond to changing needs and opportunities on the Forest since the Forest Plan was adopted in 1987, a minor, non-significant Forest Plan amendment has been incorporated into the Proposed Action. This Forest Plan amendment is for Management Area 15 – Developed Recreation Sites. As indicated in Management Area 15, current management emphasis for Developed Recreation Sites states that: “Facility development at the Snow Bowl ski area is guided by the Final Environmental Impact Statement of 1979.”<sup>4</sup>

The original management emphasis in the Forest Plan failed to allow for changed circumstances that may required and initiate a new environmental analysis of the ski area operations; therefore, the Final Environmental Statement of 1979 did not provide for unforeseen future guest and operational amenities such as snowmaking and developed snowplay at the Snowbowl. This management direction needs to be more inclusive and reference the Snowbowl’s Master Development Plan as developed from approved NEPA decisions. This amendment applies to all of the alternatives analyzed in detail in this FEIS.

In order to allow current and potential future proposals at the Snowbowl to be in compliance with Forest Plan direction, the Alternatives 1, 2 and 3 include replacing the following management emphasis on page 188 of the Forest Plan:

*“Facility development at the Snow Bowl ski area is guided by the Final Environmental Impact Statement of 1979.”*

With the following statement:

*“Facility development at the Snow Bowl ski area is guided by the **Ski Area Master Development Plan as based on approved NEPA analysis.**”*

As per FSH 1909.12, the four criteria for determining significance of the proposed amendment are responded to directly.

1. Timing. When the change in the Forest Plan would take place relative to the planning period and scheduled revisions of the Plan.

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<sup>4</sup> USDA Forest Service, 1987, pg. 188

The CNF is currently in the very initial steps of undertaking a formal Forest Plan revision process. A Notice of Intent to prepare and Environmental Impact Statement (NOI) is not scheduled to be submitted to the Federal Register until 2006, with a *potential* Record of Decision (ROD) in 2009. Therefore, because the completion of the Forest Plan revision process is not imminent, this non-significant Forest Plan amendment is being proposed at an appropriate time.

2. Location and size. Location and size of the area affected compared to the size for the overall planning area.

The CNF includes approximately 1,821,495 contiguous acres in north central Arizona. This proposed Forest Plan amendment would pertain to NFS lands within Snowbowl's existing 777-acre SUP area only, representing approximately 0.04 percent of the Forest.

3. Goals, Objectives, and Outputs. How, or to what degree, the amendment would affect the long-term relationship between levels of goods and services projected by the Forest Plan.

This amendment intends to improve the long-term relationship between levels of goods and services projected by the Forest Plan. As per the Forest Plan and the SUP, Snowbowl's permit area is managed for developed recreation. This proposed Forest Plan amendment is consistent with the developed recreation theme, and is not anticipated to negatively impact the long-term relationship between levels of good and services in any way.

4. Management Prescription. Whether the change would apply only to a specific situation or to future situations across the planning area.

The proposed Forest Plan amendment is specific to the Snowbowl SUP area within Management Area 15. This amendment would not apply to the entire Management Area or any other current or future situations on the CNF.

Subsequent to issuance of the Final EIS and ROD, Snowbowl will be required to prepare and submit an updated Approved Master Development Plan document which corresponds to the final approved alternative. The Approved Master Development Plan will guide the future development of the Snowbowl.

# APPENDIX C – CUMULATIVE EFFECTS TABLES

Tables C-1 and C-2 provide information on past, present and reasonably foreseeable future activities that were used in the cumulative effects analyses provided in Chapter 3.

**Table C-1  
Cumulative Effects Matrix  
Past, Present and Reasonably Foreseeable Future Projects**

<b>Project</b>	<b>Location</b>	<b>Description</b>	<b>Status</b>	<b>Potentially Affected Resource</b>	<b>Units of measure</b>
Kachina Peaks Wilderness	Peaks	Designation of Wilderness Area will result in diminished land use activities such as logging, mining, and road-building.	Designated 1985	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Recreation</li> <li>▪ Visual</li> <li>▪ Wildlife</li> </ul>	18,705 acres
White Vulcan Mine Settlement and Reclamation	Eastern slope of Peaks	Reclamation and closure of the White Vulcan Mine. This project is located on the opposite side of San Francisco Mountain from the Snowbowl operations.	Ongoing, to be completed by 2010.	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Visuals</li> <li>▪ Wildlife</li> <li>▪ Watershed</li> </ul>	130 acres
San Francisco Mountain Mineral Withdrawal	All of Peaks except Wilderness	The Peaks and surrounding area was withdrawn from availability for mineral entry in 2000. The designated area of special protection totals approximately 74,381 acres. This will limit potential ground disturbing activities associated with mining operations. This action precludes individuals and entities from staking a mineral claim in preface to planned extraction activities within the withdrawn area.	Completed 2000	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Visuals</li> <li>▪ Recreation</li> <li>▪ Wildlife</li> <li>▪ Soils</li> <li>▪ Watershed</li> <li>▪ Economics</li> </ul>	75 acres
Snowbowl Road Parking Restriction	Snowbowl Road	Parking along the Snowbowl Road in the winter is restricted and enforced, snow play at Snowbowl and along road closed.	Ongoing	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Recreation</li> <li>▪ Traffic</li> <li>▪ Social</li> </ul>	12 miles

**Table C-1  
Cumulative Effects Matrix  
Past, Present and Reasonably Foreseeable Future Projects**

<b>Project</b>	<b>Location</b>	<b>Description</b>	<b>Status</b>	<b>Potentially Affected Resource</b>	<b>Units of measure</b>
Peaks Nomination to National Register	Peaks Withdrawal area	The Forest Service is in the process of completing a National Register nomination for the Peaks as a Traditional Cultural Property (TCP). The area to be designated as a TCP would be inclusive of the Arizona Snowbowl SUP and would encompass 74,380.5 acres of NFS lands.	2004 nomination process will be complete	<ul style="list-style-type: none"> <li>▪ Cultural</li> </ul>	74,381 acres
Peaks Segment of the Arizona Trail	Western slopes of Peaks	Designate and construct a non-motorized trail from Sandy Seep to Kelly Tank (Peaks Segment). The segment is approximately 31.0 miles, traveling north between Hart Prairie and the Kachina Peaks Wilderness to Kelly Tank. Includes the additional trailhead at the Snowbowl parking area and a 0.4-mile connector trail that includes a short interpretive trail loop at the trailhead.	Pending DN/FONSI as of December 2003	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Recreation</li> <li>▪ Wildlife</li> </ul>	Approximately 31 miles
Bebbs Willow Restoration Project	Lower Hart Prairie	Using prescribed burning, tree thinning, soils and water rehabilitation to restore Bebb's willow-wet meadow community. The objective is to improve the hydrologic function in the 170-acre Fern Mountain Botanical Area by increasing groundwater availability in the shallow perched aquifer and springs that support the riparian habitat.	NEPA decision 2001 Implementation ongoing	<ul style="list-style-type: none"> <li>▪ Vegetation</li> <li>▪ Cultural</li> <li>▪ Watershed</li> <li>▪ Soils</li> <li>▪ Air quality</li> </ul>	600 Acres
Fort Valley Restoration Project	Lower south and west slopes of Peaks	Involves restoration of forest lands in and around the urban Flagstaff interface by using tree thinning, prescribed burning, and road and trail management techniques. The effects of the proposed Fort Valley Ecosystem Restoration are limited to the local area and the techniques of tree thinning, prescribed burning, and road and trail management proposed for Fort Valley Ecosystem and has been determined to not have significant environmental impacts.	NEPA decision 2000, implementation ongoing	<ul style="list-style-type: none"> <li>▪ Fire</li> <li>▪ Vegetation</li> <li>▪ Wildlife</li> <li>▪ Visual</li> <li>▪ Air quality</li> </ul>	9,100 Acres

**Table C-1  
Cumulative Effects Matrix  
Past, Present and Reasonably Foreseeable Future Projects**

<b>Project</b>	<b>Location</b>	<b>Description</b>	<b>Status</b>	<b>Potentially Affected Resource</b>	<b>Units of measure</b>
Transwestern Lateral Pipeline Project	West Flagstaff to Snowbowl Road	Constructed in 1992, this pipeline project brought natural gas service to the eastern portion of Fort Valley. There is on-going operation, maintenance, and construction activities for the 6 inch natural gas pipeline, which extends through Forest Service land for a distance of six miles within a 50 foot right-of-way.	Construction 1992	<ul style="list-style-type: none"> <li>▪ Vegetation</li> <li>▪ Soils</li> <li>▪ Watershed</li> <li>▪ Wildlife</li> <li>▪ Economics</li> </ul>	6 miles 50' ROW
Snowbowl Wireless Telephone Communications Site	Snowbowl SUP area at Maintenance Shop	Installation of a 125-foot tall cellular tower near Snowbowl's maintenance shop was approved via a Decision Notice in August 2000. However, it has not been constructed. It is assumed that this facility will be eventually constructed independent of any actions taken by the ski area.	NEPA complete in 2000, facilities have not been built. Construction expected in 2004	<ul style="list-style-type: none"> <li>▪ Visuals</li> <li>▪ Cultural</li> <li>▪ Economics</li> </ul>	0.2 Acre VQO
Inner Basin Water Pipeline Development and Maintenance	Inner Basin/east side of Peaks to Schultz Pass	<i>Existing</i> pipeline under permit to City of Flagstaff. Annual repair and maintenance including pipeline replacement activities.	Ongoing/Maintenance only	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Wildlife</li> <li>▪ Soils</li> <li>▪ Watershed</li> </ul>	20 Miles 30' ROW
Private Land Development	Lower Hart Prairie	Residential and summer home development exists on private lands in Hart Prairie, downhill from the Snowbowl facility. These homes are primarily used during the summer months, as no winter road access exists. Currently, there are approximately 13 summer homes developed in the lower Hart Prairie area. Additionally there are approximately four parcels of land which could potentially be developed as home sites.  Development is presently limited and likely to remain low density due to Coconino County zoning restrictions and availability of land and water supplies.	Ongoing	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Recreation</li> <li>▪ Visuals</li> <li>▪ Wildlife</li> <li>▪ Soils</li> <li>▪ Watershed</li> <li>▪ Vegetation</li> <li>▪ Noise</li> <li>▪ Water quality</li> <li>▪ Traffic</li> <li>▪ Economics</li> </ul>	Acres

**Table C-1  
Cumulative Effects Matrix  
Past, Present and Reasonably Foreseeable Future Projects**

<b>Project</b>	<b>Location</b>	<b>Description</b>	<b>Status</b>	<b>Potentially Affected Resource</b>	<b>Units of measure</b>
Miscellaneous/ongoing Recreational Uses	Peaks Area	Ongoing recreational use of the area including weddings, reunions, recreation events, hiking, bicycling, OHV use, vehicle travel on misc, horseback riding, cross-country skiing, dirt roads, camping, hunting. The USFS has developed best management practices to mitigate current and future recreational land uses.	Ongoing	<ul style="list-style-type: none"> <li>▪ Recreation</li> <li>▪ Cultural</li> <li>▪ Visuals</li> <li>▪ Wildlife</li> <li>▪ Soils</li> <li>▪ Watershed</li> <li>▪ Vegetation</li> <li>▪ Noise</li> <li>▪ Traffic</li> <li>▪ Economics</li> <li>▪ Social</li> <li>▪ Noise</li> </ul>	PAOT
Power line Maintenance	Power line from Snowbowl Road to permit area	Ongoing maintenance activities including clearing of hazard trees.	Ongoing	<ul style="list-style-type: none"> <li>▪ Wildlife</li> <li>▪ Cultural</li> <li>▪ Noise</li> <li>▪ Vegetation</li> </ul>	5 miles 50' ROW
Inner Basin Well Field	Inner Basin of the Peaks	Operation of the Inner Basin well field as part of Flagstaff's potable water system. This lies outside of the proposed areas of snowmaking and associated snowmelt runoff from Snowbowl operations.	Ongoing since turn of the century	<ul style="list-style-type: none"> <li>▪ Watershed</li> <li>▪ Cultural</li> </ul>	Acre feet
Snowbowl Road Paving	Snowbowl Road	Reconstruction and paving of the road.	Construction competed in 1988	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Recreation,</li> <li>▪ Visual</li> <li>▪ Wildlife</li> <li>▪ Traffic</li> <li>▪ Noise</li> </ul>	12 miles
Various Aspen Regeneration and exclosure fences	Peaks area	Fencing of aspen areas to promote regeneration.	Ongoing	<ul style="list-style-type: none"> <li>▪ Vegetation</li> <li>▪ Wildlife</li> <li>▪ Visual</li> </ul>	400 Acres

**Table C-1  
Cumulative Effects Matrix  
Past, Present and Reasonably Foreseeable Future Projects**

<b>Project</b>	<b>Location</b>	<b>Description</b>	<b>Status</b>	<b>Potentially Affected Resource</b>	<b>Units of measure</b>
Use of city reclaimed water	Flagstaff area	Use of reclaimed water for irrigation. Reclaimed water for the Snowbowl would not be available for other reuse. City of Flagstaff Utilities Department records (2003) indicate there are only limited demands for reclaimed water during the winter months when diversion to Snowbowl would occur.	Ongoing	<ul style="list-style-type: none"> <li>▪ Watershed</li> <li>▪ Water Quality</li> </ul>	Acre feet of water used
City Water Well Fields	Flagstaff area aquifers	Operation and continued development of the City of Flagstaff domestic water supply.	Ongoing	<ul style="list-style-type: none"> <li>▪ Watershed</li> </ul>	Acre feet
Miscellaneous improvement projects along Highway 180	Highway 180 between Flagstaff and Snowbowl	Miscellaneous improvements increasing visibility, safety and speed limits.	1990 to 2000	<ul style="list-style-type: none"> <li>▪ Traffic</li> </ul>	N/A
Grand Canyon Traffic	Highway 180 between Flagstaff and the Grand Canyon	Seasonal (i.e., spring, summer and fall) traffic levels on Highway 180 attributable to attendance at the Grand Canyon.	Ongoing	<ul style="list-style-type: none"> <li>▪ Traffic</li> </ul>	ADT/AADT
Miscellaneous facilities and trail construction within Snowbowl's SUP area	Snowbowl SUP area	Construction of lifts, trails, buildings and parking areas between 1938 and present.	1938 to present	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Recreation</li> <li>▪ Visuals</li> <li>▪ Traffic</li> <li>▪ Noise</li> <li>▪ Vegetation</li> <li>▪ Wildlife</li> <li>▪ Soils</li> </ul>	
Summer events held at Snowbowl	Snowbowl SUP area	Occasional events (weddings, concerts and festivals) held at Snowbowl throughout the summer	Ongoing	<ul style="list-style-type: none"> <li>▪ Recreation</li> </ul>	N/A
Continued growth of the Phoenix metropolitan area	Regional	N/A	N/A	<ul style="list-style-type: none"> <li>▪ All</li> </ul>	N/A

**Table C-1  
Cumulative Effects Matrix  
Past, Present and Reasonably Foreseeable Future Projects**

<b>Project</b>	<b>Location</b>	<b>Description</b>	<b>Status</b>	<b>Potentially Affected Resource</b>	<b>Units of measure</b>
Improvements to Highway 180 in 1994	five miles of Highway 180 from Cheshire to Snowbowl	Clearing, wider shoulders and a turn-lane to specifically accommodate Snowbowl-related traffic and safety issues between Snowbowl Road and Flagstaff.	Complete	<ul style="list-style-type: none"> <li>▪ Traffic</li> </ul>	N/A
Historic traffic on Highway 180 related to dispersed snowplay and the Nordic Center	Greater Flagstaff area	Highway 180 from Flagstaff, north of Snowbowl Road	Continuing	<ul style="list-style-type: none"> <li>▪ Traffic</li> <li>▪ Recreation</li> </ul>	N/A
Patented mining claims	east slopes of the Peaks	Mines are experiencing erosion problems	Historic and present	<ul style="list-style-type: none"> <li>▪ Cultural</li> <li>▪ Soils</li> <li>▪ Wildlife</li> <li>▪ Visuals</li> </ul>	unknown

**Table C-2**  
**Development History Within the Snowbowl SUP Area: 1982-1999**

Year	Project	
1982	1979 EIS appeal process completed & Preferred Alternative approved for development master plan that included:	<ul style="list-style-type: none"> <li>▪ 206 acres of ski trails</li> <li>▪ Comfortable Carrying Capacity (CCC) of 2825</li> <li>▪ Parking of 8.1 acres</li> <li>▪ Base Lodge Capacity 1/3 of CCC or 940 seats</li> <li>▪ Approval for total of five chair lifts and one Poma</li> </ul>
1982	Hart Prairie Chairlift constructed.	
1982	Fairfield Communities purchases Snowbowl.	
1983	Construction of: Hart Prairie Lodge (14,000 sq. ft.), Sunset Chairlift and three ski trails totaling 26 acres.	
1986	Agassiz Chairlift replaced with new CTEC triple.	
1987	CNF Forest Plan approved; adopts Selected Alternative in 1979 EIS as management emphasis for Snowbowl.	
1988	Widening of Snowbowl Road and paving begins.	
1988	<i>Black Jack</i> (trail #17) constructed.	
1989	Snowbowl is listed for sale and continues to operate.	
1992	Fairfield Snowbowl sold to Arizona Snowbowl Limited Partnership. 40-year Special Use Permit issued.	
1993	Improvements to Hart Prairie lodge approved.	
1993	Categorical Exclusion signed for widening <i>Logjam</i> (trail #25).	
1994	Categorical Exclusion issued for miscellaneous improvements including: installing portable handle tow, replacing Hart Prairie Chairlift, new addition to Hart Prairie Lodge, new offices, and utility upgrades.	
1994	Completion of <i>Logjam</i> widening.	
1994	Master Concept Plan submitted, based on 1979 EIS.	
1995	Completion of Hart Prairie Lodge addition; ticket offices, retail store, drop off, ADA ramps, deck, and rental shop expansion.	
1997	(June) Construction of <i>Lava</i> (trail #41a) and <i>Volcano</i> (trail #43c) via Categorical Exclusion. Approval also includes hiking trail from <i>Spur Catwalk</i> (trail #27) to <i>Midway</i> (trail #24) and the widening of <i>Spur Catwalk</i> , which were not completed.	
1997	(October) Scoping letter sent to public notifying Snowbowl's intention to implement projects approved in 1979 EIS. Previously-approved projects to be analyzed under an EA.	
1997	(November) EA open house at Snowbowl.	
1997	(December) Second EA open house at City Hall, due to public outcry on proposal.	
1998	(February) Question of TCP arises and review of bulletin 38 by USFS, discussion on NHPA, SHPO, eligibility questions.	
1998	(February) Work on EA suspended.	

# **APPENDIX D**

## **MEMORANDUM OF AGREEMENT BETWEEN THE USDA FOREST SERVICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND THE ARIZONA STATE HISTORIC PRESERVATION OFFICER**

**MEMORANDUM OF AGREEMENT**  
between the  
**UNITED STATES DEPARTMENT OF AGRICULTURE, FOREST SERVICE**  
**Coconino National Forest**  
and the  
**ADVISORY COUNCIL ON HISTORIC PRESERVATION**  
and the  
**ARIZONA STATE HISTORIC PRESERVATION OFFICER**  
**REGARDING THE ARIZONA SNOWBOWL SKI AREA**  
**PROPOSED MODIFICATIONS**

WHEREAS, the Arizona Snowbowl Resort, Limited Partnership (ASR) has made a proposal regarding future development of the Arizona Snowbowl Ski Area (Snowbowl) within the confines of the U.S. Department of Agriculture, Forest Service (USFS), represented by the Coconino National Forest, has participated in consultation for the project, and has been invited to review and comment upon this agreement;

WHEREAS, the USFS proposes to authorize the development of the Snowbowl Ski Area as described in the Draft Environmental Impact Statement for the Arizona Snowbowl Facilities Improvements (February 2004); and

WHEREAS, the San Francisco Peaks (the Peaks) Traditional Cultural Property was determined eligible for nomination to the National Register of Historic Places in July, 2000, under 36 CFR 60.4(a) because of its association with traditional cultural practices and beliefs of living Native American communities that are rooted in their history and are important in maintaining the continuing cultural identity of their community; and

WHEREAS, the USFS has determined that the providing for development at Snowbowl within a Special Use Area (SUA) through the proposed plan may have an adverse effect on the San Francisco Peaks Traditional Cultural Property, and that such potential adverse effects include, but may not be limited to, impacts on the qualities attributed to the San Francisco Peaks by Indian Tribes and others; and,

WHEREAS, concern has been expressed by Tribal governments, organizations, and others about the cumulative impacts of the project and of other actions under USFS jurisdiction on the National Register qualities of the Peaks; and

WHEREAS, the USFS, to resolve the adverse effects of the project on historic properties, has consulted with the Arizona State Historic Preservation Officer (SHPO), who has concurred with the finding of adverse effect; and

WHEREAS, in accordance with 36 CFR Section 800.6(a)(1), the USFS has notified the Advisory Council on Historic Preservation (Council) of its adverse effect determination with specified documentation, and the Council has chosen to participate in the consultation pursuant to 36 CFR Section 800.6(a)(1)(iii); and,

WHEREAS, pursuant to 36 CFR 800.6(b), the USFS has consulted with the Pueblo of Acoma, the Dine' Medicineman's Association, the Fort McDowell Yavapai Nation, the Havasupai Tribe, the Hualapai Tribe, the Hopi Tribe, the Navajo Nation (including the Cameron, Coalmine, Dilcon, Gap-Bodaway, Leupp, Tolani Lake, and Tuba City

Chapters), the San Carlos Apache Tribe, the San Juan Southern Paiute Tribe, the Tonto Apache Tribe, the Yavapai-Apache Nation, the Yavapai-Prescott Tribe, the White Mountain Apache Tribe, and the Pueblo of Zuni (the Tribes), for which the San Francisco Peaks have religious and cultural significance, and, pursuant to 36 CFR 800.6(c), has invited the Tribes and the Arizona Snowbowl Resort to sign this Memorandum of Agreement (MOA) as concurring parties;

NOW, THEREFORE, the USFS, the Arizona SHPO, and the Council agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

### **I. STIPULATIONS APPLICABLE TO ALL ALTERNATIVES**

The USFS shall ensure, by its own actions or permit stipulations, that the following measures are carried out:

1. The USFS will complete a National Register nomination for the San Francisco Peaks as a Traditional Cultural Property for review by the Arizona SHPO and interested Tribes. The area designated as a TCP is inclusive of the Arizona Snowbowl SUA and encompasses 74,380.5 acres of Coconino National Forest lands. The Arizona SHPO and Tribes who hold the Peaks in particular reverence will review and comment on drafts of the nomination, prior to the final draft being sent to the Keeper.
2. The USFS will continue to consult on this undertaking with the Tribes who hold the Peaks in particular reverence in a collaborative and cooperative manner, with mutual respect for differing views and values. The USFS will notify the Tribes of any problems or situations with the potential to adversely impact resources or cause concern to the Tribes.
3. Implementation of any elements of this undertaking will not be authorized to proceed until stipulations have been assured, or are underway, and all responsibilities under Section 106 of the National Historic Preservation Act have been satisfied, as stipulated in this Memorandum of Agreement.
4. The USFS will work with the Tribes to provide periodic inspections by tribal representatives to examine the condition of existing shrines and other existing traditional cultural places on the Peaks.
5. The USFS will continue to guarantee traditional cultural practitioners access within and outside the SUA for traditional cultural uses, such as the collection of medicinal, ceremonial, and food plants. Additionally, such access will be protected during construction, subject to fire closures and other restrictions needed to protect resources and human safety. In such instances, access will be coordinated with the USFS by having traditional cultural practitioners contact the

USFS who will then notify the ASR of the requirements for access.

6. Should any plants of traditional importance be subsequently identified within the project area, the USFS will encourage and protect the natural regeneration of those plants when developing site-specific plans.
7. The USFS will continue to work with tribal liaisons and traditional cultural practitioners to ensure that current ceremonial activities conducted on the Peaks continue uninterrupted.
8. The USFS will continue to work with traditional cultural practitioners and tribal liaisons to identify existing shrines and other special places on the San Francisco Peaks and ensure these places are avoided or otherwise protected during the continued operation of the ski facilities and other USFS permitted activities. The USFS will not draw attention to these places, nor will it allow the ASR to draw attention to these places.
9. The USFS will ensure that the ASR does not advertise or market areas for out-of-bounds skiing that lie within the Kachina Peaks Wilderness and outside the Snowbowl Ski Area permit boundary. Out-of-bounds skiing will be discouraged and skiers will be encouraged to obtain a back country permit for skiing outside of the SUA in the Kachina Peaks Wilderness. The USFS and ASR will discourage others from advertising or promoting "out-of-bounds" skiing.
10. The USFS will protect confidential records, maps, and information about traditional cultural properties, special places, and practices on the Peaks and will provide this information to other USFS personnel, the ACHP, or the SHPO on a need-to-know basis only.
11. The USFS will continue to work with tribal liaisons and traditional cultural practitioners to identify current areas of particular cultural and religious importance on the Peaks and develop a plan for protection of these areas.
12. As logs become available through various activities at the ski area, they will continue to be offered to the Tribes for kiva and other traditional structures construction needs.
13. In the months when ski lifts and trails are closed to skiers, ASR will allow traditional cultural practitioners to use the ski lifts and trails without charge to access areas to conduct traditional cultural practices, provided the requested lift access is consistent with established operating hours for the summer Skyride program.

## II. ADDITIONAL STIPULATIONS APPLICABLE TO ALTERNATIVES 2 AND 3

The USFS shall ensure, by its own actions or permit stipulations, that the following measures are carried out:

1. The specific pipeline centerline will be field staked and reviewed by the USFS (in conjunction with tribal liaisons and traditional cultural practitioners) for any places of traditional cultural importance prior to the completion of final engineering and zoning.
2. The ASR is willing to work with the Tribes and USFS to develop a cultural center and will strive to recruit tribal members to work as interpreters. The USFS and ASR will work with the Tribes to determine appropriate topics and interpretive methods. Tribes and information pertinent to them will not be included if those tribes do not wish to be represented in such a center.
3. The USFS will continue to work with tribal liaisons and traditional cultural practitioners to ensure that current traditional practices and ceremonies conducted in the project area are unimpeded.
4. Should a new disturbance area for facilities identified in the EIS be needed once the project is underway, the USFS will ensure that a survey of all un-surveyed areas of proposed ground disturbance prior to project implementation will occur, and identify any cultural resources to be avoided by construction activities. The USFS will also undertake appropriate consultation with the SHPO and Tribes when determining survey coverage, site eligibility, effect determinations, and mitigation related to particular construction activities.
5. The USFS will schedule additional meetings and on-site inspections as requested by the Tribes.
6. Should snowmaking be approved, the USFS will share with the Tribes any monitoring reports it or ASR authorizes or receives from approved outside contractors regarding water quality and the effects of additional moisture on plants, animals, and the terrain, upon tribal requests to receive such reports.
7. Should snowmaking be approved, the USFS will continue to consult and work with the Tribes to minimize impacts to traditional values, to the extent possible, caused by snowmaking and the use of reclaimed water.
8. The USFS will provide reports to the Tribes documenting project implementation monitoring, conservation, and protection activities related to all resources, upon tribal requests to receive such reports.
9. To the extent practicable, the final location of new ski trails will take advantage of previously disturbed areas or openings such as meadows or beetle kill areas.

### III. DURATION

This agreement will be null and void if its terms are not carried out within ten years from the date of execution of the Agreement and approval of the project. Prior to such time, the USFS may consult with the other signatories to reconsider the terms of the agreement and amend in accordance with Stipulation VII below.

### IV. MONITORING AND REPORTING

Over the first ten years following the execution of this agreement and approval of the project, or until construction is complete, the USFS shall provide all parties to this agreement an annual summary report detailing work undertaken pursuant to its terms. Such report shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in the USFS's efforts to carry out the terms of this agreement. Failure to provide such summary reports may be considered non-compliance with the terms of this MOA, pursuant to Stipulation VII, below.

All work related to inventory, evaluation, monitoring, treatment, and management of cultural and historic properties under the terms of this Agreement shall be conducted or directly supervised by appropriately trained persons who meet the Secretary of the Interior's Professional Qualifications Standards (36 CFR 61, Appendix A) for the particular fields of study required by those activities. The USFS will provide project oversight and/or will require ASR to provide a consultant acceptable to the USFS and SHPO to conduct such oversight for the purpose of implementing and monitoring the terms of this Agreement. Inspections will occur commensurate with the pace of construction activities and annually thereafter. This provision does not apply to cultural assessment work conducted or authorized by the Tribes. Tribes will provide the USFS copies of any reports prepared of their own assessment of the inventory, evaluation, monitoring, treatment, and management of cultural and historic properties under the terms of this Agreement.

All studies authorized by the USFS or ASR related to inventory, evaluation, monitoring, treatment, and management of cultural and historic properties, and under the terms of this Agreement, shall meet professional standards, as outlined in the National Park Service's *Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines*, *National Register Bulletin 38*, and other guidance published by the National Park Service, SHPO, and the Advisory Council on Historic Preservation.

The USFS shall ensure that all technical documents prepared to satisfy the terms of this Agreement are responsive to contemporary professional standards, including the Secretary of the Interior's *Standards for Documenting Historic Properties* and the SHPO's 1999 (or most current revision), *Administrative Procedure: Documentation Submitted for Review in Compliance with Historic Preservation Laws*.

## V. CONFIDENTIALITY

The USFS shall ensure that all sensitive information, is managed in such a way that historic properties, traditional cultural values, and sacred offerings are not compromised, to the fullest extent available under the law.

Signatory and concurring parties to this Agreement shall safeguard information about the nature and location of prehistoric, historic, and traditional cultural properties and activities on the San Francisco Peaks, and not reveal that information to any additional parties, pursuant to Section 304 of the National Historic Preservation Act, without the express permission of the USFS and the appropriate tribe(s).

## VI. DISPUTE RESOLUTION

Should any Signatory to this agreement object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, the USFS shall consult with the objecting Signatory(ies) to resolve the objection and notify SHPO of the objection. If the USFS determines within 30 days that such objection(s) cannot be resolved, the USFS will:

- A. Forward all documentation relevant to the dispute to the Council, in accordance with 36 CFR 800.2(b)(2). Upon receipt of adequate documentation, the Council shall review and advise the USFS on the resolution of the objection within 30 days. Any comment provided by the Council, and all comments from the Signatories to the MOA, will be taken into account by the USFS in reaching a final decision regarding the dispute.
- B. If the Council does not provide comments regarding the dispute within 30 days after receipt of adequate documentation, the USFS may render a decision regarding the dispute. In reaching its decision, the USFS will take into account all comments regarding the dispute from the Signatories to the MOA.
- C. The USFS's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged. The USFS will notify all parties of its decision in writing before implementing that portion of the undertaking subject to dispute under this stipulation. The USFS decision will be final.

## VII. AMENDMENTS AND NON-COMPLIANCE

If any Signatory to this MOA determines that its terms will not or cannot be carried out, or that an amendment to its terms must be made, that Signatory shall immediately consult with the other Signatories to develop an amendment to this MOA pursuant to 36 CFR 800.6(c)(7) and 800.6(c)(8). The amendment will be effective on the date a copy signed by all of the original Signatories is filed with the Council. If the Signatories cannot agree

to appropriate terms to amend the MOA, any Signatory may terminate the agreement in accordance with Stipulation VIII, below.

**VIII. TERMINATION**

If the MOA is not amended following the consultation set out in Stipulation VII, it may be terminated by any Signatory. Within 30 days following termination, the USFS shall notify the Signatories if it will initiate consultation to execute a new MOA with the Signatories under 36 CFR 800.6 (c)(1) or request the comments of the Council under 36 CFR 800.7(a) and proceed accordingly.

**IX. EXECUTION**

Execution of this Memorandum of Agreement by the USFS and Arizona SHPO, Council, concurring tribes, and ASR, and the submission of documentation and filing of this MOA with the Council, pursuant to 36 CFR Section 800.6(b)(1)(iv), is evidence that the USFS has taken into account the effects of this undertaking on historic properties and afforded the Council an opportunity to comment.

**SIGNATORIES:**

United States Department of Agriculture-Forest Service

*for* Lucia M. Turner 12/16/2004  
Harv Forsgren Date  
Regional Forester, U.S.D.A. Forest Service, Southwestern Region

Arizona State Historic Preservation Officer

James W. Garrison 1/20/05  
James W. Garrison Date  
State Historic Preservation Officer

Advisory Council on Historic Preservation

John Fowler 2/7/05  
John Fowler Date  
Executive Director

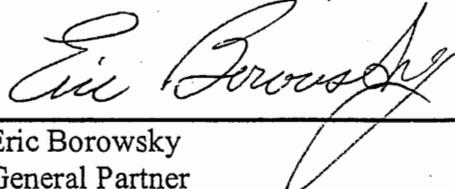
**CONCURRING PARTIES:**

Pueblo of Acoma

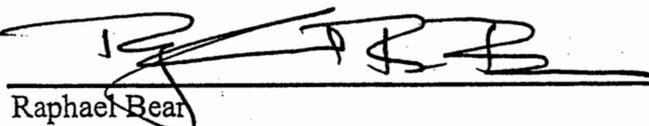
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Fred Vallo Date  
Governor

Arizona Snowbowl Resort, Limited Partnership

 12/7/04  
Eric Borowsky Date  
General Partner

The Fort McDowell Yavapai Nation

 11-24-04  
Raphael Bear Date  
President

The Havasupai Tribe

---

Linda Mahone Date  
Chairman

The Hopi Tribe

---

Wayne Taylor Date  
Tribal Chairman

The Hualapai Tribe

*Charles Vaughn*

*12-10-04*

Charles Vaughn  
Chairman

Date

The Navajo Nation

Joe Shirley, Jr.  
President

Date

The Navajo Nation, Cameron Chapter

Teddy Bedonie  
President

Date

The Navajo Nation, Coalmine Chapter

Charlie McCabe  
President

Date

The Navajo Nation, Dilcon Chapter

Carol Davis  
President

Date

The Navajo Nation, Gap-Bodaway Chapter

---

Dorothy Lee  
President

Date

The Navajo Nation, Leupp Chapter

---

Alex Riggs, Sr.  
President

Date

The Navajo Nation, Tolani Lake Chapter

---

Keith Begay  
President

Date

Navajo Nation, Tuba City Chapter

---

Frank Bilagody  
President

Date

Dine' Medicineman's Association

---

Anthony Lee  
President

Date

The San Carlos Apache Tribe

---

Kathleen Wesley-Kitcheyan  
Chairwoman

Date

The San Juan Southern Paiute Tribe

---

Johnny Murphy Lehi, Sr.  
President

Date

The Tonto Apache Tribe

---

Ivan Smith  
Chairman

Date

The White Mountain Apache Tribe

---

Dallas Massey, Sr.  
Chairman

Date

The Yavapai-Apache Nation

---



Jamie Fullmer  
Chairman

02/07/05  
Date

Yavapai-Prescott Indian Tribe



Ernest Jones, Sr.  
President

Date

Pueblo of Zuni

Arlen P. Quetawki, Sr.  
Governor

Date

# Appendix R

## Annex X

### **United States of America: Situation of the Native Americans in relation to artificial snowmaking from recycled wastewater in the San Francisco Peaks**

USA 1/2011

1. In a communication of 10 January 2011, the Special Rapporteur on the rights of indigenous peoples, James Anaya, called the attention of the Government of the United States of America to information received relating to the proposed use of recycled wastewater for a commercial ski operation the San Francisco Peaks (or the “Peaks”), a mountainous area that is sacred to several Native American tribes. The full text of this communication can be accessed from the electronic version of the joint communications report (A/HRC/18/51), which is available on the web site of the Human Rights Council. In his communication the Special Rapporteur requested a response within 60 days. He regrets that there is no record of a response in the files of the Office of the High Commissioner for Human Rights at the time of finalization of this report. In the absence of a response, the Special Rapporteur developed the observations below, which include an evaluation of the situation and recommendations to the Government of the United States. These observations were transmitted to the Government on 6 July 2011.

#### **Background**

2. The San Francisco Peaks are located north of the city of Flagstaff, Arizona within land that is administered by the United States Forest Service as part of the Coconino National Forest. According to information received, the Arizona Snowbowl Resort Limited Partnership (“Snowbowl”) owns and operates a commercial ski operation in the western flank of the San Francisco Peaks, under a 777-acre special use permit issued by the Forest Service. In 2002 Snowbowl filed an application for expansion of its facilities, including a request for approval to make snow from treated sewage effluent. In February 2005, the Forest Service issued its Final Environmental Impact Statement and Record of Decision approving the proposed artificial snowmaking from recycled waste wastewater, the construction of a pipeline from Flagstaff to carry the treated effluent from Flagstaff and improvement of guest service facilities. Several Native American tribes and organizations have vigorously opposed the Forest Service’s decision. To them, according to sources, the sacredness of the San Francisco Peaks depends on the purity of the water and plant life in the area, which allegedly will be contaminated if wastewater is introduced into the Peaks through the planned artificial snowmaking. However, their federal court lawsuit to challenge the approval of artificial snowmaking on, inter alia, religious freedom grounds was unsuccessful.<sup>1</sup>

#### **Observations of the Special Rapporteur**

3. On the basis of information he has received and gathered on this situation, which he considers to be in material respects undisputed, the Special Rapporteur offers the following

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<sup>1</sup> See *Navajo Nation v. United States Forest Service*, 535 F.3d 1058 (9<sup>th</sup> Cir. 2008), cert. denied, 129 S.Ct. 2763 (2009).

observations, in the hope that they will serve to promote appropriate action by the United States to address the human rights matters raised.

4. The extensive documentation by the Government and federal courts in relevant proceedings makes clear that the San Francisco Peaks are sacred to several Native American tribes, and that the presence of the ski operation and now the initiative to make artificial snow from recycled wastewater on the Peaks offend the religious beliefs and practices of members of these tribes. Apart from the provisions of domestic law that have been applied by the courts to examine this situation, international standards, including those based on human rights treaties to which the United States is a party to and the Declaration on the Rights of Indigenous Peoples, require adequate consultation and close scrutiny for any action that affects the sacred sites and religious practices of indigenous peoples. The United States should engage in a comprehensive review of its relevant policies and actions to ensure that they are in compliance with these international standards in relation to the San Francisco Peaks and other sacred sites of Native Americans, and should take appropriate remedial action. In the paragraphs below, the Special Rapporteur elaborates upon these points.

*The effects of the planned snowmaking on Native American religion*

5. The Special Rapporteur is aware that the development of the Snowbowl ski area and the recent plans for expanding its facilities, including for artificial snowmaking with recycled wastewater, have proceeded with extensive examination and documentation by the Government and federal courts of the impacts on Native American culture and religion. Required environmental impact studies and the legal challenges to the federal permits for Snowbowl's expansion on the San Francisco Peaks have prompted this examination and documentation, which make abundantly clear the sacred character of the Peaks to the tribes, the affront on their religious beliefs and the tribes' opposition to the planned snowmaking.

6. The Final Environmental Impact Statement compiled by the U.S. Forest Service to assess the proposal for artificial snowmaking and other additions to Snowbowl's operations on the Peaks included the following observations:

The San Francisco Peaks are sacred to at least 13 formally recognized tribes that are still actively using the Peaks in cultural, historic, and religious contexts. A central underlying concept to all tribes for whom the Peaks are especially important is the recognition that the San Francisco Peaks are a source of water in the form of rain, springs, and snow. It is believed that the Peaks were put there for the people and it is therefore the peoples' duty to protect it for the benefit of the world... [N]ine significant qualities... characterize the Peaks for the tribes. These qualities include:

- They are the abode of deities and other spirit beings.
- They are the focus of prayers and songs whereby humans communicate with the supernatural.
- They contain shrines and other places where ceremonies and prayers are performed.
- They are the source of water.
- They are the source of soil, plant, and animal resources that are used for ceremonial and traditional purposes.
- They mark the boundaries of traditional or ancestral lands.
- They form a calendar that is used to delineate and recognize the ceremonial season.

- They contain places that relate to legends and stories concerning the origins, clans, traditions, and ceremonies of various Southwestern tribes.
- They contain sites and places that are significant in the history and culture of various tribes.

Two examples of the cultural significance of the San Francisco Peaks are the Hopi and Navajo peoples' religious and spiritual connections to the Peaks, as discussed below.

#### Hopi

Hopi clans migrated through the San Francisco Peaks (called *Nuvatukyaovi*, "High Place of Snow"), made settlements nearby, and placed shrines on the Peaks. All of the religious ceremonies focus on *Nuvatukyaovi* and demonstrate the sacred relationship of the Peaks to the Hopi people. The history of clan migrations through the area continue to be related, discussed, and passed on from generation to generation. The Peaks contain clan and society shrines, and gathering areas for medicinal and religious use. Hopi religious leaders visit the Peaks annually. The San Francisco Peaks are the spiritual essence of what Hopis consider the most sacred landscapes in Hopi religion. They are the spiritual home of the *Katsinam*, significant religious beings that all Hopis believe in, and are therefore, sacred. The ceremonies associated with the Peaks, the plants and herbs gathered on the Peaks, and the shrines and ancestral dwellings located in the vicinity of the Peaks are of central importance to the religious beliefs and traditions that are the core of Hopi culture....

#### Navajo

The Navajo people believe that the Creator placed them on land between four sacred mountains: Blanca Peak in Colorado, Mount Taylor in New Mexico, the San Francisco Peaks in Arizona, and Hesperus Peak in Colorado. According to their own history, the Navajos have always lived between these mountains. Each of the four mountains is associated with a cardinal direction, symbolizing the boundaries of the Navajo homeland. For the Navajo, the Peaks are the sacred mountain of the west, *Doko'oo'sliid*, "Shining on Top," a key boundary marker and a place where medicine men collect soil for their medicine bundles and herbs for healing ceremonies. Navajo traditions tell that San Francisco Peak was adorned with *Diichilí*, Abalone Shell, Black Clouds, Male Rain, and all animals, besides being the home of *Haashch'éélt'i'i* (Talking God), *Naada'algaii* 'Ashkii (White Corn Boy), and *Naadá 'Altsoii 'At'ééd* (Yellow Corn Girl). The sacred name of the Peaks is *Diichilí Dzil* – (Abalone Shell Mountain). The Navajo people have been instructed by the Creator never to leave their sacred homeland. *Dook'o'osliid* and the other three sacred mountains are the source of curing powers. They are perceived as a single unit, such as the wall of a hogan, or as a particular time of a single day. *Dook'o'osliid* is seen as a wall made of abalone shell and stone, with mixed yellow and white bands....

#### Environmental Consequences

The 1975 Hopi Tribal Resolution noted that there are numerous medicinal herbs and other plants at several levels of the Peaks that are used to treat the ailments of the Hopi people. The Forest Service is unaware of any plants or other natural resource material used by the Hopi within the Snowbowl ... area; however, the addition of new trails, increased parking, and the potential for additional annual visitation within the ... area and the San Francisco Peak themselves causes concern among the Hopi and other tribes that their areas of traditional use would be impacted. Specifically,

the Hopi make pilgrimages to shrines and use the Peaks for religious reasons such as gathering evergreens and herbs and delivering prayer feathers.

Although the reclaimed water proposed for use in snowmaking fully meets both the Federal and Arizona state water quality standards, it is believed that trace levels of unregulated residual constituents within reclaimed water (e.g., pathogens, pharmaceuticals, hormones, etc.) could negatively impact the spiritual and medicinal purity of resident flora on the Peaks. Several specific concerns have been raised about the impact of snowmaking on the spiritual values of the Peaks.

An additional concern is that some of the reclaimed water once passed through hospitals or mortuaries could carry the spirits of the dead with it. Those spirits, as part of the water draining from the Peaks, would then infiltrate plants, thus affecting their ritual purity.

From both a Hopi and Navajo perspective, any plants that would come into contact with reclaimed water would be contaminated for medicinal purposes, as well as for use in ceremonies needed to perpetuate their cultural values....

The Hopi believe that the *Katsinam* are responsible for moisture and that the installation of snowmaking technology within the SUP [special use permit] area would alter the natural processes of the San Francisco Peaks and the responsibilities of the *Katsinam*.

The Hopi, Navajo, and other tribes have existed in the region of the San Francisco Peaks for thousands of years and have developed their cultures and religious institutions around the natural and cultural landscape of the San Francisco Peaks. Traditions, responsibilities, and beliefs that delineate who they are as a people, and as a culture, are based on conducting ritual ceremonies they are obligated to perform as keepers of the land. These obligatory activities focus on the Peaks, which are a physical and spiritual microcosm of their cultures, beliefs, and values. Snowmaking and expansion of facilities, especially the use of reclaimed water, would contaminate the natural resources needed to perform the required ceremonies that have been, and continue to be, the basis for the cultural identity for many of these tribes.<sup>2</sup>

7. The records of the proceedings in federal court litigation concerning Snowbowl's ski operations on the San Francisco Peaks reinforce the above assessment of the sacred character of the Peaks, and of the effects on Native American religion of the planned snowmaking and other modifications, on top of the effects of the existing ski facilities.<sup>3</sup> Even while holding that the Government's approval of the Snowbowl modifications did not violate federal law, the Ninth Circuit Court of Appeals, sitting en banc, acknowledged the sacred character of the San Francisco Peaks and that "[t]o the [tribes], the [presence of recycled wastewater] will desecrate a sacred mountain and will decrease the spiritual fulfillment they get from practicing their religion on the mountain".<sup>4</sup>

8. Despite such acknowledgment, the federal appellate court held that this impact on religion is not of the kind that could lead to finding a violation of the federal Religious

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<sup>2</sup> USDA Forest Service, Arizona Snowbowl Facilities Improvements Final Environmental Impact Statement, Vol. 1 (2005), pp. 3-7 to 3-11, 3-16 to 3-18 (hereinafter "FEIS").

<sup>3</sup> See *Navajo Nation v. United States Forest Service*, 408 F. Supp. 2d 866 (D. Ariz., 2006), aff'd in part and rev'd in part, 479 F.3d 1024 (9<sup>th</sup> Cir. 2008); aff'd on rehearing, 535 F.3d 1058 (9<sup>th</sup> Cir. 2008), cert. denied, 129 S.Ct. 2763 (2009); *Wilson v. Block*, 708 F.2d 735 (D.C. Court of Appeals, 1983), cert. denied 463 U.S. 958 (1983).

<sup>4</sup> *Navajo Nation v. United States Forest Service*, 535 F. 3d 1058, 1070 (9<sup>th</sup> Cir. 2008) (en banc), cert. denied, 129 S.Ct. 2763 (2009).

Freedom Restoration Act (RFRA). For the Ninth Circuit Court of Appeals, RFRA only protects against government action that actively coerces Native American religious practitioners into violating their religious beliefs or that penalizes their religious activity with loss or threat loss of government benefits. Along with finding the absence of such conditions, the court pointed to the lower court determination that in fact no plants or religious shrines would be physically affected by the snowmaking and that practitioners would continue to have access to the mountain, including the ski area, to conduct religious activities.<sup>5</sup> Neither the appellate nor lower court questioned, however, that for Native American religious practitioners from several tribes, snowmaking with recycled wastewater in Snowbowl would be a desecration of a sacred mountain, even if federal and state environmental standards are met and they continue to have access to the mountain along with skiers.

9. It is not the purpose of the Special Rapporteur to review or challenge the application of domestic law by the United States judicial system. Rather, the Special Rapporteur means to draw attention to the relevant international standards that bind the United States and that should guide action by Government actors, even when certain decisions may be permissible under domestic law. The Special Rapporteur respectfully reminds the United States that the judicial applications and interpretations of the legal protections for Native American religion available under domestic law do not pose any legal barrier to Government action in accordance with a higher standard.

*The lack of indigenous agreement or consent to artificial snowmaking on a sacred mountain*

10. In its Record of Decision to permit snowmaking from recycled wastewater and other modifications to the ski operation on the San Francisco Peaks, the United States Forest Service acknowledged that “[o]ver the years the tribes have continued to state their opposition to development at Snowbowl”, as they did in 1979 when the Forest Service was considering the option of closing down the ski operation but decided instead to allow it to expand.<sup>6</sup> The Forest Service reported extensive consultations with the tribes about the most recent plans for Snowbowl enhancements. “In all 200 phone calls were made, 41 meetings were held, and 245 letters were sent to Tribal officials, tribal historic preservation offices, traditional tribal leaders/practitioners, and the general tribal public”.<sup>7</sup>

11. The Forest Service confirms that “[a]s with the decision in 1979, the proposal to improve the facilities at the Snowbowl has been met with adamant opposition from the tribes, even though there have been changes in laws, improvements in working relationships and successes in working together on other projects ...”.<sup>8</sup> Despite this adamant opposition by the tribes based on their religious practices and beliefs, the Forest Service decided to approve the artificial snowmaking and other ski area modifications, bringing into question the United States’ adherence to international standards to which it has expressed its commitment.

Article 19 of the Declaration on the Rights of Indigenous Peoples provides:

States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free

<sup>5</sup> See *Ibid.*, pp. 1063, 1070.

<sup>6</sup> USDA Forest Service, Record of Decision – Arizona Snowbowl Facilities Improvements Final Environmental Impact Statement and Forest Management Plan #21 (February 2005), p.3 (hereinafter “FEIS-Record of Decision”).

<sup>7</sup> *Ibid.*, p. 9.

<sup>8</sup> *Ibid.*, p. 3.

prior and informed consent before adopting and implementing any legislative measure that affects them.

12. This standard of consultation and consent is a corollary of the right to self-determination and the cultural rights of minorities that are affirmed, respectively, in articles 1 and 27 of the International Covenant on Civil and Political Rights, as manifested by the jurisprudence of the Human Rights Committee.<sup>9</sup> Additionally, it is instrumental to implementing the principles of non-discrimination found in the International Convention on the Elimination of All Forms of Racial Discrimination, as instructed by the Committee on the Elimination of Racial Discrimination (CERD).<sup>10</sup> In its General Recommendation 23, CERD calls upon State parties to “[e]nsure that members of indigenous peoples have equal rights in respect of effective participation in public life and that no decisions directly relating to their rights and interests are taken without their informed consent ...”.<sup>11</sup>

13. Under the cited human rights treaties, to which the United States is a party, and the Declaration on the Rights of Indigenous Peoples, which the United States has endorsed, consultations should take place with the objective of achieving agreement or consent by indigenous peoples to decisions that may directly affect them in significant ways, such as decisions affecting their sacred sites. Simply providing indigenous peoples with information about a proposed decision and gathering and taking into account their points of view is not sufficient in this context. Consultation must occur through procedures of dialogue aimed at arriving at a consensus.<sup>12</sup>

14. It is far from clear that the consultations with the tribes about the artificial snowmaking and other ski area modifications were undertaken through procedures involving negotiations toward an agreed-upon outcome. It appears instead that the consultations were more in the nature of dissemination of information about the Snowbowl development plans and gathering of views about those plans, within a process of government decision making that did not depend on agreement or consent on the part of the tribes.<sup>13</sup> In any case, it is beyond question that the tribes have not agreed or consented to the Snowbowl modifications; indeed they have actively opposed them.

15. In the absence of consent by indigenous peoples to decisions that affect them, States should act with great caution. At a minimum, States should ensure that any such decision does not infringe indigenous peoples’ internationally-protected collective or individual rights, including the right to maintain and practice religion in relation to sacred sites. It is

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<sup>9</sup> See Report of the Special Rapporteur on the situation of human rights and fundamental freedoms of indigenous people, James Anaya, A/HRC/12/34 (15 July 2009), paras. 40- 41 (hereinafter “2009 annual report of the Special Rapporteur”).

<sup>10</sup> *Ibid.*, para. 40.

<sup>11</sup> A/52/18, annex V at para. 4(d).

<sup>12</sup> For a discussion of the duty of States to consult with indigenous peoples affecting them, see 2009 annual report of the Special Rapporteur, *supra*, paras. 36-74.

<sup>13</sup> The Forest Service did develop a Memorandum of Agreement (MOA) related to adverse effects of the proposed ski area modifications, as a result of the nomination of the San Francisco Peaks for inclusion in the National Register of Historic Places, and it invited the tribes to sign the MOA as concurring parties. The Forest Service reported that four of the affected tribes did sign, while the others (including Navajo and Hopi) declined to do so or did not respond. FEIS-Record of Decision, pp. 26-27. The MOA does not embody or propose agreement to the ski area modifications but rather provides for a series of measures calculated to mitigate adverse effects of the development of the ski area and to protect the cultural values associated with the San Francisco Peaks. See FEIS, Appendix D. While most of the affected tribes did not sign the MOA, it is not clear that any of them were involved in developing its terms, other than indirectly through the consultations reported by the Forest Service.

therefore necessary in this case to assess the nature of the right of Native Americans to practice their religious traditions under international human rights standards and the scope of permissible restriction of the right.

*International standards protecting the right of Native Americans to maintain and practice their religious traditions*

16. Under relevant sources of international law, the United States has a duty to respect and protect Native American religion, a duty that goes beyond not coercing or penalizing Native American religious practitioners. The right of indigenous peoples to maintain and practice their distinctive religions, including in relation to sacred areas, is protected by the International Covenant on Civil and Political Rights and the International Convention on the Elimination of All Forms of Racial Discrimination. Further, it is recognized specifically by the United Nations Declaration on the Rights of Indigenous Peoples, which provides an authoritative statement of standards that States should follow in keeping with their obligations under these and other human rights treaties, as well as under the human rights clauses of the United Nations Charter. Any restriction on the right of indigenous peoples to maintain and practice their religious traditions, not just those involving active coercion or penalties, is subject to the most exacting scrutiny under these international instruments.

17. The right to practice or manifest religion or belief is protected under Article 18(1) of the International Covenant on Civil and Political Rights, which states that “[e]veryone shall have the right to freedom of thought, conscience and religion [which includes] freedom ... either individually or in community with others and in public or private, to manifest his religion or belief in worship, observance, practice and teaching.” State parties have a duty to take the measures necessary to ensure the effective enjoyment of this and other rights recognized the Covenant (Art. 2(2)). In its Article 27, which is also of relevance to indigenous peoples, the Covenant gives special consideration to the rights of minorities whose cultural and religious traditions differ from those of the majority. Article 27 states, “Persons belonging to minorities shall not be denied the right, in community with the other members of their group, to enjoy their own culture, to profess and practise their own religion ...”. In its interpretation of State parties’ obligations under Article 27, the Human Rights Committee, in its General Comment 23 affirmed that “positive measures by States may also be necessary to protect the identity of a minority and the rights of its members to enjoy and develop their culture and language and to practise their religion, in community with other members of the group”.<sup>14</sup>

18. Article 5 of the International Convention on the Elimination of All Forms of Racial Discrimination provides that State parties are to “guarantee the right of everyone ... to equality before the law, notably in the enjoyment of ...[t]he right to freedom of thought, conscience and religion.” In interpreting and applying this Convention, CERD has observed the need to take into account the particular characteristics of groups in order to achieving effective equality in the enjoyment of their human rights. Otherwise, “[t]o treat in an equal manner persons or groups whose situations are objectively different will constitute discrimination in effect, as will the unequal treatment of persons whose situations are objectively the same.”<sup>15</sup> Accordingly, in its General Recommendation 23, CERD has noted the distinctive characteristics of indigenous peoples in light of their histories and cultures, and has called upon States to take particular measures to protect their rights, including

<sup>14</sup> CCPR/C/21/Rev.1/Add.5, para. 6(2).

<sup>15</sup> CERD General Recommendation 32: Special Measures, para. 8.

measures to “[e]nsure that indigenous communities can exercise their rights to practise and revitalize their cultural traditions and customs ...”.<sup>16</sup>

19. The Declaration on the Rights of Indigenous Peoples, which reinforces the call to ensure for indigenous peoples the enjoyment of fundamental human rights historically denied to them, for its part affirms that “[i]ndigenous peoples have the right to manifest, practice, develop and teach their spiritual and religious traditions, customs and ceremonies; the rights to maintain, protect, and have access in privacy to their religious and cultural sites” (Art. 12). Additionally, Article 25 of the Declaration provides that indigenous peoples’ right to “maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories ... and to uphold their responsibilities to future generations in this regard.” The Declaration thus recognizes that, for indigenous peoples, the ability to effectively practice and manifest their religion and beliefs depends many times on the protection of and access to sites of particular religious and cultural significance. Consequently, the duty of States to ensure on an equal basis the right to the free exercise of religion includes that duty to adopt safeguards for the exercise of indigenous religious traditions in connection with sacred sites.

*Permissible limitations on the right to maintain and practice religion*

20. The international law duty of States to ensure the exercise by indigenous peoples of their religious traditions extends to safeguarding against any meaningful limitations to that exercise, not just limitations that entail coercion to act against one’s religious beliefs or penalties for doing so. Under Article 18(3) of the Covenant on Civil and Political Rights, “Freedom to manifest one’s religion or beliefs may be subject only to such limitations as prescribed by law and are necessary to protect public safety, order, health or morals, or the fundamental rights and freedoms of others.” With this standard there is no qualification on the kind of limitation or restriction that must undergo examination for justification on the basis of the stated purposes. Under the plain language of Article 18 of the Covenant, *any* clearly observable limitation that makes for a meaningful restriction on the exercise of religion is subject to scrutiny.

21. The process of snowmaking from reclaimed sewage water on the San Francisco Peaks undoubtedly constitutes a palpable limitation on religious freedom and belief, as clearly indicated by the U.S. Forest Service’s Final Environmental Impact Statement. This limitation exists even assuming minimal physical environmental degradation as a result of the snowmaking. It bears remembering that the Ninth Circuit Court of Appeals acknowledged that the effect of the proposed use of reclaimed wastewater would constitute a desecration of the affected indigenous peoples’ religion.<sup>17</sup> The religious freedom at stake is not simply about maintaining ceremonial or medicinal plants free from adverse physical environmental conditions or about physical access to shrines within the Peaks. More comprehensively, it is about the integrity of entire religious belief systems and the critical place of the Peaks and its myriad qualities within those belief systems.

*Is the limitation on Native American religion necessary to achieve a valid public purpose or protect the human rights of others?*

22. It may be concluded without much difficulty that the limitation on Native American religion resulting from the decision of the U.S. Forest Service to permit the artificial snowmaking is “prescribed by law”, in the sense that it is pursuant to the Forest Service’s authority and legally prescribed procedures for managing the lands around the San

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<sup>16</sup> CERD/C/51/Misc.13/Rev.4, para. 4(d)(e)).

<sup>17</sup> See *Navajo Nation*, 535 F. 3d at 1070.

Francisco Peaks. The question remains, however, whether the limitation from that decision is “necessary to protect public safety, order, health or morals, or the fundamental rights and freedoms of others”, as stipulated by Article 18(3) of the International Covenant on Civil and Political Rights. This question in turn entails two inquiries: first, whether an adequate purpose is being pursued and, second, whether the limitation on Native American religion is necessary to achieve that purpose.

23. As to the first question, whether there is a sufficient purpose within the terms of article 18(3) of the Covenant, the Human Rights Committee in its General Recommendation 22 has explained that this provision “is to be strictly interpreted: restrictions are not allowed on grounds not specified there... Limitations may be applied only for those purposes for which they were prescribed”.<sup>18</sup> It is far from apparent how the decision to permit snowmaking by a private recreational ski facility is in furtherance of one of the specified public purposes – public safety, order, health or morals – or the human rights of others. In its Record of Decision on the artificial snowmaking and other modifications to the ski area, the Forest Service explained that “[d]ownhill skiing is an important component of the recreation opportunities offered by National Forests, and the Forest Service and the ski industry have forged a partnership to provide recreational opportunities on [National Forest Service] lands.”<sup>19</sup> In the view of the Forest Service, “the overall benefits of providing stable winter recreational opportunities for the public and the community... merits [the] selection” of the proposed use of recycled wastewater for snowmaking operations.<sup>20</sup> In this connection, the Forest Service considered the financial viability of Snowbowl to be a factor: “Snowbowl’s ability to maintain or improve its current level of service and endure the business conditions caused by unreliable snowfall is questionable... [Therefore] the installation and operation of snowmaking infrastructure... will enable a reliable and consistent operating season, thereby helping to stabilize the Snowbowl’s viability”.<sup>21</sup>

24. Even assuming that a sufficient purpose could be discerned, it is left to be determined whether the limitation on religion arising from the artificial snowmaking is necessary for that purpose, necessity being in significant part a function of proportionality. As stated by the Human Rights Committee, “[l]imitations ... must be directly related and proportionate to the specific need on which they are predicated”.<sup>22</sup> An assessment of necessity and proportionality requires examination of the nature and severity of the limitation on religion, in relation to the identified valid purpose and the manner in which the purpose is being pursued. In this respect as well, it is far from readily apparent how the limitation on Native American religion imposed by the planned snowmaking can be justified.

25. In determining necessity and proportionality, there must be due regard for the significance of the San Francisco Peaks in the religious traditions of the tribes, the desecration that the artificial snowmaking signifies, and the cumulative effect of that desecration. The artificial snowmaking simply builds on what already was an affront to religious sensibilities: the installation of the ski area in the first place and its gradual expansion. In its Final Environmental Impact Statement, the Forest Service noted the past, present and potential future cumulative effects of the ski operation, with its expansion and upgrades, on the cultural resources in the area.<sup>23</sup> The cumulative effects on Native

<sup>18</sup> CCPR/C/21/Rev.1/Add.4, para. 8.

<sup>19</sup> FEIS-Record of Decision, p. 23.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid., p. 24.

<sup>22</sup> CCPR/C/21/Rev.1/Add.4, para. 8.

<sup>23</sup> FEIS, supra, at 3-25.

American religion of the expansions and upgrades of the ski operation, and not just the added effects of the snowmaking, must be found necessary and proportionate in relation to some sufficient purpose. It is highly questionable that the effects on Native American religion can be justified under a reasonable assessment of necessity and proportionality, if the purpose behind the Government decision to permit the enhancements to the ski operation is none other than to promote recreation.

*Recommendations*

26. On the basis of the foregoing, the Special Rapporteur respectfully recommends that the United States Government engage in a comprehensive review of its relevant policies and actions to ensure that they are in compliance with international standards in relation to the San Francisco Peaks and other Native American sacred sites, and that it take appropriate remedial action.

27. In this connection, the Government should reinitiate or continue consultations with the tribes whose religions practices are affected by the ski operations on the San Francisco Peaks and endeavor to reach agreement with them on the development of the ski area. The Government should give serious consideration to suspending the permit for the modifications of Snowbowl until such agreement can be achieved or until, in the absence of such an agreement, a written determination is made by a competent government authority that the final decision about the ski area modifications is in accordance with the United States' international human rights obligations.

28. The Special Rapporteur wishes to stress the need to ensure that actions or decisions by Government agencies are in accordance with, not just domestic law, but also international standards that protect the right of Native American to practice and maintain their religious traditions. The Special Rapporteur is aware of existing government programs and policies to consult with indigenous peoples and take account their religious traditions in government decision-making with respect to sacred sites. The Special Rapporteur urges the Government to build on these programs and policies to conform to international standards and by doing so to establish a good practice and become a world leader that it can in protecting the rights of indigenous peoples.

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# Appendix S

**Richard F. WILSON, et al., Appellants**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**The HOPI INDIAN TRIBE, Appellant,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**NAVAJO MEDICINEMEN'S ASSOCIA-  
TION, et al., Appellants,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**NAVAJO MEDICINEMEN'S ASSOCIA-  
TION, et al., Appellants,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**The HOPI INDIAN TRIBE, Appellant,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**Richard F. WILSON and Jean Wilson,  
husband and wife, Appellants,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**Nos. 81-1905, 81-1912, 81-1956, 82-1705,  
82-1706 and 82-1725.**

United States Court of Appeals,  
District of Columbia Circuit.

Argued Oct. 15, 1982.

Decided May 20, 1983.

Appeals were taken from decisions of the United States District Court for the District of Columbia, Charles R. Richey, J., which affirmed decisions of the Forest Service and Department of Agriculture to permit private interests to expand and develop the government-owned ski area on the San

Francisco Peaks in the Coconino National Forest. The Court of Appeals, Lumbard, Senior Circuit Judge, sitting by designation, held that: (1) decision to permit private interests to expand and develop government-owned ski area did not violate First Amendment rights of Navajo and Hopi Indian tribes, who were not denied access to the Peaks or impaired in their ability to gather sacred objects or conduct ceremonies, and (2) Forest Service did not violate the American Indian Religious Freedom Act or the National Historic Preservation Act.

Affirmed.

#### 1. Constitutional Law ⇌84

To be protected by free exercise clause of First Amendment, a belief or practice must be "rooted in religion." U.S.C.A. Const.Amend. 1.

#### 2. Constitutional Law ⇌84

Free exercise clause proscribes government action that burdens religious beliefs or practices unless the challenged action serves a compelling governmental interest that cannot be achieved in a less restrictive manner. U.S.C.A. Const.Amend. 1.

#### 3. Constitutional Law ⇌84

Initial burden of proof in free exercise cases is upon plaintiff to demonstrate a burden upon religion and only if a burden is proven does it become necessary to consider whether governmental interest served is compelling, or whether the government has adopted the least burdensome method of achieving its goal. U.S.C.A. Const.Amend. 1.

#### 4. Constitutional Law ⇌84

Decision to permit private interests to expand and develop government-owned ski area on the San Francisco Peaks in the Coconino National Forest did not violate First Amendment rights of Navajo and Hopi Indian tribes, who argued that the Peaks were sacred and that development of them would be a profane act and an affront to the deities but who were not denied access to the Peaks or impaired in their

ability to gather sacred objects or conduct ceremonies. U.S.C.A. Const.Amend. 1.

#### 5. Constitutional Law ⇌84

First Amendment right to hold religious beliefs is absolute. U.S.C.A. Const. Amend. 1.

#### 6. Constitutional Law ⇌84

Plaintiffs seeking to restrict governmental land use in a name of religious freedom must, at a minimum, demonstrate that government's proposed land use would impair a religious practice that could not be performed in any other site. U.S.C.A. Const.Amend. 1.

#### 7. Indians ⇌6

Forest Service did not burden religious practices of Navajo and Hopi Indians in any manner prohibited by American Indian Religious Freedom Act in permitting private interests to expand and develop government-owned ski area on San Francisco Peaks in the Coconino National Forest, which the Indians claimed to be sacred, where the decision would not deny Indians' access to the Peaks nor prevent them from collecting religious objects and where Forest Service held meetings with Indian religious practitioners and conducted public hearings on reservations and gave due consideration to the views expressed. American Indian Religious Freedom Act, § 1, 42 U.S.C.A. § 1996.

#### 8. Indians ⇌6

American Indian Religious Freedom Act requires federal agencies to consider, but not necessarily to defer to, Indian religious values; it does not prohibit agencies from adopting all land uses that conflict with traditional Indian religious beliefs or practices, rather, an agency undertaking a land use project will be in compliance with the Act if, in the decision-making process, it obtains and considers views of Indian leaders and if, in project implementation, it avoids unnecessary interference with Indian religious practices. American Indian Religious Freedom Act, § 1, 42 U.S.C.A. § 1996.

#### 9. Fish ⇌12

##### Game ⇌3½

Protection of section of Endangered Species Act requiring each federal agency to insure that its actions are not likely to jeopardize continued existence of any endangered or threatened species does not apply to those species which are unlisted and not proposed for listing. Endangered Species Act of 1973, § 7(a)(2), as amended, 16 U.S.C.A. § 1536(a)(2).

#### 10. Statutes ⇌220

Subsequent legislative history is not controlling evidence of intent underlying previously enacted legislation.

#### 11. Woods and Forests ⇌8

Forest Service, which permitted private interests to expand and develop government-owned ski area on San Francisco Peaks in the Coconino National Forest, would be required to comply with Endangered Species Act by taking appropriate measures to minimize danger to an alpine plant which was proposed for listing as a threatened species. Endangered Species Act of 1973, § 7(a)(3), as amended, 16 U.S.C.A. § 1536(a)(3).

#### 12. Health and Environment ⇌25.5(3)

Section of Wilderness Act authorizing President to recommend for inclusion in designated wilderness areas lands contiguous to areas formerly designated as "primitive" by Secretary of Agriculture applied only to primitive areas and lands contiguous thereto and therefore Forest Service's approval of development of government-owned ski area in an area which was neither contained in nor contiguous to any primitive area did not violate the Act. Wilderness Act, § 3(b), 16 U.S.C.A. § 1132(b).

#### 13. Health and Environment ⇌25.5(8)

Forest Service, which conducted only a partial survey of the impact area and found no effect on a nearby ranch and that the Peaks themselves were not eligible for listing near the National Register, did not violate National Historic Preservation Act in approving development of government-

owned ski area on the San Francisco Peaks in the Coconino National Forest. Executive Order No. 11593, § 1 et seq., 16 U.S.C.A. § 470 note.

#### 14. Health and Environment ⇐25.5(8)

Complete survey of the impact area is not required under the National Historic Preservation Act where both a partial survey and all other evidence indicate that a complete survey would be fruitless. Executive Order No. 11593, § 1 et seq., 16 U.S.C.A. § 470 note.

#### 15. Woods and Forests ⇐8

Statutory section authorizing permit areas no larger than 80 acres did not constitute the sole authority under which Secretary of Agriculture could grant permits for the private recreational development of national forest lands and did not limit the Secretary of Agriculture's authority to issue permits under statutory section authorizing the Secretary to make such rules and regulations as will ensure the objects of such reservations to regulate their occupancy and use and to preserve the forests thereon from destruction. 16 U.S.C.A. §§ 497, 551.

#### 16. Woods and Forests ⇐8

Forest Service, which approved development of government-owned ski area on National Forest Lands, had authority to grant dual permits to ski resort operator. 16 U.S.C.A. §§ 497, 551.

Appeals from the United States District Court for the District of Columbia (D.C. Civil Action Nos. 81-00558, 81-00481 & 81-00493).

John Paul Kennedy, Salt Lake City, Utah, with whom David B. Lee, Salt Lake City, Utah, was on the brief, for Hopi Indian Tribe, appellant in Nos. 81-1912 and 82-1706. C. Benson Hufford, Tuba City, Ariz., also entered an appearance for appellant, in No. 81-1912. Richard M. Hymas, Salt Lake City, Utah, also entered an appearance for Hopi Indian Tribe in Nos. 82-1705, 82-1706 and 82-1725.

John A. MacKinnon, Tuba City, Ariz., with whom Elizabeth Bernstein and C. Benson Hufford, Tuba City, Ariz., were on the brief, for Navajo Medicinemen's Association, et al., appellants in Nos. 81-1956 and 82-1705. Daniel S. Press, Window Rock, Ariz., also entered an appearance for appellants in No. 81-1956. C. Benson Hufford, Tuba City, Ariz., also entered an appearance for Navajo Medicinemen's Association, et al., in No. 82-1725.

Charles R. Work, Chicago, Ill., with whom Robert W. Warden, Douglas J. Wall, Flagstaff, Ariz., John A. Hodges, and Robert A. Warden, Washington, D.C., were on the brief, for Richard F. Wilson and Jean Wilson, appellants in Nos. 81-1905 and 82-1725, and amici curiae in Nos. 81-1912, 81-1956, 82-1705 and 82-1706.

Jacques B. Gelin, Atty., Dept. of Justice, Washington, D.C., with whom Patricia J. Beneke and Robert L. Klarquist, Attys., Dept. of Justice, Washington, D.C., were on the brief, for appellees. Robert D. Clark, Atty., Dept. of Justice, Washington, D.C., also entered an appearance for appellees in Nos. 81-1905, 81-1912 and 81-1956.

Richard McCune Shannon, Phoenix, Ariz., and Stephen P. Kling, Baltimore, Md., were on the brief for appellee, Northland Recreation Inc.

Ellen Leitzer, Albuquerque, N.M., was on the brief, for Eastern Band of Cherokee Indians, et al., amici curiae urging reversal in Nos. 81-1905, 81-1912 and 81-1956.

Before TAMM and GINSBURG, Circuit Judges, and LUMBARD,\* Senior Circuit Judge, United States Court of Appeals for the Second Circuit.

Opinion for the Court filed by Senior Circuit Judge LUMBARD.

LUMBARD, Senior Circuit Judge:

These appeals challenge the grant of summary judgment by the District Court for the District of Columbia which affirmed the decisions of the Forest Service and the

\* Sitting by designation pursuant to 28 U.S.C.

§ 294(d).

Department of Agriculture to permit private interests to expand and develop the government-owned Snow Bowl ski area on the San Francisco Peaks in the Coconino National Forest just north of Flagstaff, Arizona. The appeals are brought by the Hopi Indian Tribe, the Navajo Medicine-men's Association and other Navajos, and Richard F. Wilson, et al. each of whom filed separate suits which were consolidated for trial by Judge Richey. We affirm.

The Navajo and Hopi Indian tribes are federally recognized tribes of American Indians. The Hopi reservation and most of the Navajo reservation are located in north-eastern Arizona and encompass a total area of 25,000 square miles. Approximately 9,000 Hopis and 160,000 Navajos reside on the reservations.

The dominant geological formation visible from the Hopi villages and much of the western Navajo reservation is the San Francisco Peaks. The Peaks, which rise to a height of 12,633 feet, have for centuries played a central role in the religions of the two tribes. The Navajos believe that the Peaks are one of the four sacred mountains which mark the boundaries of their homeland. They believe the Peaks to be the home of specific deities and consider the Peaks to be the body of a spiritual being or god, with various peaks forming the head, shoulders, and knees of a body reclining and facing to the east, while the trees, plants, rocks, and earth form the skin. The Navajos pray directly to the Peaks and regard them as a living deity. The Peaks are invoked in religious ceremonies to heal the Navajo people. The Navajos collect herbs from the Peaks for use in religious ceremonies, and perform ceremonies upon the Peaks. They believe that artificial development of the Peaks would impair the Peaks' healing power.

The Hopis believe that the Creator uses emissaries to assist in communicating with mankind. The emissaries are spiritual beings and are generally referred to by the Hopis as "Kachinas." The Hopis believe that for about six months each year, commencing in late July or early August and

extending through mid-winter, the Kachinas reside at the Peaks. During the remaining six months of the year the Kachinas travel to the Hopi villages and participate in various religious ceremonies and practices. The Hopis believe that the Kachinas' activities on the Peaks create the rain and snow storms that sustain the villages. The Hopis have many shrines on the Peaks and collect herbs, plants and animals from the Peaks for use in religious ceremonies. The Hopis believe that use of the Peaks for commercial purposes would constitute a direct affront to the Kachinas and to the Creator.

The San Francisco Peaks are within the Coconino National Forest and are managed by the Forest Service. A 777 acre portion of the Peaks, known as the "Snow Bowl," has been used for downhill skiing since 1937 when the Forest Service build a road and ski lodge. The lodge was destroyed by fire in 1952 and was replaced in 1956. Ski lifts were built at the Snow Bowl in 1958 and 1962. Since 1962 the facilities have changed very little.

In April 1977 the Forest Service transferred the permit to operate the Snow Bowl skiing facilities from Summit Properties, Inc. to the Northland Recreation Company. In July 1977 Northland submitted to the Forest Service a "master plan" for the future development of the Snow Bowl, which contemplated the construction of additional parking and ski slopes, new lodge facilities, and ski lifts. The Forest Service, pursuant to the National Environmental Policy Act, conducted public workshops and solicited alternatives to Northland's plan. The Forest Service evaluated the proposed alternatives and identified six which were feasible and represented the spectrum of public opinion. These alternatives ranged from complete elimination of artificial structures in the Snow Bowl to full development as proposed by Northland. On June 23, 1978 the Forest Service filed a draft Environmental Impact Statement evaluating the six alternatives. Between June 23 and September 30, 1978 the Forest Service solicited public opinion on the draft Environmental

Impact Statement. Special efforts were made to solicit the views of the Hopis and Navajos.

On February 27, 1979 the Forest Supervisor of the Coconino National Forest issued his decision to permit moderate development of the Snow Bowl under a "Preferred Alternative," which in fact was not one of the six alternatives previously identified. The Preferred Alternative envisions the clearing of 50 acres of forest for new ski runs, instead of the 120 acres requested by Northland. The Preferred Alternative also authorizes construction of a new day lodge, improvement of restroom facilities, reconstruction of existing chair lifts, construction of three new lifts, and the paving and widening of the Snow Bowl road.

At the request of various persons, including certain of the plaintiffs, the Regional Forester on February 7, 1980 overruled the Forest Supervisor and ordered maintenance of the status quo. The Chief Forester on December 31, 1980 reversed the Regional Forester and reinstated the Forest Supervisor's approval of the Preferred Alternative.

On March 2, 1981, the Navajo Medicine-men's Association filed suit in the District Court for the District of Columbia, naming as defendants John R. Block, Secretary of Agriculture; R. Max Peterson, Chief Forester of the Forest Service; the Forest Service; and the United States. The complaint sought a halt to further development of the Snow Bowl and the removal of existing ski facilities. This suit was consolidated with similar suits brought by the Hopi tribe and Jean and Richard Wilson, owners of a ranch located a mile and a half below the Snow Bowl.

The plaintiffs alleged that expansion of the Snow Bowl facilities would violate the Indians' First Amendment right to the free exercise of religion, the American Indian Religious Freedom Act, the fiduciary duties owed the Indians by the government, the Endangered Species Act, two statutes regulating private use of national forest land (16 U.S.C. §§ 497, 551), the National Historic Preservation Act, the Multiple-Use Sustained Yield Act, the Wilderness Act, the

National Environmental Policy Act, and the Administrative Procedure Act.

Pursuant to expedited procedures agreed to by all the parties, numerous affidavits were submitted together with a Joint Stipulation of Material Facts. The parties filed cross-motions for summary judgment. While these motions were pending the district court on May 27, 1981 permitted Northland to intervene as a defendant. After a hearing, Judge Richey on June 15, 1981 granted summary judgment to the defendants on all issues except the plaintiffs' claim under the National Historic Preservation Act. Finding that the Forest Service had failed to comply with certain requirements of that Act, Judge Richey remanded the cause to the Forest Service for further proceedings and stayed development until compliance. After the defendants reported back, Judge Richey on May 14, 1982 ruled that the Forest Service had achieved compliance and he entered final judgment for the defendants on all issues and vacated his stay. These appeals followed promptly and the defendants have agreed to delay development pending their disposition.

From our review of the record we are convinced that Judge Richey's conclusions of law are in accordance with precedent and not in error. Accordingly, we affirm the judgments. Our opinion considers in detail the claims raised by the plaintiffs under the following constitutional provisions and statutes: the Free Exercise Clause, the American Indian Religious Freedom Act, the Establishment Clause, the Endangered Species Act, the Wilderness Act, the National Historic Preservation Act, and 16 U.S.C. §§ 497, 551.

#### 1. *Free Exercise of Religion.*

Religious freedom is guaranteed by the First Amendment, which states: "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof." The Navajo and Hopi plaintiffs contend that development of the Snow Bowl is inconsistent with their First Amendment right freely to hold and prac-

tice their religious beliefs.<sup>1</sup> Believing the San Francisco Peaks to be sacred, they feel that development of the Peaks would be a profane act, and an affront to the deities, and that, in consequence, the Peaks would lose their healing power and otherwise cease to benefit the tribes. They contend that development would seriously impair their ability to pray and conduct ceremonies upon the Peaks, and to gather from the Peaks the sacred objects, such as fir boughs and eaglets, which are necessary to their religious practices. As relief, the Navajos and Hopis seek a phased removal of all artificial structures on the Peaks, or, at the least, an injunction against further development of the Snow Bowl. Judge Richey, although he recognized the sincerity of the plaintiffs' beliefs, held that a First Amendment claim had not been stated. He found that the government had not denied the Indians access to the Peaks or impaired their ability to gather sacred objects and conduct ceremonies, and thus had not burdened their beliefs or religious practices. We agree with Judge Richey that the plaintiffs have not shown an impermissible burden on religion.

[1] To be protected by the Free Exercise Clause of the First Amendment, a belief or practice must be "rooted in religion." *Thomas v. Review Bd. of the Indiana Employment Sec. Div.*, 450 U.S. 707, 713, 101 S.Ct. 1425, 1429, 67 L.Ed.2d 624 (1981). The parties have stipulated that the plaintiffs' beliefs are religious and are sincerely held, and the record contains abundant evidence supporting that stipulation. We therefore proceed directly to apply the Free Exercise Clause to the plaintiffs' claims and the proof before us.

1. Judge Richey properly ruled that Jean and Richard Wilson, who are not Indians, did not have standing to assert the Navajo and Hopi religious claims. See, e.g., *Singleton v. Wulff*, 428 U.S. 106, 114, 96 S.Ct. 2868, 2874, 49 L.Ed.2d 826 (1976). We have, however, considered the Wilsons' briefs on the religious claims as briefs of *amicus curiae*.

2. The plaintiffs claim that further development of the Snow Bowl could have a serious and adverse impact upon their tribes' cultures and social organization. Abbott Sekaquaptewa, then-chairman of the Hopi tribe, stated in "Nar-

[2,3] The Free Exercise Clause proscribes government action that burdens religious beliefs or practices, unless the challenged action serves a compelling governmental interest that cannot be achieved in a less restrictive manner. See, e.g., *Badoni v. Higginson*, 638 F.2d 172, 176-77 (10th Cir. 1980), *cert. denied*, 452 U.S. 954, 101 S.Ct. 3099, 69 L.Ed.2d 965 (1981), *Barnett v. Rodgers*, 410 F.2d 995, 1000 (D.C.Cir.1969). The initial burden of proof in free exercise cases is upon the plaintiff to demonstrate a burden upon religion. See *School Dist. of Abington v. Schempp*, 374 U.S. 203, 223, 83 S.Ct. 1560, 1572, 10 L.Ed.2d 844 (1963). Only if a burden is proven does it become necessary to consider whether the governmental interest served is compelling, or whether the government has adopted the least burdensome method of achieving its goal. In analyzing the plaintiff's contention that the ski resort expansion will burden their religions, we consider separately the effects of development upon their beliefs and upon their religious practices.

[4] The plaintiffs stress that development of the Snow Bowl for a ski resort is grossly inconsistent with their beliefs. The Hopis and the Navajos believe that they owe a duty to the deities to maintain the San Francisco Peaks in their natural state. They believe that breach of that duty will lead to serious adverse consequences for their peoples. Navajo and Hopi religious practitioners are deeply troubled by the development that has already occurred upon the Peaks, and expansion of the Snow Bowl will increase their disquiet.<sup>2</sup>

rative Direct Testimony" submitted to the district court:

It is my opinion that in the long run if the expansion is permitted, we will not be able successfully to teach our people that this is a sacred place. If the ski resort remains or is expanded, our people will not accept the view that this is the sacred Home of the Kachinas. The basis of our existence as a society will become a mere fairy tale to our people. If our people no longer possess this long-held belief and way of life, which will inevitably occur with the continued presence of the ski resort . . . a direct and negative

[5] The First Amendment right to hold religious beliefs is absolute. *Cantwell v. Connecticut*, 310 U.S. 296, 303, 60 S.Ct. 900, 903, 84 L.Ed. 1213 (1940). The Free Exercise Clause "categorically prohibits government from regulating, prohibiting, or rewarding religious beliefs as such." *McDaniel v. Paty*, 435 U.S. 618, 626, 98 S.Ct. 1322, 1327, 55 L.Ed.2d 593 (1978). Notwithstanding the plaintiffs' concerns, it is clear that the government has not regulated, prohibited, or rewarded their religious beliefs as such, nor has it in any manner directly burdened the plaintiffs in their beliefs. The Free Exercise Clause, however, also proscribes certain *indirect* burdens on belief. Arguing that an impermissible indirect burden has been imposed, the plaintiffs direct our attention to *Sherbert v. Verner*, 374 U.S. 398, 83 S.Ct. 1790, 10 L.Ed.2d 965 (1963) and *Thomas v. Review Board of the Indiana Employment Sec. Div.*, 450 U.S. 707, 101 S.Ct. 1425, 67 L.Ed.2d 624 (1981).

In *Sherbert*, the plaintiff, a Seventh-Day Adventist, was discharged by her employer because she refused to work on Saturday, the Sabbath Day of her faith. The South Carolina Employment Security Commission refused the plaintiff's application for unemployment benefits, finding that her religious convictions did not constitute "good cause" for refusing available work. The South Carolina Supreme Court upheld the Commission's determination. The Supreme Court reversed. The fact that no criminal sanctions compelled the plaintiff to violate her beliefs, said the Court, did not end the free exercise inquiry. Instead, held the Court, the government burdens the free exercise of religion when it conditions receipt of a government benefit, such as unemployment compensation, on conduct inconsistent with the recipient's religious beliefs. In *Thomas*, the plaintiff, a Jehovah's Witness, quit his job at a factory producing tank turrets because he believed armaments production to be inconsistent with his faith. The Indiana Supreme Court held that the plaintiff's decision to quit employment because of his religious convictions did not

constitute "good cause" and denied him unemployment benefits. The Supreme Court reversed, holding, as it did in *Sherbert*, that the government burdens free exercise when it forces an individual to choose between a government benefit and fidelity to religious belief. The Court stated:

Where the state conditions receipt of an important benefit upon conduct proscribed by a religious faith, or where it denies such a benefit because of conduct mandated by religious belief, thereby putting substantial pressure on an adherent to modify his behavior and to violate his beliefs, a burden upon religion exists. While the compulsion may be indirect, the infringement upon free exercise is nonetheless substantial.

450 U.S. at 717-18, 101 S.Ct. at 1431-1432.

*Sherbert* and *Thomas* are not factually analogous to the present case. The government here has not conditioned any benefit upon conduct proscribed or mandated by the plaintiffs' beliefs. Acknowledging this factual distinction, the plaintiffs read *Sherbert* and *Thomas* broadly as condemning under the Free Exercise Clause governmental actions which strongly, if indirectly, encourage religious practitioners to modify their beliefs. Specifically, the plaintiffs argue that governmental actions which "desecrate and destroy the spiritual character of a religion's most sacred shrine" and which may thereby force practitioners "to fundamentally modify their religious doctrine to conform to the changed circumstance" create free exercise burdens under *Sherbert* and *Thomas*. We disagree. *Sherbert* and *Thomas* hold only that the government may not, by conditioning benefits, penalize adherence to religious belief. Many government actions may offend religious believers, and may cast doubt upon the veracity of religious beliefs, but unless such actions penalize faith, they do not burden religion. The Secretary of Agriculture has a statutory duty, see, e.g., 16 U.S.C. §§ 471, 528 (1976) to manage the National Forests in the public interest, and he has determined that the public interest would best be

impact upon our religious practices [will result]. The destruction of these practices will

also destroy our present way of life and culture.

served by expansion of the Snow Bowl ski area. In making that determination, the Secretary has not directly or indirectly penalized the plaintiffs for their beliefs. The construction approved by the Secretary is, indeed, inconsistent with the plaintiffs' beliefs, and will cause the plaintiffs spiritual disquiet, but such consequences do not state a free exercise claim under *Sherbert, Thomas*, or any other authority.<sup>3</sup> In sum, the plaintiffs have not shown that expansion of the Snow Bowl will burden their freedom to believe. A separate question, to which we now turn, is whether expansion will burden the plaintiffs in the practice of their religions.

The plaintiffs must have access to the San Francisco Peaks to practice their religions. Certain of the plaintiffs' ceremonies must be performed upon the Peaks and religious objects must be collected there. Because the plaintiffs' religions are, in this sense, site specific, development of the Peaks would severely impair the practice of the religions if it destroyed the natural conditions necessary for the performance of ceremonies and the collection of religious objects. The plaintiffs claim that the Preferred Alternative will impair their religious practices in precisely that manner. Few courts have considered whether the Free Exercise Clause prohibits the government from permitting land uses that impair

specific religious practices. Of the cases which have considered this problem, we find *Sequoyah v. TVA*, 620 F.2d 1159 (6th Cir.), cert. denied, 449 U.S. 953, 101 S.Ct. 357, 66 L.Ed.2d 216 (1980), to be particularly instructive.

In *Sequoyah*, a class action brought on behalf of practitioners of the Cherokee religion, the plaintiffs sought to halt construction of the Tellico Dam on the Little Tennessee River. The plaintiffs alleged that the dam, when completed, would flood the Cherokee "sacred homeland" along the river, and would destroy "sacred sites, medicine gathering sites, holy places and cemeteries," and "disturb the sacred balance of the land." 620 F.2d at 1160. The Sixth Circuit affirmed a grant of summary judgment to the defendant, ruling that the plaintiffs, to establish a burden on free exercise, had to prove that the valley to be flooded was indispensable or central to their ceremonies and practices. The plaintiffs' proof was insufficient, held the court, as the evidence indicated that medicines obtainable in the valley could be obtained elsewhere, and that the flooding would not prevent the plaintiffs from engaging in any particular religious observances.<sup>4</sup>

[6] Judge Richey relied upon the *Sequoyah* analysis in the present case, and held that the plaintiffs had failed to show

3. *Pillar of Fire v. Denver Urban Renewal Authority*, 181 Colo. 411, 509 P.2d 1250 (1973), is not to the contrary. In *Pillar of Fire*, the plaintiff church sought to enjoin the condemnation by an urban renewal project of its first permanent church building. The plaintiff alleged that its members revered the building for its historical and symbolic meaning in the birth of their sect. The Colorado Supreme Court held that the plaintiff was entitled to a court hearing at which its interests could be weighed against those of the renewal authority. "(R)eligious faith and tradition," said the court, "can invest certain structures and land sites with significance which deserves First Amendment protection." 181 Colo. at 419, 509 P.2d at 1254. A governmental taking of privately-owned religious property, however, involves different considerations than does a claimed First Amendment right to restrict the government's use of its own land.

4. Four cases in addition to *Sequoyah* have considered free exercise claims seeking to restrict development of government land. In *Badoni v.*

*Higginson*, 638 F.2d 172 (10th Cir.1980), cert. denied, 452 U.S. 954, 101 S.Ct. 3099, 69 L.Ed.2d 695 (1981), Navajo religious practitioners believed that the Rainbow natural bridge, a great arch of sandstone located in the Rainbow Bridge National Monument in Utah, was sacred. They complained that a government reservoir which had partially inundated the bridge had covered some of their gods and prayer sites, and that the noisy tourists who visited the bridge desecrated the site and made ceremonies impractical. As relief, the plaintiffs requested the court to order the government to lower the reservoir, to issue regulations controlling tourist behavior, and on appropriate notice, to close the monument to tourists so that ceremonies could be conducted. The Tenth Circuit affirmed a district court decision denying relief. The Tenth Circuit held that the government had a compelling interest in filling the reservoir that outweighed any First Amendment right the plaintiffs might assert, and that closing the Monument, or restricting tourist behavior, to accommodate the plaintiffs' beliefs

the indispensability of the Snow Bowl to the practice of their religions. The plaintiffs challenge Judge Richey's reliance upon *Sequoyah* on two grounds. They argue first that *Sherbert* and *Thomas*, and not *Sequoyah*, establish the standard applicable to their claim. They contend that governmental action which indirectly imposes a burden upon religious practice greater than the burdens involved in *Sherbert* and *Thomas* necessarily violates the First Amendment. Contending that the Snow Bowl ski area effectively prohibits the practice of their religions, the plaintiffs claim that their burden is greater than that of the practitioners in *Sherbert* and *Thomas*, who, the plaintiffs say, could have continued to practice their beliefs simply by choosing to forego government benefits. However, as we previously stated, *Sherbert* and *Thomas* considered only whether the government may legally condition benefits on a decision to forego or to adhere to religious belief or practice. Those cases did not purport to create a benchmark against which to test all indirect burden claims. Second, the plaintiffs argue that *Sequoyah* incorrectly interpreted the First Amendment. They argue that the First Amendment protects all religious practices, whether or not "cen-

would violate the Establishment Clause. Ruling as it did, the Tenth Circuit never considered in detail whether the Free Exercise Clause can create a right to restrict government land use. The decision in *Badoni* therefore offers little guidance here. In *Crow v. Gullet*, 541 F.Supp. 785 (D.S.D.1982), a class action on behalf of the Lakota and Tsistsistas nations, and Lakota and Tsistsistas religious practitioners, the plaintiffs objected to certain construction projects and park regulations at the Bear Butte State Park in South Dakota. The plaintiffs alleged, *inter alia*, that Bear Butte was a significant site in their religions that would be desecrated by the access roads, parking lot, and viewing platforms that the state had built or was planning to build. The district court denied relief, holding that "the free exercise clause places a duty upon a state to keep from prohibiting religious acts, not to provide the means or the environment for carrying them out." 541 F.Supp. at 791. It is uncertain, however, whether the court believed that the Free Exercise Clause can never restrict government land use, since the court specifically noted that the plaintiffs had "failed to establish that particular religious practices were dam-

tral," and that courts are not competent to rule upon the centrality of religious belief or practice. We agree that the First Amendment protection of religion "does not turn on the theological importance of the disputed activity," *Unitarian Church West v. McConnell*, 337 F.Supp. 1252, 1257 (E.D. Wis.1972), *affd.*, 474 F.2d 1351 (7th Cir. 1973), *vacated and remanded on other grounds*, 416 U.S. 932, 94 S.Ct. 1927, 40 L.Ed.2d 283 (1974) and that courts may not "dictate which practices are or are not required in a particular religion." *Geller v. Secretary of Defense*, 423 F.Supp. 16, 17 (D.D.C.1976). See *Thomas*, 450 U.S. at 715-16, 101 S.Ct. at 1430-1431; *Serbian Eastern Orthodox Diocese v. Milivojevich*, 426 U.S. 696, 708-20, 96 S.Ct. 2372, 2380-2385, 49 L.Ed.2d 151 (1976). These principles, however, are not contrary to *Sequoyah's* analysis. Far from requiring judicial evaluation of religious doctrine, *Sequoyah* focuses inquiry solely upon the importance of the geographic site in question to the practice of the plaintiffs' religion. If the plaintiffs cannot demonstrate that the government land at issue is indispensable to some religious practice, whether or not central to their religion, they have not justified a First Amendment claim. We agree with

aged by the construction." *Id.* In *Inupiat Community of Arctic Slope v. United States*, 548 F.Supp. 182, 188-89 (D.Alaska 1982), the Inupiat people of Alaska brought suit to quiet title to portions of the Beaufort and Chukchi Seas in which the United States had issued oil leases. The plaintiffs claimed, *inter alia*, that development would burden their right freely to practice their religion. The court rejected the plaintiffs' claim, finding that the plaintiffs had failed to show impairment of their religious practices, that the government had a compelling interest in developing energy resources, and that the Establishment Clause in any event barred relief. Finally, in *Northwest Indian Cemetery Protective Assoc. v. Peterson*, 552 F.Supp. 951 (N.D.Cal.1982), the plaintiffs, claiming that their religious activities would be disrupted, sought to enjoin the Forest Service from approving construction of a road upon land sacred to several Northwest Indian tribes. The court held for the defendants, and stated that the First Amendment does not obligate the government "to control or limit public access to public lands in order to facilitate" religious practices. 552 F.Supp. at 954.

*Sequoyah's* resolution of the conflict between the government's property rights and duties of public management, and a plaintiff's constitutional right freely to practice his religion. We thus hold that plaintiffs seeking to restrict government land use in the name of religious freedom must, at a minimum, demonstrate that the government's proposed land use would impair a religious practice that could not be performed at any other site.<sup>5</sup>

The plaintiffs argue that their proof establishes a denial of First Amendment rights even under the above standard. They rely principally upon the affidavits submitted by Hopi and Navajo religious practitioners, which establish that ceremonies conducted upon the Peaks are indispensable to the plaintiffs' religions; that ceremonial objects must be collected from the Peaks to be effective; that some ceremonial objects and medicinal herbs are collected from the Snow Bowl, and that expansion of the ski area could make those objects and herbs more difficult to find; that ceremonies and prayers have occasionally been conducted in the Snow Bowl, but that expansion of the ski area will destroy the natural conditions necessary for prayers and ceremonies to be effective; and that the mountain as a whole, and not just parts thereof, is considered sacred.

The plaintiffs' affidavits, together with other evidence in the record, establish the indispensability of the Peaks to the practice

of the plaintiffs' religions. The Forest Service, however, has not denied the plaintiffs access to the Peaks, but instead permits them free entry onto the Peaks and does not interfere with their ceremonies or the collection of ceremonial objects. At the same time, the evidence does not show the indispensability of that small portion of the Peaks encompassed by the Snow Bowl permit area. The plaintiffs have not proven that expansion of the ski area will prevent them from performing ceremonies or collecting objects that can be performed or collected in the Snow Bowl but nowhere else. The record evidence is, in fact, to the contrary. The Forest Service's Final Environmental Statement found, on the basis of comments submitted by Hopi and Navajo practitioners, that "religious practices, including collecting plant materials, may occur in many locations on the sacred mountain." The government submitted affidavits from two experts on Hopi and Navajo religion. One expert stated that expansion of the Snow Bowl should have little "direct" impact on the plaintiffs' religious practices; the other stated with respect to Hopi practices that "(g)uarantee of access to the mountain should permit the continuation of all essential ritual practices," and with respect to Navajo practices that "(n)o ceremonial items . . . are found only in the permit area." It must be remembered that the Snow Bowl permit area comprises only 777 of the 75,000 acres of the Peaks, and

5. We do not hold that such proof necessarily would establish a burden on free exercise. Instead, we hold only that the First Amendment requires, at a minimum, proof that the religious practice could not be performed at any site other than that to be developed. Because we agree with Judge Richey that the plaintiffs have not satisfied this minimum burden of proof, we need not consider what, if any, additional factors are necessary to establish a free exercise burden. At the same time, we decline to follow those cases which have placed primary reliance upon the government's property interest and which have held, apparently, that the Free Exercise Clause can never supersede the government's ownership rights and duties of public management. See *Crow v. Gullet*, 541 F.Supp. 785, 791 (D.S.D.1982); *Northwest Indian Protective Cemetery Assoc. v. Peterson*, 552 F.Supp. 951, 954 (N.D.Cal.1982). The government must manage its land in accord-

ance with the constitution, *Badoni v. Higginson*, 638 F.2d 172, 176 (10th Cir.1980), cert. denied, 452 U.S. 954, 101 S.Ct. 3099, 69 L.Ed.2d 695 (1981); *Sequoyah v. TVA*, 620 F.2d 1159, 1164 (6th Cir.1980), cert. denied, 449 U.S. 953, 101 S.Ct. 357, 66 L.Ed.2d 216 (1980), which nowhere suggests that the Free Exercise Clause is inapplicable to government land. This is not to say that the government's property rights, and its duty to manage its land for the public benefit, have no bearing upon the free exercise analysis. In holding that government land uses can never burden the right to freedom of belief, and can burden the right to freedom of practice only if site-specific religious practices are significantly impaired, we pay due regard to the government's rights and duties in its land. However, we see no basis for completely exempting government land use from the Free Exercise Clause.

that prior construction on the Peaks has not prevented the plaintiffs from practicing their religions.<sup>6</sup> Judge Richey found that "the Snow Bowl operation has been in existence for nearly fifty years and it appears that plaintiffs' religious practices and beliefs have managed to coexist with the diverse developments that have occurred there." (footnote omitted). The plaintiffs simply have not demonstrated that development will prevent them from engaging in any religious practices.<sup>7</sup>

As the plaintiffs have not shown that development will burden them in their religious beliefs or practices, we need not decide whether the ski area expansion is a compelling governmental interest, or whether the Preferred Alternative is the least restrictive means of achieving that interest.

## 2. American Indian Religious Freedom Act.

[7] The American Indian Religious Freedom Act, 42 U.S.C. § 1996 (Supp. IV 1980) (AIRFA), provides:

6. Among the structures currently on the Peaks are natural gas, telephone, and electric transmission lines, water tanks for stock, unpaved roads, and the present Snow Bowl ski resort. Cinder extraction and mining have been conducted on the Peaks for at least the past 30 years.

7. The plaintiffs urge that Judge Richey erred in granting the defendants summary judgment because material issues of fact were in dispute. They argue that when Judge Richey granted summary judgment the parties still disputed the effect development would have upon the plaintiffs' religions. We conclude, however, that in light of the case's procedural posture judgment was properly granted. On May 20, 1981, the parties filed with the district court a Joint Stipulation of Material Acts (supplemented on June 1, 1981). Although the stipulated facts did not dispose of one crucial factual issue—the indispensability of the permit area to the practice of the plaintiffs' religions—they did establish many of the principal facts underlying the plaintiffs' claim. The parties supplemented the stipulated facts with numerous affidavits concerning the religious significance of the Snow Bowl. The parties filed with their affidavits cross-motions for summary judgment which were argued before Judge Richey. When Judge Richey asked counsel for the Hopis whether the plaintiffs had "any reservations

On and after August 11, 1978 it shall be the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

The plaintiffs contend that AIRFA proscribes all federal land uses that conflict or interfere with traditional Indian religious beliefs or practices, unless such uses are justified by compelling governmental interests. They argue that the Snow Bowl ski resort expansion is not a compelling governmental interest, and is accordingly proscribed by AIRFA. Judge Richey refused to give AIRFA the broad reading urged by plaintiffs. He found that AIRFA requires federal agencies to evaluate their policies and procedures with the aim of protecting Indian religious freedom, to refrain from

about the Court deciding this on the merits by virtue of stipulation and the affidavits," he replied, "Not at all, Your Honor." We thus find that the plaintiffs agreed to the disposition of this claim on the written record. As the Ninth Circuit stated in *Gillespie v. Norris*, 231 F.2d 881, 883-84 (9th Cir.1956):

Now, while summary judgment cannot be granted where there are questions of fact to be disposed of, even by consent of all concerned, there is no reason why parties cannot agree to try a case upon affidavits, admissions and agreed documents. In effect, that is what was done here. No objection whatever was made at the time of submission that there were questions of fact which could not be decided upon the evidence before the trial court.

*Accord, Starsky v. Williams*, 512 F.2d 109, 111-13 (9th Cir.1975). Upon his review of the written record, Judge Richey found that the plaintiffs had not "shown that the permit area of the San Francisco Peaks is central or indispensable to their religion." This finding is not clearly erroneous and, indeed, is not significantly refuted by any evidence in the record. We must emphasize that evidence that all of San Francisco Peaks, including the Snow Bowl, is sacred, does not establish the indispensability of the permit area.

prohibiting access, possession and use of religious objects and the performance of religious ceremonies, and to consult with Indian organizations in regard to proposed actions, but that AIRFA does not require "Native traditional religious considerations always [to] prevail to the exclusion of all else." We agree. Judge Richey's interpretation of AIRFA<sup>8</sup> is fully supported by the legislative history, and the record supports his finding of Forest Service compliance.

[8] AIRFA affirms the protection and preservation of traditional Indian religions as a policy of the United States, but the statutory language does not indicate the extent to which Congress intended that policy to override other land use considerations. We therefore look for guidance to the legislative history, and, in particular, to the substantially identical committee reports prepared by the Senate Select Committee on Indian Affairs and the House Committee on Interior and Insular Affairs. These reports reveal that in AIRFA Congress addressed the unwarranted and often unintended intrusions upon Indian religious practices resulting from federal officials' ignorance and the inflexible enforcement of laws and regulations which, though intended to achieve valid secular goals, had directly affected Indian religious practices. The reports identify three areas of concern: (1) denial of access to religious sites; (2) restrictions on the possession of such substances as peyote; and (3) actual interference with religious events. The federal government, the reports note, had sometimes denied Indians access to religious sites on federal land; had failed to accommodate such federal statutes as the drug and endangered species laws to the Indians' religious needs, and had itself interfered, or permitted others to interfere, with religious observances. See S.Rep. No. 709, 95th Cong., 2d Sess. 2-4; H.R.Rep. No. 1308, 95th Cong., 2d Sess. 2-3, *reprinted in* 1978 U.S.Code Cong. & Ad.News 1262, 1263-64. Thus, the House Report stated that the

purpose of AIRFA is "to insure that the policies and procedures of various Federal agencies, as they may impact upon the exercise of traditional Indian religious practices, are brought into compliance with the constitutional injunction that Congress shall make no laws abridging the free exercise of religion." H.R.Rep. No. 1308, *supra*, at 1, 1978 U.S.Code Cong. & Ad.News at 1262.

It is clear from the reports, and from the statutory preamble, that AIRFA requires federal agencies to learn about, and to avoid unnecessary interference with, traditional Indian religious practices. Agencies must evaluate their policies and procedures in light of the Act's purpose, and ordinarily should consult Indian leaders before approving a project likely to affect religious practices. AIRFA does not, however, declare the protection of Indian religions to be an overriding federal policy, or grant Indian religious practitioners a veto on agency action. "The clear intent of [AIRFA]," the Senate report states, "is to insure for traditional native religions the same rights of free exercise enjoyed by more powerful religions. However, it is in no way intended to provide Indian religions with a more favorable status than other religions, only to insure that the U.S. Government treats them equally." S.Rep. No. 709, *supra*, at 6. The comments made during debate by Representative Udall of Arizona, the chairman of the Interior and Insular Affairs Committee and the sponsor of the House bill, similarly indicate that AIRFA does not supersede the many laws under which federal lands are managed for the public good. Representative Udall stated:

Mr. Speaker, it is not the intent of my bill to wipe out laws passed for the benefit of the general public or to confer special religious rights on Indians.

\* \* \* \* \*

Mr. Speaker, I have received a letter from Assistant Attorney General Patricia M. Wald which . . . states that it is the

8. Judge Richey's decision marked the first judicial interpretation of AIRFA. Courts in only two other circuits have since construed AIRFA, and both followed Judge Richey's interpreta-

tion. *Northwest Indian Cemetery Protective Assoc. v. Peterson*, 552 F.Supp. 951, 954 (N.D. Cal.1982); *Crow v. Gullet*, 541 F.Supp. 785, 793-94 (D.S.D.1982).

Department's understanding that this resolution, in and of itself, does not change any existing State or Federal law. That, of course, is the committee's understanding and intent.

124 Cong.Rec. 21,444 (1978).

All this simple little resolution says to the Forest Service, to the Park Service, to the managers of public lands is that if there is a place where Indians traditionally congregate to hold one of their rites and ceremonies, let them come on unless there is some overriding reason why they should not.

\* \* \* \* \*

(The resolution) simply says to our managers of public lands that they ought to be encouraged to use these places. It has no teeth in it. It is the sense of the Congress.

*Id.* at 21,445.

Thus AIRFA requires federal agencies to consider, but not necessarily to defer to, Indian religious values. It does not prohibit agencies from adopting all land uses that conflict with traditional Indian religious beliefs or practices. Instead, an agency undertaking a land use project will be in compliance with AIRFA if, in the decision-making process, it obtains and considers the views of Indian leaders, and if, in project implementation, it avoids unnecessary interference with Indian religious practices. This court's recent decision in *New Mexico Navajo Ranchers Assoc. v. ICC*, 702 F.2d 227 (D.C.Cir.1983) (per curiam), indicates that agencies will not be permitted to ignore their AIRFA duties. There, this court remanded for further consideration the ICC's approval of a rail line to be built across northwestern New Mexico because the ICC had failed properly to consider, *inter alia*, evidence that the railroad permittee would not fulfill its promise to protect Navajo sacred sites along the right-of-way.

Finally, we find that the Forest Service complied with AIRFA in the present case. Before approving the Preferred Alternative the Forest Service held many meetings with Indian religious practitioners and conducted public hearings on the Hopi and Navajo

reservations at which practitioners testified. The views there expressed were discussed at length in the Final Environmental Statement and were given due consideration in the evaluation of the alternative development schemes proposed for the Snow Bowl. Development of the Snow Bowl under the Preferred Alternative will not deny the plaintiffs access to the Peaks, nor will it prevent them from collecting religious objects. The Forest Service has not burdened the plaintiffs' religious practices in any manner prohibited by AIRFA.

### 3. Establishment Clause.

Judge Richey held that to grant the plaintiffs the relief they request would violate the Establishment Clause of the First Amendment. We think it unnecessary to reach that issue. As neither the Free Exercise Clause nor AIRFA entitles the plaintiffs to relief, we have no reason to consider whether relief is barred by a separate constitutional provision. We note, moreover, that where governmental action violates the Free Exercise Clause, the Establishment Clause ordinarily does not bar judicial relief. *See, e.g., Wisconsin v. Yoder*, 406 U.S. 205, 220-21 & 234 n. 22, 92 S.Ct. 1526, 1535-1536, & 1542 n. 22, 32 L.Ed.2d 15 (1972); *Sherbert v. Verner*, 374 U.S. 398, 409, 83 S.Ct. 1790, 1796, 10 L.Ed.2d 965 (1963).

### 4. Endangered Species Act.

The plaintiffs claim that the Forest Service violated section 7(a)(2) of the Endangered Species Act, 16 U.S.C. § 1536(a)(2) (Supp. IV. 1980), by failing to insure that the Preferred Alternative will not be likely to jeopardize the continued existence on the Peaks of a small yellow-flowered plant called *senecio franciscanus*, or the "San Francisco Peaks groundsel." *Senecio franciscanus* exists only in an elongated area of approximately 2.6 square kilometers at the top of the Peaks. This elongated area extends into the Snow Bowl permit area. As an alpine plant, *senecio franciscanus* is particularly susceptible to damage from human activity. The plant's population, once re-

duced by human activity, would not recover for decades or even centuries. The approved development will extend into a small portion of the plant's habitat and will destroy a small number of plants. The greatest threat to the plant's continued existence, however, is posed not by construction, or by skiers, but by summer hikers who walk off-trail and trample the fragile plants. Expansion of the ski lifts will significantly increase the threat to the plant by allowing a greater number of hikers to reach its habitat.

On June 16, 1976 the Secretary of the Interior proposed *senecio franciscanus* for formal listing as an endangered species under section 4 of the Endangered Species Act of 1973, 16 U.S.C. § 1533. Section 4 requires the Secretary to publish in the Federal Register a list of those species determined by him or by the Secretary of Commerce to be endangered or threatened within the meaning of the Act. The Endangered Species Act amendments of 1978 required the withdrawal of all listing proposals over two years old. A one year grace period was extended to proposals already over two years old. On December 10, 1979 the Secretary withdrew the proposal to list *senecio franciscanus* because no action had been taken on the proposal since its submission. At the time the plaintiffs commenced this suit *senecio franciscanus* was neither listed nor proposed for listing.

Section 7(a)(2) of the Endangered Species Act requires each federal agency, with the assistance of the Secretary, to insure that its actions are not likely to jeopardize the continued existence of any endangered or threatened species. Section 7(a)(2) provides:

Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered

species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical . . . In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

[9] Section 7(a)(2) requires an agency, prior to project implementation, formally to consult the Secretary about any agency action that might affect a protected species. Section 7(b), 16 U.S.C. § 1536(b), requires the Secretary to provide to an agency that consults him under section 7(a)(2) a written opinion indicating how the agency's proposed action would affect the protected species and identifying means of protecting the species. The Forest Service has not formally consulted the Secretary about *senecio franciscanus*, and it has not obtained the written opinion required by section 7(b). The plaintiffs' claim would therefore have merit if section 7(a)(2) in fact protected *senecio franciscanus*. We, however, agree with Judge Richey, who held that § 7(a)(2) applies only to species listed pursuant to section 4, and hence had no application to the unlisted *senecio franciscanus*.

To support their argument that § 7(a)(2) protects all endangered or threatened species, whether or not listed, the plaintiffs make four principal points. First, they point out that § 7(a)(2) refers to "any endangered species or threatened species," (emphasis supplied), and does not, unlike many other sections of Act, see, e.g., §§ 7(a)(1), (c)(1), 16 U.S.C. §§ 1536(a)(1), (c)(1), specifically refer to species which are "listed" or "proposed to be listed." Second, they note that § 7(a)(2)'s reference to "endangered . . . or threatened species" does not incorporate a listing requirement because the statutory definitions of "endangered species" and "threatened species" do not mention listing.<sup>9</sup> Third, they draw at-

9. 16 U.S.C. § 1532(6) defines "endangered species" as "any species which is in danger of extinction throughout all or a significant portion of its range other than [certain insects]."

16 U.S.C. § 1532(20) defines "threatened species" as "any species which is likely to become an endangered species within the foreseeable

tention to the difference between the 1973 and the 1978 versions of section 7. As enacted in 1973, section 7 in a single clause required federal agencies to carry out "programs for the conservation of *endangered species and threatened species listed pursuant to section 1533*" and to insure that agency actions did not jeopardize the continued existence "of *such* endangered species and threatened species." (emphasis supplied). The 1978 amendments to the Endangered Species Act divided that clause into two sentences. In the first sentence Congress again required agencies to conduct programs for the preservation of "listed" species, and in the second sentence again required agencies to insure the continued existence of endangered and threatened species. However, the amended section 7, in contrast to the original, did not, in restricting agency action, directly or indirectly refer to "listed" species. Instead, the 1978 amendments changed the word "such" in the original statute to "any" and required agencies to insure the existence of "any endangered species or threatened species." Finally, the plaintiffs note that in 1979 both houses of Congress considered proposed amendments to the Act which, *inter alia*, would have added an explicit listing requirement to § 7(a)(2). See S. 1143, 96th Cong., 1st Sess. § 6(a) (1979), 125 Cong.Rec. S7557 (daily ed. June 13, 1979); H.R. 2218, 96th Cong., 1st Sess. (amendment of Rep. Breaux) § 5 (1979), 125 Cong.Rec. H9648 (daily ed. October 24, 1979). Although Congress did amend the Endangered Species Act in 1979, it did not amend § 7(a)(2) to include a specific listing requirement.

[10] The plaintiffs claim that their points prove that Congress intended the 1978 amendments to extend § 7 protection

future throughout all or a significant portion of its range."

10. The plaintiffs' final point—Congress' failure in 1979 to amend § 7(a)(2) to refer specifically to listed or proposed species—adds little to their argument. Congress in 1979 clearly believed that § 7(a)(2) applied only to listed species. See the discussion *infra*. Thus the proposed amendments to § 7(a)(2) were intended

to unlisted species.<sup>10</sup> The legislative history, however, strongly indicates that Congress had no such intent. In its report on the 1978 amendments, the House Committee on Merchant Marine and Fisheries stated:

The protections provided to animal and plant species threatened with extinction are activated by the listing of a species as "endangered" or "threatened."

H.R.Rep. No. 1625, 95th Cong., 2nd Sess. 5, reprinted in 1978 U.S.Code Cong. & Ad. News, 9453, 9455. The House report further states: "The mandate of section 7 applies once a species is listed." *Id.*, at 7, 1978 U.S.Code Cong. & Ad.News at 9458. These statements, it is true, are contained in a section of the committee report that summarizes the operation of the 1973 Act, and thus are not direct evidence of Congress' intent regarding the 1978 amendments. That portion of the committee report which does discuss the effect of the 1978 amendments, see *Id.* at 19-25, 1978 U.S.Code Cong. & Ad.News at 9469-75, however, contains no indication that in amending section 7 Congress intended to broaden its coverage to protect species not protected by the 1973 Act. Instead, Congress principally intended in amending section 7 to define procedures that would facilitate agency compliance with the section and to establish a mechanism by which agencies could, in appropriate cases, be exempted from the section. Comments made in connection with the 1979 amendments are also significant. The Committee on Merchant Marine and Fisheries states in its report on the 1979 amendments: "The mandate of section 7 applies once a species is listed or once 'critical habitat' is designated for any listed species." H.R.Rep. No. 167, 96th Cong., 1st Sess. 5, reprinted in 1979 U.S.Code Cong. & Ad.

not to add a listing requirement, but to extend § 7 protection, for the first time, to species only proposed for listing. Although Congress did not amend § 7(a)(2) in this respect, it did protect proposed species by adding § 7(a)(3) to the Act. See H.R.Conf.Rep. No. 697, 96th Cong., 1st Sess. 13, reprinted in 1979 U.S.Code Cong. & Ad.News 2557, 2572, 2576.

News 2557, 2561 (1979). The House Conference Report on the amendments states:

The conferees note that the purpose of a listing proposal is to determine whether a species is endangered or threatened and should be listed as such. The protections of Section 7 should not apply until a species has been formally listed.

H.R.Conf.Rep. No. 697, 96th Cong., 1st Sess. 13, reprinted in 1979 U.S.Code Cong. & Ad. News 2572, 2577. We are aware that subsequent legislative history is not controlling evidence of the intent underlying previously enacted legislation. See *Consumer Product Safety Comm. v. GTE Sylvania, Inc.*, 447 U.S. 102, 118 n. 13, 100 S.Ct. 2051, 2061 n. 13, 64 L.Ed.2d 766 (1980). Nonetheless, we think that the 1979 committee and conference reports are entitled to significant weight in interpreting the effect of the 1978 amendment of section 7. Those reports were close in time to the 1978 amendments, and their interpretation of amended section 7 is consistent with the view apparent from the 1978 House report.

The structure of the Endangered Species Act confirms that § 7(a)(2) applies only to listed species. Of particular significance is the central role played by the Secretary of the Interior in the administration of the Act.<sup>11</sup> Section 4 requires the Secretary to determine by regulation which species are endangered or threatened, to publish a list of such species, and periodically to review the list for necessary changes. Section 5, 16 U.S.C. § 1534, authorizes the Secretary to acquire land for the protection of listed species and other plants and wildlife. Section 6, 16 U.S.C. § 1535, authorizes the Secretary to enter into agreements with the states to achieve the purposes of the Act. Section 7(b), as previously noted, requires the Secretary to advise agencies that con-

11. The Secretary of Commerce also has significant duties under the Act. Here, however, we are concerned only with the duties of the Secretary of the Interior.

12. The plaintiffs claim that individual federal agencies are qualified to decide whether the species their actions will affect are endangered or threatened. They rely upon that provision of § 7(a)(2) which states: "In fulfilling the re-

sult him under § 7(a)(2) on means of protecting covered species. These provisions show that under the Act the Secretary has primary responsibility to research the status of different species, to list those species that are in need of protection, and to act for the preservation of listed species. Thus it would be anomalous to construe § 7(a)(2) as requiring each federal agency, regardless of its inexpertise in matters of environmental protection or wildlife conservation, to decide for itself whether any of the species its proposed action would affect is endangered or threatened. It is more logical to conclude that § 7(a)(2) requires an agency, in consultation with the Secretary, to assess the impact of proposed agency action upon a listed species and to develop plans for the species' protection.<sup>12</sup>

We also note that the plaintiffs' interpretation of § 7(a)(2) would make a nullity of § 7(a)(3), 16 U.S.C. § 1536(a)(3), which requires each agency to consult the Secretary "on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed." Section 7(d), 16 U.S.C. 1536(d), prohibits an agency, pending the completion of a § 7(a)(2) consultation about a listed species, from making any "irretrievable commitment of resources" which would foreclose the formulation or implementation of any reasonable alternative for species protection that the Secretary might suggest under § 7(b). In contrast, § 7(a)(3), concerning proposed species, explicitly states that the consultation it requires does not include the § 7(d) limitation on the commitment of resources. The plaintiffs, however, would extend § 7(a)(2) protection, including the § 7(d) limitation, to all vulnerable species, whether or not listed or proposed for listing. They would thus extend to species not proposed for

requirements of this paragraph each agency shall use the best scientific and commercial data available." That language, the plaintiffs argue, requires agencies to use the best available data to determine species status. We think it clear, however, that the quoted language serves only partially to define the nature of an agency's duties once a listed species has brought § 7(a)(2) into play.

listing greater protection than § 7(a)(3) grants to proposed species. The plaintiffs' interpretation would make irrelevant the protection afforded by § 7(a)(3) and would violate the basic rule of statutory construction that courts should, if possible, give effect to every word used by Congress. See, e.g., *Reiter v. Sonotone Corp.*, 442 U.S. 330, 339, 99 S.Ct. 2326, 2331, 60 L.Ed.2d 931 (1979); *Symons v. Chrysler Corp. Loan Guarantee Bd.*, 670 F.2d 238, 242 (D.C.Cir. 1981). For these reasons we conclude that to be protected under § 7(a)(2) a species must be listed under § 4.

The plaintiffs claim that if listing is required under § 7(a)(2), we should treat *senecio franciscanus* as if it were listed. They rely upon the Forest Service's recognition in the Final Environmental Statement that the Preferred Alternative threatens the plant, and upon the fact that the Fish and Wildlife Service, since at least 1976, has been aware of the plant's vulnerability. They contend that the Secretary's failure formally to list the plant since 1976 constitutes unreasonable delay and a violation of the statutory mandate "to halt and reverse the trend towards species extinction, whatever the cost." *TVA v. Hill*, 437 U.S. 153, 184, 98 S.Ct. 2279, 2297, 57 L.Ed.2d 117 (1978). We agree with Judge Richey that there is no evidence of such bad faith or unreasonable conduct on the part of the Secretary as would warrant an injunction against the United States ordering the listing of *senecio franciscanus*.

[11] On November 22, 1982, approximately one month after we heard argument, the Secretary, through the Fish and Wildlife Service, proposed *senecio franciscanus* for listing as a threatened species. 47 Fed.Reg. 52,483 (1982). Because *senecio franciscanus* is now proposed for listing, § 7(a)(3) (discussed above) requires the Forest Service to consult the Secretary about the possible impact of the Preferred Alternative upon the plant. We do not think it necessary to remand this case to the district court to insure Forest Service compliance with § 7(a)(3). Section 7(a)(3) does not incorporate the § 7(d) limitation on commit-

ment of resources and thus does not prohibit development until consultation is completed. More important, we have no reason to believe that the Forest Service has not, or will not, comply with § 7(a)(3). The record indicates that appropriate measures can be taken to minimize the danger to *senecio franciscanus*. We are confident that the Forest Service will, in good faith, implement such measures.

#### 5. *Wilderness Act.*

[12] On May 2, 1979 President Carter, on the advice of the Secretary of Agriculture, recommended to Congress that it designate as wilderness under the National Wilderness Preservation System Act of 1964, 16 U.S.C. §§ 1131-36 (1976), some 14,650 acres of the San Francisco Peaks. Congress has not yet acted upon that recommendation. The area recommended for wilderness designation abuts the Snow Bowl permit area on the north, south, and east, but includes no part of the permit area. A substantial part of the permit area is still undeveloped; in particular, a strip of land approximately 500 feet wide along the area's northern border, adjacent to the recommended wilderness area, remains heavily forested. Under the Preferred Alternative that strip of land will be partially developed for skiing. The plaintiffs contend that the Secretary of Agriculture, in approving development of pristine land adjacent to a recommended wilderness area, infringed Congress' exclusive authority to determine wilderness area boundaries. The plaintiffs base their claim upon § 3(b) of the Wilderness Act, 16 U.S.C. § 1132(b) (1976), and argue that the Secretary may not, by authorizing expansion of the ski area, impair Congress' discretion to include undeveloped portions of the Snow Bowl in the San Francisco Peaks wilderness area. As Judge Richey found, the plaintiffs' claim is without merit.

Section 1132(b) authorizes the President to recommend for inclusion in designated wilderness areas lands contiguous to areas formerly designated as "primitive" by the Secretary of Agriculture. It provides:

The Secretary of Agriculture shall, within ten years after September 3, 1964, review, as to its suitability or nonsuitability for preservation as wilderness, each area in the national forests classified on September 3, 1964 by the Secretary of Agriculture or the Chief of the Forest Service as "primitive" and report his findings to the President. The President shall advise the United States Senate and House of Representatives of his recommendations with respect to the designation as "wilderness" or other reclassification of each area on which review has been completed . . . Each recommendation of the President for designation as "wilderness" shall become effective only if so provided by an Act of Congress . . . Any [primitive] area may be increased in size by the President at the time he submits his recommendations to the Congress by not more than five thousand acres with no more than one thousand two hundred and eighty acres of such increase in any one compact unit; if it is proposed to increase the size of any such area by more than five thousand acres or by more than one thousand two hundred and eighty acres in any one compact unit the increase in size shall not become effective until acted upon by Congress. *Nothing herein contained shall limit the President in proposing, as part of his recommendations to Congress, the alteration of existing boundaries of primitive areas or recommending the addition of any contiguous area of national forest lands predominantly of wilderness value.*

(emphasis supplied).

In *Parker v. United States*, 448 F.2d 793, 797 (10th Cir.1971), cert. denied, 405 U.S. 989, 92 S.Ct. 1252, 31 L.Ed.2d 455 (1972), the Tenth Circuit held that the italicized language reflects "the clear intent of Congress . . . that both the President and the Congress shall have a meaningful opportunity to add contiguous areas predominantly of wilderness value to existing primitive areas for final wilderness designation." A "meaningful opportunity" can be preserved

only if lands within the ambit of § 1132(b) remain undeveloped until such time as the President and Congress act. Thus in *Parker*, the Tenth Circuit affirmed a district court order enjoining the Secretary from authorizing lumbering of certain virgin land contiguous to a primitive area, where the President and Congress had not yet considered whether to designate the land in question as wilderness.

*Parker* indicates that § 1132(b) can restrict the Secretary's discretion to approve development of wilderness land contiguous to a designated primitive area. The defendants, however, contend that § 1132(b) does not apply to national forest land which is neither contained in nor contiguous to a primitive area, and that the plaintiffs' claim must therefore fail, as neither the Snow Bowl permit area nor any other part of the San Francisco Peaks has ever been designated primitive. We agree.

The clear focus of the statutory language is upon the Secretary's duties with respect to primitive areas. A brief review of the statute's background confirms that the statute has no broader application. In 1929 the Secretary of Agriculture, by regulation, established procedures for the designation of primitive areas in national forests. The 1929 regulation was superseded in 1939 by new regulations which authorized the Secretary of Agriculture to designate wilderness areas in excess of 100,000 acres and the Chief of the Forest Service to designate wild areas of between 5,000 and 100,000 acres. The Secretary of Agriculture then reviewed the 73 primitive areas designated between 1929 and 1939 to determine which should be designated in whole or in part as wilderness or wild areas. By 1964, when Congress considered legislation to create a statutory scheme for the protection of wilderness lands, 18 tracts of national forest land had been designated as wilderness areas, 35 as wild areas, and 34 remained in their original classification as primitive areas. See H.R.Rep. No. 1538, 88th Cong., 2d Sess. 7-8, reprinted in 1964 U.S.Code, &

Ad.News, 3615, 3616.<sup>13</sup> Congress concluded that the areas designated as wilderness or wild areas had been "defined with precision," *Id.* at 3617, and could be given statutory protection immediately. Accordingly, in § 3(a) of the Wilderness Act, 16 U.S.C. § 1132(a), Congress designated as wilderness all areas within the national forests that the Secretary of Agriculture had classified at least 30 days before September 3, 1964 as wilderness or wild. Congress believed, however, that the primitive areas had not been "defined with precision," and that such areas "should not be considered for inclusion in the wilderness system until completion of a thorough review." *Id.* Accordingly, in § 3(b) of the Act, 16 U.S.C. § 1132(b), Congress ordered the Secretary of Agriculture to review each designated primitive area as to its suitability for inclusion in the wilderness system. It thus is clear from § 1132(b)'s limited purpose that the statute applies only to primitive areas and lands contiguous thereto. Since the Snow Bowl permit area is neither contained in nor contiguous to any primitive area, the plaintiffs have no claim under § 1132(b).<sup>14</sup>

#### 6. National Historic Preservation Act.

[13] In his June 15, 1981 opinion, Judge Richey found that the Forest Service had committed three violations of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470 *et seq.* (1976), and implementing regulations. First, he found that the Forest Service had not, as required by 16 U.S.C. § 470f and Executive Order 11593,<sup>15</sup> examined the project area to identify prop-

erties eligible for inclusion in the National Register of Historic Places. See 16 U.S.C. § 470a. Second, he found that the Forest Service had not, as required by 36 C.F.R. § 800.4(b), consulted the Arizona State Historic Preservation Officer (SHPO) about the effect of the Preferred Alternative upon two National Register properties near the Snow Bowl—the Fern Mountain Ranch, owned by plaintiffs Jean and Richard Wilson, and the C. Hart Merriam Base Camp. Finally, he found that the Forest Service had not, as required by 36 C.F.R. § 800.4(a)(1), consulted the SHPO about the eligibility of the San Francisco Peaks themselves for inclusion in the National Register. Judge Richey remanded the case to the Forest Service for compliance with NHPA, and stayed development pending compliance. Upon remand, the Forest Service conducted archaeological surveys of the permit area and consulted the SHPO. On September 22, 1981, the Chief Forester determined that the project area contained no properties either listed or eligible for listing on the National Register; that expansion of the ski area would not affect the historic qualities of the Merriam Base Camp or the Fern Mountain Ranch; and that the San Francisco Peaks themselves were not eligible for listing. The SHPO had concurred in these findings by letter dated September 11, 1981. After the plaintiffs failed to obtain administrative reversal of the Chief Forester's determination, the defendants returned to court to show compliance to Judge Richey. On May 14, 1982 Judge Richey ruled that the Forest Service had com-

13. Also, one area had been designated as "canoe." *Id.*

14. Additionally, § 1132(b) applies only to forest land "predominantly of wilderness value." 16 U.S.C. § 1131(c) defines "wilderness" as "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation . . . with the imprint of man's work substantially unnoticeable. . . ." The permit area certainly is not wilderness under that definition. As Judge Richey noted, the permit area contains a ski lodge and ski runs and has been partially cleared of trees. The fact that portions of the permit area remain undeveloped cannot change the fact that the area is not "predominantly of

wilderness value." We therefore would reject the plaintiffs' § 1132(b) claim even were the statute otherwise applicable. The plaintiffs' reliance upon *Parker v. United States*, 309 F.Supp. 593 (D.Colo.1970), *affd.*, 448 F.2d 793 (10th Cir.1971), *cert. denied*, 405 U.S. 989, 92 S.Ct. 1252, 31 L.Ed.2d 455 (1972), is misplaced. Not only was the land at issue in that case contiguous to a designated primitive area, it also contained no development other than a short access road.

15. Executive Order 11593 is reprinted in 16 U.S.C.A. § 470 (1974) at 26, and at 36 F.R. 8921 (1971).

plied with NHPA in all respects. He granted the defendants final judgment on all counts and lifted the stay against development.

The plaintiffs claim that Judge Richey erred in finding compliance with NHPA. They contend that the Forest Service's efforts to identify eligible properties in the permit area were legally insufficient; that the Preferred Alternative will affect the historic qualities of the Fern Mountain Ranch;<sup>16</sup> and that the San Francisco Peaks are eligible for listing. The plaintiffs' three contentions will be considered in order.

16 U.S.C. § 470f and implementing regulations, see 36 C.F.R. § 800.4(a), together with Executive Order 11593, require federal agencies approving land use projects to identify all properties within and about the project area that are eligible for listing in the National Register and that may be affected by the project. See *Romero-Barcelo v. Brown*, 643 F.2d 835, 859 (1st Cir.1981), *reversed on other grounds*, 456 U.S. 305, 102 S.Ct. 1798, 72 L.Ed.2d 91 (1982). The specific area to be examined for eligible properties is the "area of the undertaking's potential environmental impact," 36 C.F.R. § 800.4(a), which is defined as the "geographical area within which direct and indirect effects generated by the undertaking could reasonably be expected to occur." 36 C.F.R. § 800.3(o). The agency must consult the SHPO when determining the area of potential environmental impact and the scope of surveys needed to identify eligible properties within that area. 36 C.F.R. §§ 800.3(o), 800.4(a)(1), (2). The Forest Service and the SHPO agreed that the Preferred Alternative's area of potential environmental impact included the 777 acre permit area, the Snow Bowl road, and 30-foot strips of land on both sides of the road. Forest Service and Northern Arizona University archaeologists in July, 1981 conducted archaeological surveys in which they intensively examined 272 acres, or 35% of the total permit area, including all 77 acres

proposed for development under the Preferred Alternative. The surveys revealed no evidence of Navajo or Hopi use and in fact discovered only one archaeological site—the foundation of the old Snow Bowl ski lodge that burned in 1952. The Forest Service found the lodge foundation to be ineligible for listing, and the plaintiffs do not argue to the contrary. The SHPO agreed that the surveys satisfied the Forest Service's affirmative obligation to locate and identify eligible properties in the impact area. See 36 C.F.R. § 800.4(a)(2).

[14] The plaintiffs argue that the Forest Service breached its NHPA duty to identify *all* eligible properties by failing to survey 100% of the impact area. They contend that the Forest Service's partial surveys may have left some eligible properties undetected. We think that the partial surveys were sufficient. The regulations do not expressly require agencies in all cases completely to survey impact areas, and in fact recognize that the need for surveys will vary from case to case. See C.F.R. §§ 800.4(a)(1), (2). We believe that a complete survey is not required where both the partial survey, and all other evidence, indicate that a complete survey would be fruitless. Here, the defendants' surveys discovered neither eligible properties nor any evidence to suggest that such properties might be present in areas not surveyed. The existing literature on the San Francisco Peaks gave the Forest Service no indication of historical or archaeological sites in the impact area. Additionally, the high altitude and steep slopes of the San Francisco Peaks made the impact area an unlikely site for past human habitation and hence an unlikely place in which to find eligible properties. Under these circumstances a complete survey was not required. We find support for our conclusion in the First Circuit's decision in *Romero-Barcelo, supra*, where the Navy conducted a partial archaeological survey of the island of Vieques off the Puerto Rican coast in connection with training operations

16. The plaintiffs have on appeal dropped their claim that development will impair the historic

qualities of the C. Hart Merriam Base Camp.

there to be conducted. The Navy's survey identified numerous eligible properties and suggested the probable existence of other archaeological sites not specifically located. The First Circuit held that § 470f and Executive Order 11593 required the Navy to conduct further surveys to locate the sites thought to be present. Significantly, however, the court stated that its decision did not require the Navy "to undertake a 100% survey of Vieques," or to survey parts of the island where the initial survey established "archeological sterility." 643 F.2d at 860.

As a second ground for reversal, the plaintiffs argue that the Forest Service erred in finding that the Preferred Alternative will have no effect upon the historic qualities of the Fern Mountain Ranch. Section 800.4(b) of 36 C.F.R. requires each agency, in consultation with the SHPO, to determine for each listed or eligible property within the potential environmental impact area, whether the agency project will affect the historical, archaeological, or other characteristic of the property that qualified it for inclusion in the National Register. The agency is to determine whether an effect is present according to the criteria of 36 C.F.R. § 800.3. If the agency determines that the project will have no effect, the project may proceed. 36 C.F.R. § 800.4(b)(1). If, however, the agency determines merely that the project will have no *adverse* effect, the agency's determination must be submitted to the Advisory Council on Historic Preservation for review and comment, 36 C.F.R. § 800.4(c), and if the agency determines that there will be an adverse effect, the agency must formally consult the Council. 36 C.F.R. §§ 800.4(d), 800.6(b). The plaintiffs argue that Judge Richey erred in failing to require formal consultation under § 800.6(b). We conclude, however, that Judge Richey properly upheld the Forest Service's finding of "no effect."

The Fern Mountain Ranch is located on the western slopes of the San Francisco Peaks, approximately one and one-half miles to the north of the Snow Bowl. The Ranch provides an excellent view of the Peaks' wooded slopes, and of the permit

area. Development under the Preferred Alternative will somewhat impair the Ranch's rustic setting since the new ski lifts and slopes will be readily visible from the Ranch. The plaintiffs argue that alteration of the Ranch's natural setting would constitute an "adverse effect" under the regulations. They rely upon 36 C.F.R. § 800.3(b), which defines "adverse effect" as including, *inter alia*, an "alteration of the property's surrounding environment," or the "(i)ntroduction of visual . . . or atmospheric elements that are out of character with the property." The plaintiffs' argument fails to recognize that the § 800.3 criteria are to be applied with reference only to those characteristics of the property that qualified it for National Register listing. See 36 C.F.R. § 800.4(b). The Ranch's natural setting is not one of the characteristics that qualified it for listing. Instead, the Nomination Form for the Ranch's listing indicates that the Ranch is historically significant for three reasons: (1) its original nineteenth-century buildings are still standing and in use; (2) it played an important role, as a rest stop, in the development of the Grand Canyon as a tourist attraction; and (3) it was the first ranch in Arizona to raise Arabian horses. Clearly, the Preferred Alternative will not affect the Ranch's three relevant characteristics and its effect upon the view from the Ranch is, under the circumstances, immaterial. The plaintiffs also argue that the Preferred Alternative will adversely effect the Ranch because the increased tourist traffic at the Snow Bowl will, they say, increase the dangers of trespassing, vandalism, and arson at the Ranch. The Forest Service, however, determined that increased use of the Snow Bowl would not endanger the Ranch. The Forest Service's determination of this factual issue is adequately supported.

The plaintiffs also argue that the Forest Service violated NHPA by finding that the San Francisco Peaks themselves were not eligible for listing. The plaintiffs rely upon the fact that several other mountains and properties which are historically significant principally because of their association with

Indian religion or culture have been listed. Those properties, however, may or may not have possessed the particular attributes of the San Francisco Peaks. The determination in each case of a property's eligibility is the responsibility of the agency and of the SHPO, see C.F.R. § 800.4(a)(3), and in the absence of an abuse of discretion, their application of the regulations to the facts must be sustained. We agree with Judge Richey that the plaintiffs have not shown an abuse of discretion.

Lastly, the plaintiffs argue that the Forest Service should have requested a final determination of the Peaks' eligibility from the Secretary of the Interior. Section 800.4(a)(3) of 36 C.F.R. states that when a "question" exists as to a property's eligibility, the Secretary shall be requested to make a final determination. Section 63.2(c) of 36 C.F.R. states that a "question" exists "when the agency and the State Historic Preservation Officer disagree or when the agency determines that a question exists." Here, the Forest Service and the SHPO agreed that the Peaks were not eligible, and the Forest Service did not otherwise determine that a question existed. The plaintiffs' argument that a question existed because the Forest Service and the SHPO relied upon different reasoning in reaching their identical conclusions has no merit. Section 800.4(a)(3), as clarified by § 63.2(c), is obviously intended not to require the agency and the SHPO to reason alike, but only to resolve disputes between the two, and to provide a means by which the Secretary can have the final say on properties of uncertain status.

#### 7. *Land Use Permits.*

[15, 16] In 1977 the Forest Service issued two permits to Northland for use of the Snow Bowl permit area, which on May 18, 1982 were amended to reflect the development approved under the Preferred Alternative. One of the amended permits, covering 24 acres, is a term permit valid until May 1, 1997. The Forest Service granted this permit under the Act of March 4, 1915, as amended, 16 U.S.C. § 497 (1976), which provides:

The Secretary of Agriculture is authorized, under such regulations as he may make and upon such terms and conditions as he may deem proper, (a) to permit the use and occupancy of suitable areas of land within the national forests, not exceeding eighty acres and for periods not exceeding thirty years, for the purpose of constructing or maintaining hotels, resorts, and any other structures or facilities necessary or desirable for recreation, public convenience, or safety; . . .

Northland will build the ski lodge and all other permanent facilities upon the land covered by the term permit. The other permit, an annual or revocable permit covering the remaining 753 acres of the permit area, was issued by the Forest Service under the authority of the Act of June 4, 1897, as amended, 16 U.S.C. § 551 (1976), which authorizes the Secretary of Agriculture to "make such rules and regulations . . . as will insure the objects of such reservations, namely, to regulate their occupancy and use and to preserve the forests thereon from destruction." The land covered by the revocable permit will be used only for ski slopes.

The plaintiffs challenge the validity of the "dual permit" system employed by the Forest Service. They contend that 16 U.S.C. § 497, which authorizes permit areas no larger than 80 acres, constitutes the sole authority under which the Secretary may grant permits for the private recreational development of national forest lands. They accordingly claim that the Forest Service exceeded its authority in issuing a revocable permit under 16 U.S.C. § 551 and in granting permits covering 777 acres to a single developer. We agree with Judge Richey that § 497 does not limit the Secretary's authority under § 551 and that Congress has sanctioned the use of dual permits.

In 1905 Congress transferred the management of the national forests from the Secretary of the Interior to the Secretary of Agriculture. Act Feb. 1, 1905, c. 288, § 1, 33 Stat. 628. As early as May 31, 1905 the Attorney General informed the Secretary of Agriculture that the Act of 1897, as amend-

ed, authorized him to grant revocable permits for the private, commercial use of national forest land. 25 Op.Atty.Gen. 470 (1905). The Secretary of Agriculture thereafter routinely granted revocable permits for many purposes, including summer houses and camping grounds, under the 1897 Act. In 1911 the Supreme Court upheld the authority of the Secretary to grant revocable grazing permits under the Act. *United States v. Grimaud*, 220 U.S. 506, 31 S.Ct. 480, 55 L.Ed. 563 (1911).

In 1915 Congress enacted legislation, now § 497, which, in contrast to the Act of 1897, expressly authorized the Secretary of Agriculture to grant private permits to national forest land. The 1915 Act authorized the Secretary to grant term permits to areas not larger than five acres for periods not exceeding 30 years. The plaintiffs claim that the 1915 Congress intended to repeal whatever permit authority the Secretary possessed under the 1897 Act. The plaintiffs' argument has no support in the legislative history, which instead suggests that Congress acted not to repeal the Secretary's existing powers, but to enable him, for the first time, to grant long-term permits. The Congress recognized that the permanent structures necessary for recreational use of the national forests would not be built unless private parties could obtain secure tenure. Congressman Hawley, the sponsor of the House bill, stated:

At present the people have an unlimited right to go upon the public land in the national forests. They can go there and build a temporary camp, put up a tent or a little camp of some kind. They are given now by the Secretary of Agriculture permission to construct temporary structures. But it does not enable them to put up any important building, or to justify any considerable expenditure. But if they could get permission for a period of years they can afford to put up a better building(.)

52 Cong.Rec. 1787 (1915). Significantly, the Congress had before it a letter from the Secretary of Agriculture which discussed the Secretary's practice of granting revocable permits under the 1897 Act.<sup>17</sup> The letter stated:

There is at the present time some hesitancy on the part of persons who want to use national-forest land upon which to construct summer residences, hotels, stores, and other structures involving a large expenditure, because of *the indefinite tenure of the permits to them which the present law provides for*. At the present time, however, *there are several thousand such permits in use*, upon which structures have been erected. In justice to those who desire to construct more substantial improvements, it is believed that the present law should be amended to give persons a better right than the *revocable permit now authorized*.

(emphasis supplied). We must therefore presume that when Congress acted in 1915 it had knowledge of the Secretary's practice under the 1897 Act. Accordingly, the absence in the Act and in the legislative history of any language expressly repudiating the Secretary's practice is strong evidence that Congress did not intend the 1915 Act to affect the Secretary's power to issue revocable permits. Certainly the plaintiffs have shown no reason to depart from the settled rule disfavoring repeal by implication. See *Watt v. Alaska*, 451 U.S. 259, 267, 101 S.Ct. 1673, 1678, 68 L.Ed.2d 80 (1981).

We conclude, therefore, that the 1915 Act neither limited the Secretary's power to issue revocable permits to areas larger than five acres nor prohibited him from issuing revocable and term permits simultaneously. Our conclusion is reinforced by Congress' awareness of, but failure to repudiate, the continuing practice of the Forest Service after 1915 to issue revocable permits under the 1897 Act. The Forest Service, following the 1915 Act, believed that the purposes of the Act could not be achieved unless it

17. The letter was both included in the House committee report, H.R.Rep. No. 1023, 63d Cong., 2d Sess. 2 (1915), and read during de-

bate by Congressman Hawley. 52 Cong.Rec. 1787 (1915).

had authority to issue term permits to areas larger than five acres. Congress in the 1930's and 1940's considered several bills that would have expanded the Forest Service's authority to grant term permits, but enacted none of them. These bills are nonetheless significant because the reports they generated gave Congress clear notice that the Forest Service was continuing to issue revocable permits for recreational uses, and further, was issuing dual permits. For example, the Senate report on S. 773 (72nd Cong., 1st Sess. (1932)), contains a letter from the Secretary of Agriculture to the Chairman of the Committee on Agriculture and Forestry, which states:

The general laws relating to the national forests do not authorize the issuance of permits *other than terminable at the discretion of the Secretary of Agriculture*. One act, that of March 4, 1915 . . . authorizes the issuance of permits for not to exceed 30 years and for areas of not to exceed 5 acres . . . Experience has proved that 5 acres is insufficient to permit of the proper development of the most modern types of outdoor camps, hotels, resorts, sanitoria, etc., which, in addition to the principal structures, usually require the related use of lands for the various necessary utilities, recreational services, etc., now regarded as essential to such services. *At present these are provided by the issuance of supplemental terminable permits*, which inject an undesirable element of uncertainty of tenure and add to routine requirements of administration.

S.Rep. No. 754, 72d Cong., 1st Sess. 2 (1932) (emphasis supplied). Similarly, in connection with H.R. 1809 (80th Cong., 1st Sess. (1948)), the Acting Secretary of Agriculture

18. H.R. 1809, as originally proposed, would have authorized the Secretary to grant term permits to areas not larger than 80 acres for periods not exceeding 30 years in all of the national forests. The House Committee on Agriculture amended the bill to apply only to Alaskan national forests, because it believed that broadening the Secretary's powers as to other national forests might have undesirable results. See H.R.Rep. No. 805, 80th Cong., 1st Sess. 1 (1948). The bill passed as amended. 16 U.S.C. § 497a (1976). The plaintiffs argue

sent the Chairman of the Committee on Agriculture a letter, which stated:

Of course, the large majority of . . . permitted uses [in the national forests] are of relatively short duration or entail only small capital investments. In such circumstances *the type of terminable permit, renewable from year to year, which this Department is authorized to issue without limitation as to character of use or area*, is adequate.

H.R.Rep. No. 805, 80th Cong., 1st Sess. 2 (1948) U.S.Code Cong. & Admin.News, pp. 1337, 1338 (emphasis supplied).<sup>18</sup>

In 1956 Congress finally amended the 1915 Act to grant the Secretary broader power to issue term permits. The amendment increased the acreage limitation in § 497 from five acres to 80 because effective recreational development of the national forests had been stymied by the five-acre limitation on term permits. See H.R.Rep. No. 2792, 84th Cong., 2d Sess., *reprinted in* 1956 U.S.Code Cong. & Ad.News 3634. The committee reports, far from repudiating the Secretary's practice of issuing revocable permits, expressly approved the practice:

The Department of Agriculture now has adequate authority to issue revocable permits for *all* purposes under the act of June 4, 1897 (16 U.S.C. § 551). Its authority to issue term permits . . . would be broadened by S. 2216(.

S.Rep. No. 2511, 84th Cong., 2d Sess. 1, (emphasis supplied), *quoted in* H.R.Rep. No. 2792, *supra*, at 2, 1956 U.S.Code Cong. & Ad.News at 3635. Congress has not amended either § 497 or § 551 in relevant part since 1956.

that the amendment to H.R. 1809 reflects Congress' intent not to allow the Secretary to issue permits to large areas in the lower 48 states. The better interpretation, however, is that Congress was not yet ready to authorize the Secretary to grant *term* permits to areas larger than 5 acres. The legislative history of H.R. 1809 nowhere disapproves of the Secretary's practice of issuing dual permits and revocable permits to areas larger than 5 acres. As the quoted letter illustrates, Congress knew of that practice.

We conclude, then, that the Secretary has consistently interpreted the Act of 1915 as *not* limiting his authority to issue revocable permits under the Act of 1897; that Congress has for decades had knowledge of the Secretary's interpretation, but has never objected; and that on the one occasion when Congress did comment on the Secretary's interpretation and practice, in 1956, it expressed approval. Under these circumstances the Secretary's authority to issue revocable permits under § 551, whether or not exercised in connection with dual permits, cannot be doubted. As this court stated in *Kay v. FCC*, 443 F.2d 638, 646-47 (1970), "a consistent administrative interpretation of a statute, shown clearly to have been brought to the attention of Congress and not changed by it, is almost conclusive evidence that the interpretation has congressional approval." (footnote omitted).

In *Sierra Club v. Hickel*, 433 F.2d 24, 35 (9th Cir.1970), *affd. on other grounds sub nom. Sierra Club v. Morton*, 405 U.S. 727, 92 S.Ct. 1361, 31 L.Ed.2d 636 (1972), the Ninth Circuit approved the practice of issuing dual permits to ski resort operators<sup>19</sup> and, in language highly instructive here, stated:

The fact that the record discloses that there are now a total of at least eighty-four recreational developments on national forest lands in which there is such a combination of the term permit and the revocable permit is convincing proof of their legality. Many of these developments are ski developments making use of the maximum acres of the term permit plus revocable permits for additional acreage in amounts in some cases in excess of 6,000 acres . . . It seems apparent, as was obvious to both [the 1956] Senate and House Committees, that the

eighty-acre long-term permit was a necessity to obtain proper financing for substantial permanent improvements, while developments of less magnitude and permanency, such as trails, slopes, corrals, could be placed upon lands held under revocable permits.

(footnote omitted). The Forest Service has continued, following the decision in *Sierra Club*, to grant dual permits to ski resort operators. There are presently about 200 ski developments in the national forests and most of them employ dual permits.<sup>20</sup>

The case of *Wilderness Society v. Morton*, 479 F.2d 842 (D.C.Cir.) (en banc), *cert. denied*, 411 U.S. 917, 93 S.Ct. 1550, 36 L.Ed.2d 309 (1973), cited by the plaintiffs, does not support their argument. In *Wilderness Society*, the plaintiffs challenged the issuance of rights-of-way and special land use permits by the Secretary of the Interior to a consortium of oil companies for the construction of the Alaska pipeline. The permits covered land greater in width than the express limitation contained in § 28 of the Mineral Leasing Act of 1920, 30 U.S.C. § 185. This court found that § 28 constituted the Secretary's sole authority to issue permits for the use of federal land for oil pipelines, and held that the Secretary had exceeded his authority in failing to adhere to the width limitations. The plaintiffs also contended that the permits issued by the Secretary violated § 497. The court found it unnecessary to decide that claim, and declined to comment on the Ninth Circuit's decision in *Sierra Club*. The court did, however, note that § 497 had "no provision comparable to that in Section 28 of the Mineral Leasing Act expressly stating that no rights-of-way for the uses in question shall be granted except under the provisions, conditions and limitations of the stat-

19. *Sierra Club* vacated a preliminary injunction enjoining the Secretaries of Interior and Agriculture from authorizing a large-scale, private recreational development in the Sequoia National Forest. Because *Sierra Club* involved an interlocutory appeal it required the Ninth Circuit to decide only whether the plaintiffs had shown a strong likelihood of success on the merits. Although the Ninth Circuit found that the plaintiffs had shown little or no likelihood

of success, it did not make a final determination of the validity of dual permits. That issue therefore technically remains open in the Ninth Circuit. See *Sierra Club v. Morton*, 348 F.Supp. 219, 220 (N.D.Cal.1972). *Sierra Club* did, however, give detailed consideration to the legality of dual permits.

20. S.Rep.No. 1019, 94th Cong., 2d Sess. 8 (1976).

ute." 479 F.2d at 870. That distinction between the language of § 497 and of § 28, together with the legislative history recounted above, indicate clearly enough that § 497, unlike § 28, cannot be read as an exclusive grant of authority as to the uses in question.<sup>21</sup>

Finally, the plaintiffs claim that even if the Secretary had authority under §§ 497 and 551 to issue dual permits to Northland, the 753-acre permit issued under § 551 is invalid because not actually revocable. We see no merit in this claim. The Forest Service's continuing power to revoke the § 551 permit is apparent from the permit's terms, which state that the permit will terminate on May 1, 1997 unless previously terminated "upon breach of any of the conditions herein or at the discretion of the regional forester or the Chief, Forest Service." (emphasis supplied). The plaintiffs argue that the permit is not truly revocable because the Forest Service's own regulations require a rational basis for the revocation of such permits, see 36 C.F.R. § 251.60(b) (1982), and subject revocations to administrative review. 36 C.F.R. § 211.19 (1982). The plaintiffs have not, however, cited any authority holding that a permit, to be "revocable," must be revocable at the mere arbitrary will of the issuing authority, and we decline to read such a requirement into the authorizing statute. *Cf. Sierra Club, supra*, 433 F.2d at 35. The plaintiffs also argue that the permit is not revocable because the Forest Service is unlikely to revoke it before the term permit expires. The short answer is that the Forest Service has power to revoke.

#### CONCLUSION

We also agree with Judge Richey's disposition of the plaintiffs' remaining claims.

21. In both 1975 and 1977 the Senate considered bills which would have substantially revised the Forest Service's authority to issue permits for the private recreational use of national forest land. The bills expressly authorized the Forest Service to grant term permits to ski resort operators to areas larger than 80 acres. S. 1338, 95th Cong., 1st Sess. § 3, 123 Cong. Rec. 11,643 (1977); S. 2125, 94th Cong., 2d Sess. § 3 (1976). The bills never became law. Although the bills were intended to achieve a

Accordingly, we affirm the judgment of the district court.



### U.S. SOUTHWEST AFRICA/NAMIBIA TRADE & CULTURAL COUNCIL, Appellant,

v.

UNITED STATES of America, et al.

No. 81-2199.

United States Court of Appeals,  
District of Columbia Circuit.

Argued Sept. 16, 1982.

Decided May 27, 1983.

Appeal was taken from refusal by official of the Federal Aviation Administration to approve advertisement as suitable for public display in various advertising areas at federally-owned airports. The United States District Court for the District of Columbia, Oliver Gasch, J., affirmed, and appeal was taken. The Court of Appeals, Mikva, Circuit Judge, held that refusal to approve advertisement infringed upon First Amendment rights.

Reversed and remanded.

number of goals, they were proposed, in part, because of concern that under *Wilderness Society v. Morton* the Forest Service's practice of issuing dual permits might be illegal. See 123 Cong. Rec. 11,641 (1977) (Remarks of Sen. Haskell); S.Rep. No. 324, 95th Cong., 1st Sess. 11-12 (1977); S.Rep. No. 1019, 94th Cong., 2d Sess. 8-9 (1976). However, as stated above, *Wilderness Society* does not preclude the issuance of dual permits under §§ 497 and 551.

# Appendix S



HAUT-COMMISSARIAT AUX DROITS DE L'HOMME • OFFICE OF THE HIGH COMMISSIONER FOR HUMAN RIGHTS  
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REFERENCE:GH/SP

9 March 2012

Excellency,

I write to inform you that in the course of its 80th session, the Committee considered, on a preliminary basis, under its early warning and urgent action procedure, information submitted by non-governmental organisations concerning the Ski Resort project in San Francisco Peaks. The Committee has also considered the situation of Western Shoshone and particularly the implementation of its 2006 Decision 1 (68) taken under the same procedure.

The Committee recalls its recommendations to the State party (CERD/C/USA/CO/6 of March 2008), particularly paragraph 29 which urges the State party to take all appropriate measures, in consultation with indigenous peoples concerned and their representatives chosen in accordance with their own procedure, to ensure that activities carried out in areas of spiritual and cultural significance to Native Americans do not have a negative impact on the enjoyment of their rights under the Convention. The Committee has further recommended that the State party recognize the right of Native Americans to participate in decisions affecting them, and consult and cooperate in good faith with the indigenous peoples concerned before adopting and implementing any activity in areas of spiritual and cultural significance to Native Americans.

In light of the information at its disposal, the Committee remains concerned at the potential impact of the Ski Resort Project on indigenous peoples' spiritual and cultural beliefs. The Committee requests information about the process by the State party to obtain the free, prior and informed consent of indigenous peoples with regard to the project.

The Committee requests information on concrete measures taken to ensure that the sacred character of this site for indigenous peoples is respected, including the possibility of suspending the permit granted to the Arizona Snowbowl in order to further consult with indigenous peoples and take into account their concerns and religious traditions.

Her Excellency Mrs. Betty E. King  
Ambassador, Permanent Representative  
Permanent Mission of United States of America  
to the United Nations Office and other international organizations in Geneva  
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Regarding traditional rights to land of Western Shoshone, the Committee requests updated information on the implementation of its 2006 Decision 1 (68) and its request to the State party to send high-level representatives to meet with Shoshone peoples.

The Committee urges the State party to take urgent action to find a solution acceptable to all in accordance with its obligations under the Convention. It recalls its general recommendation No. 23 (1997) on the rights of indigenous peoples, in particular their right to own, develop, control and use their communal lands, territories and resources as well as the duty of the State party to ensure that indigenous communities can exercise their rights to practise and revitalize their cultural traditions and customs.

In accordance with Article 9(1) of the Convention and article 65 of its Rules of Procedure, the Committee would be grateful to urgently receive information on the issues and concerns as outlined above before **31 July 2012** or in its next periodic report overdue since 20 November 2011 in case the report is finalized before that date.

Allow me, Excellency, to reiterate the wish of the Committee to continue to engage in a constructive dialogue with the Government of the United States of America, with a view to promoting the effective implementation of the Convention.

Yours sincerely,

Alexei Avtonomov  
Chairperson of the Committee  
on the Elimination of Racial Discrimination

# Appendix T

**Richard F. WILSON, et al., Appellants**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**The HOPI INDIAN TRIBE, Appellant,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**NAVAJO MEDICINEMEN'S ASSOCIA-  
TION, et al., Appellants,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**NAVAJO MEDICINEMEN'S ASSOCIA-  
TION, et al., Appellants,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**The HOPI INDIAN TRIBE, Appellant,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**Richard F. WILSON and Jean Wilson,  
husband and wife, Appellants,**

v.

**John R. BLOCK, Secretary of  
Agriculture, et al.**

**Nos. 81-1905, 81-1912, 81-1956, 82-1705,  
82-1706 and 82-1725.**

United States Court of Appeals,  
District of Columbia Circuit.

Argued Oct. 15, 1982.

Decided May 20, 1983.

Appeals were taken from decisions of the United States District Court for the District of Columbia, Charles R. Richey, J., which affirmed decisions of the Forest Service and Department of Agriculture to permit private interests to expand and develop the government-owned ski area on the San

Francisco Peaks in the Coconino National Forest. The Court of Appeals, Lumbard, Senior Circuit Judge, sitting by designation, held that: (1) decision to permit private interests to expand and develop government-owned ski area did not violate First Amendment rights of Navajo and Hopi Indian tribes, who were not denied access to the Peaks or impaired in their ability to gather sacred objects or conduct ceremonies, and (2) Forest Service did not violate the American Indian Religious Freedom Act or the National Historic Preservation Act.

Affirmed.

#### 1. Constitutional Law ⇌84

To be protected by free exercise clause of First Amendment, a belief or practice must be "rooted in religion." U.S.C.A. Const.Amend. 1.

#### 2. Constitutional Law ⇌84

Free exercise clause proscribes government action that burdens religious beliefs or practices unless the challenged action serves a compelling governmental interest that cannot be achieved in a less restrictive manner. U.S.C.A. Const.Amend. 1.

#### 3. Constitutional Law ⇌84

Initial burden of proof in free exercise cases is upon plaintiff to demonstrate a burden upon religion and only if a burden is proven does it become necessary to consider whether governmental interest served is compelling, or whether the government has adopted the least burdensome method of achieving its goal. U.S.C.A. Const.Amend. 1.

#### 4. Constitutional Law ⇌84

Decision to permit private interests to expand and develop government-owned ski area on the San Francisco Peaks in the Coconino National Forest did not violate First Amendment rights of Navajo and Hopi Indian tribes, who argued that the Peaks were sacred and that development of them would be a profane act and an affront to the deities but who were not denied access to the Peaks or impaired in their

ability to gather sacred objects or conduct ceremonies. U.S.C.A. Const.Amend. 1.

#### 5. Constitutional Law ⇌84

First Amendment right to hold religious beliefs is absolute. U.S.C.A. Const. Amend. 1.

#### 6. Constitutional Law ⇌84

Plaintiffs seeking to restrict governmental land use in a name of religious freedom must, at a minimum, demonstrate that government's proposed land use would impair a religious practice that could not be performed in any other site. U.S.C.A. Const.Amend. 1.

#### 7. Indians ⇌6

Forest Service did not burden religious practices of Navajo and Hopi Indians in any manner prohibited by American Indian Religious Freedom Act in permitting private interests to expand and develop government-owned ski area on San Francisco Peaks in the Coconino National Forest, which the Indians claimed to be sacred, where the decision would not deny Indians' access to the Peaks nor prevent them from collecting religious objects and where Forest Service held meetings with Indian religious practitioners and conducted public hearings on reservations and gave due consideration to the views expressed. American Indian Religious Freedom Act, § 1, 42 U.S.C.A. § 1996.

#### 8. Indians ⇌6

American Indian Religious Freedom Act requires federal agencies to consider, but not necessarily to defer to, Indian religious values; it does not prohibit agencies from adopting all land uses that conflict with traditional Indian religious beliefs or practices, rather, an agency undertaking a land use project will be in compliance with the Act if, in the decision-making process, it obtains and considers views of Indian leaders and if, in project implementation, it avoids unnecessary interference with Indian religious practices. American Indian Religious Freedom Act, § 1, 42 U.S.C.A. § 1996.

#### 9. Fish ⇌12

##### Game ⇌3½

Protection of section of Endangered Species Act requiring each federal agency to insure that its actions are not likely to jeopardize continued existence of any endangered or threatened species does not apply to those species which are unlisted and not proposed for listing. Endangered Species Act of 1973, § 7(a)(2), as amended, 16 U.S.C.A. § 1536(a)(2).

#### 10. Statutes ⇌220

Subsequent legislative history is not controlling evidence of intent underlying previously enacted legislation.

#### 11. Woods and Forests ⇌8

Forest Service, which permitted private interests to expand and develop government-owned ski area on San Francisco Peaks in the Coconino National Forest, would be required to comply with Endangered Species Act by taking appropriate measures to minimize danger to an alpine plant which was proposed for listing as a threatened species. Endangered Species Act of 1973, § 7(a)(3), as amended, 16 U.S.C.A. § 1536(a)(3).

#### 12. Health and Environment ⇌25.5(3)

Section of Wilderness Act authorizing President to recommend for inclusion in designated wilderness areas lands contiguous to areas formerly designated as "primitive" by Secretary of Agriculture applied only to primitive areas and lands contiguous thereto and therefore Forest Service's approval of development of government-owned ski area in an area which was neither contained in nor contiguous to any primitive area did not violate the Act. Wilderness Act, § 3(b), 16 U.S.C.A. § 1132(b).

#### 13. Health and Environment ⇌25.5(8)

Forest Service, which conducted only a partial survey of the impact area and found no effect on a nearby ranch and that the Peaks themselves were not eligible for listing near the National Register, did not violate National Historic Preservation Act in approving development of government-

owned ski area on the San Francisco Peaks in the Coconino National Forest. Executive Order No. 11593, § 1 et seq., 16 U.S.C.A. § 470 note.

#### 14. Health and Environment ⇐25.5(8)

Complete survey of the impact area is not required under the National Historic Preservation Act where both a partial survey and all other evidence indicate that a complete survey would be fruitless. Executive Order No. 11593, § 1 et seq., 16 U.S.C.A. § 470 note.

#### 15. Woods and Forests ⇐8

Statutory section authorizing permit areas no larger than 80 acres did not constitute the sole authority under which Secretary of Agriculture could grant permits for the private recreational development of national forest lands and did not limit the Secretary of Agriculture's authority to issue permits under statutory section authorizing the Secretary to make such rules and regulations as will ensure the objects of such reservations to regulate their occupancy and use and to preserve the forests thereon from destruction. 16 U.S.C.A. §§ 497, 551.

#### 16. Woods and Forests ⇐8

Forest Service, which approved development of government-owned ski area on National Forest Lands, had authority to grant dual permits to ski resort operator. 16 U.S.C.A. §§ 497, 551.

Appeals from the United States District Court for the District of Columbia (D.C. Civil Action Nos. 81-00558, 81-00481 & 81-00493).

John Paul Kennedy, Salt Lake City, Utah, with whom David B. Lee, Salt Lake City, Utah, was on the brief, for Hopi Indian Tribe, appellant in Nos. 81-1912 and 82-1706. C. Benson Hufford, Tuba City, Ariz., also entered an appearance for appellant, in No. 81-1912. Richard M. Hymas, Salt Lake City, Utah, also entered an appearance for Hopi Indian Tribe in Nos. 82-1705, 82-1706 and 82-1725.

\* Sitting by designation pursuant to 28 U.S.C.

John A. MacKinnon, Tuba City, Ariz., with whom Elizabeth Bernstein and C. Benson Hufford, Tuba City, Ariz., were on the brief, for Navajo Medicinemen's Association, et al., appellants in Nos. 81-1956 and 82-1705. Daniel S. Press, Window Rock, Ariz., also entered an appearance for appellants in No. 81-1956. C. Benson Hufford, Tuba City, Ariz., also entered an appearance for Navajo Medicinemen's Association, et al., in No. 82-1725.

Charles R. Work, Chicago, Ill., with whom Robert W. Warden, Douglas J. Wall, Flagstaff, Ariz., John A. Hodges, and Robert A. Warden, Washington, D.C., were on the brief, for Richard F. Wilson and Jean Wilson, appellants in Nos. 81-1905 and 82-1725, and amici curiae in Nos. 81-1912, 81-1956, 82-1705 and 82-1706.

Jacques B. Gelin, Atty., Dept. of Justice, Washington, D.C., with whom Patricia J. Beneke and Robert L. Klarquist, Attys., Dept. of Justice, Washington, D.C., were on the brief, for appellees. Robert D. Clark, Atty., Dept. of Justice, Washington, D.C., also entered an appearance for appellees in Nos. 81-1905, 81-1912 and 81-1956.

Richard McCune Shannon, Phoenix, Ariz., and Stephen P. Kling, Baltimore, Md., were on the brief for appellee, Northland Recreation Inc.

Ellen Leitzer, Albuquerque, N.M., was on the brief, for Eastern Band of Cherokee Indians, et al., amici curiae urging reversal in Nos. 81-1905, 81-1912 and 81-1956.

Before TAMM and GINSBURG, Circuit Judges, and LUMBARD,\* Senior Circuit Judge, United States Court of Appeals for the Second Circuit.

Opinion for the Court filed by Senior Circuit Judge LUMBARD.

LUMBARD, Senior Circuit Judge:

These appeals challenge the grant of summary judgment by the District Court for the District of Columbia which affirmed the decisions of the Forest Service and the

§ 294(d).

Department of Agriculture to permit private interests to expand and develop the government-owned Snow Bowl ski area on the San Francisco Peaks in the Coconino National Forest just north of Flagstaff, Arizona. The appeals are brought by the Hopi Indian Tribe, the Navajo Medicine-men's Association and other Navajos, and Richard F. Wilson, et al. each of whom filed separate suits which were consolidated for trial by Judge Richey. We affirm.

The Navajo and Hopi Indian tribes are federally recognized tribes of American Indians. The Hopi reservation and most of the Navajo reservation are located in north-eastern Arizona and encompass a total area of 25,000 square miles. Approximately 9,000 Hopis and 160,000 Navajos reside on the reservations.

The dominant geological formation visible from the Hopi villages and much of the western Navajo reservation is the San Francisco Peaks. The Peaks, which rise to a height of 12,633 feet, have for centuries played a central role in the religions of the two tribes. The Navajos believe that the Peaks are one of the four sacred mountains which mark the boundaries of their homeland. They believe the Peaks to be the home of specific deities and consider the Peaks to be the body of a spiritual being or god, with various peaks forming the head, shoulders, and knees of a body reclining and facing to the east, while the trees, plants, rocks, and earth form the skin. The Navajos pray directly to the Peaks and regard them as a living deity. The Peaks are invoked in religious ceremonies to heal the Navajo people. The Navajos collect herbs from the Peaks for use in religious ceremonies, and perform ceremonies upon the Peaks. They believe that artificial development of the Peaks would impair the Peaks' healing power.

The Hopis believe that the Creator uses emissaries to assist in communicating with mankind. The emissaries are spiritual beings and are generally referred to by the Hopis as "Kachinas." The Hopis believe that for about six months each year, commencing in late July or early August and

extending through mid-winter, the Kachinas reside at the Peaks. During the remaining six months of the year the Kachinas travel to the Hopi villages and participate in various religious ceremonies and practices. The Hopis believe that the Kachinas' activities on the Peaks create the rain and snow storms that sustain the villages. The Hopis have many shrines on the Peaks and collect herbs, plants and animals from the Peaks for use in religious ceremonies. The Hopis believe that use of the Peaks for commercial purposes would constitute a direct affront to the Kachinas and to the Creator.

The San Francisco Peaks are within the Coconino National Forest and are managed by the Forest Service. A 777 acre portion of the Peaks, known as the "Snow Bowl," has been used for downhill skiing since 1937 when the Forest Service build a road and ski lodge. The lodge was destroyed by fire in 1952 and was replaced in 1956. Ski lifts were built at the Snow Bowl in 1958 and 1962. Since 1962 the facilities have changed very little.

In April 1977 the Forest Service transferred the permit to operate the Snow Bowl skiing facilities from Summit Properties, Inc. to the Northland Recreation Company. In July 1977 Northland submitted to the Forest Service a "master plan" for the future development of the Snow Bowl, which contemplated the construction of additional parking and ski slopes, new lodge facilities, and ski lifts. The Forest Service, pursuant to the National Environmental Policy Act, conducted public workshops and solicited alternatives to Northland's plan. The Forest Service evaluated the proposed alternatives and identified six which were feasible and represented the spectrum of public opinion. These alternatives ranged from complete elimination of artificial structures in the Snow Bowl to full development as proposed by Northland. On June 23, 1978 the Forest Service filed a draft Environmental Impact Statement evaluating the six alternatives. Between June 23 and September 30, 1978 the Forest Service solicited public opinion on the draft Environmental

Impact Statement. Special efforts were made to solicit the views of the Hopis and Navajos.

On February 27, 1979 the Forest Supervisor of the Coconino National Forest issued his decision to permit moderate development of the Snow Bowl under a "Preferred Alternative," which in fact was not one of the six alternatives previously identified. The Preferred Alternative envisions the clearing of 50 acres of forest for new ski runs, instead of the 120 acres requested by Northland. The Preferred Alternative also authorizes construction of a new day lodge, improvement of restroom facilities, reconstruction of existing chair lifts, construction of three new lifts, and the paving and widening of the Snow Bowl road.

At the request of various persons, including certain of the plaintiffs, the Regional Forester on February 7, 1980 overruled the Forest Supervisor and ordered maintenance of the status quo. The Chief Forester on December 31, 1980 reversed the Regional Forester and reinstated the Forest Supervisor's approval of the Preferred Alternative.

On March 2, 1981, the Navajo Medicine-men's Association filed suit in the District Court for the District of Columbia, naming as defendants John R. Block, Secretary of Agriculture; R. Max Peterson, Chief Forester of the Forest Service; the Forest Service; and the United States. The complaint sought a halt to further development of the Snow Bowl and the removal of existing ski facilities. This suit was consolidated with similar suits brought by the Hopi tribe and Jean and Richard Wilson, owners of a ranch located a mile and a half below the Snow Bowl.

The plaintiffs alleged that expansion of the Snow Bowl facilities would violate the Indians' First Amendment right to the free exercise of religion, the American Indian Religious Freedom Act, the fiduciary duties owed the Indians by the government, the Endangered Species Act, two statutes regulating private use of national forest land (16 U.S.C. §§ 497, 551), the National Historic Preservation Act, the Multiple-Use Sustained Yield Act, the Wilderness Act, the

National Environmental Policy Act, and the Administrative Procedure Act.

Pursuant to expedited procedures agreed to by all the parties, numerous affidavits were submitted together with a Joint Stipulation of Material Facts. The parties filed cross-motions for summary judgment. While these motions were pending the district court on May 27, 1981 permitted Northland to intervene as a defendant. After a hearing, Judge Richey on June 15, 1981 granted summary judgment to the defendants on all issues except the plaintiffs' claim under the National Historic Preservation Act. Finding that the Forest Service had failed to comply with certain requirements of that Act, Judge Richey remanded the cause to the Forest Service for further proceedings and stayed development until compliance. After the defendants reported back, Judge Richey on May 14, 1982 ruled that the Forest Service had achieved compliance and he entered final judgment for the defendants on all issues and vacated his stay. These appeals followed promptly and the defendants have agreed to delay development pending their disposition.

From our review of the record we are convinced that Judge Richey's conclusions of law are in accordance with precedent and not in error. Accordingly, we affirm the judgments. Our opinion considers in detail the claims raised by the plaintiffs under the following constitutional provisions and statutes: the Free Exercise Clause, the American Indian Religious Freedom Act, the Establishment Clause, the Endangered Species Act, the Wilderness Act, the National Historic Preservation Act, and 16 U.S.C. §§ 497, 551.

#### 1. *Free Exercise of Religion.*

Religious freedom is guaranteed by the First Amendment, which states: "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof." The Navajo and Hopi plaintiffs contend that development of the Snow Bowl is inconsistent with their First Amendment right freely to hold and prac-

tice their religious beliefs.<sup>1</sup> Believing the San Francisco Peaks to be sacred, they feel that development of the Peaks would be a profane act, and an affront to the deities, and that, in consequence, the Peaks would lose their healing power and otherwise cease to benefit the tribes. They contend that development would seriously impair their ability to pray and conduct ceremonies upon the Peaks, and to gather from the Peaks the sacred objects, such as fir boughs and eaglets, which are necessary to their religious practices. As relief, the Navajos and Hopis seek a phased removal of all artificial structures on the Peaks, or, at the least, an injunction against further development of the Snow Bowl. Judge Richey, although he recognized the sincerity of the plaintiffs' beliefs, held that a First Amendment claim had not been stated. He found that the government had not denied the Indians access to the Peaks or impaired their ability to gather sacred objects and conduct ceremonies, and thus had not burdened their beliefs or religious practices. We agree with Judge Richey that the plaintiffs have not shown an impermissible burden on religion.

[1] To be protected by the Free Exercise Clause of the First Amendment, a belief or practice must be "rooted in religion." *Thomas v. Review Bd. of the Indiana Employment Sec. Div.*, 450 U.S. 707, 713, 101 S.Ct. 1425, 1429, 67 L.Ed.2d 624 (1981). The parties have stipulated that the plaintiffs' beliefs are religious and are sincerely held, and the record contains abundant evidence supporting that stipulation. We therefore proceed directly to apply the Free Exercise Clause to the plaintiffs' claims and the proof before us.

1. Judge Richey properly ruled that Jean and Richard Wilson, who are not Indians, did not have standing to assert the Navajo and Hopi religious claims. See, e.g., *Singleton v. Wulff*, 428 U.S. 106, 114, 96 S.Ct. 2868, 2874, 49 L.Ed.2d 826 (1976). We have, however, considered the Wilsons' briefs on the religious claims as briefs of *amicus curiae*.

2. The plaintiffs claim that further development of the Snow Bowl could have a serious and adverse impact upon their tribes' cultures and social organization. Abbott Sekaquaptewa, then-chairman of the Hopi tribe, stated in "Nar-

[2, 3] The Free Exercise Clause proscribes government action that burdens religious beliefs or practices, unless the challenged action serves a compelling governmental interest that cannot be achieved in a less restrictive manner. See, e.g., *Badoni v. Higginson*, 638 F.2d 172, 176-77 (10th Cir. 1980), *cert. denied*, 452 U.S. 954, 101 S.Ct. 3099, 69 L.Ed.2d 965 (1981), *Barnett v. Rodgers*, 410 F.2d 995, 1000 (D.C.Cir.1969). The initial burden of proof in free exercise cases is upon the plaintiff to demonstrate a burden upon religion. See *School Dist. of Abington v. Schempp*, 374 U.S. 203, 223, 83 S.Ct. 1560, 1572, 10 L.Ed.2d 844 (1963). Only if a burden is proven does it become necessary to consider whether the governmental interest served is compelling, or whether the government has adopted the least burdensome method of achieving its goal. In analyzing the plaintiff's contention that the ski resort expansion will burden their religions, we consider separately the effects of development upon their beliefs and upon their religious practices.

[4] The plaintiffs stress that development of the Snow Bowl for a ski resort is grossly inconsistent with their beliefs. The Hopis and the Navajos believe that they owe a duty to the deities to maintain the San Francisco Peaks in their natural state. They believe that breach of that duty will lead to serious adverse consequences for their peoples. Navajo and Hopi religious practitioners are deeply troubled by the development that has already occurred upon the Peaks, and expansion of the Snow Bowl will increase their disquiet.<sup>2</sup>

rative Direct Testimony" submitted to the district court:

It is my opinion that in the long run if the expansion is permitted, we will not be able successfully to teach our people that this is a sacred place. If the ski resort remains or is expanded, our people will not accept the view that this is the sacred Home of the Kachinas. The basis of our existence as a society will become a mere fairy tale to our people. If our people no longer possess this long-held belief and way of life, which will inevitably occur with the continued presence of the ski resort . . . a direct and negative

[5] The First Amendment right to hold religious beliefs is absolute. *Cantwell v. Connecticut*, 310 U.S. 296, 303, 60 S.Ct. 900, 903, 84 L.Ed. 1213 (1940). The Free Exercise Clause "categorically prohibits government from regulating, prohibiting, or rewarding religious beliefs as such." *McDaniel v. Paty*, 435 U.S. 618, 626, 98 S.Ct. 1322, 1327, 55 L.Ed.2d 593 (1978). Notwithstanding the plaintiffs' concerns, it is clear that the government has not regulated, prohibited, or rewarded their religious beliefs as such, nor has it in any manner directly burdened the plaintiffs in their beliefs. The Free Exercise Clause, however, also proscribes certain *indirect* burdens on belief. Arguing that an impermissible indirect burden has been imposed, the plaintiffs direct our attention to *Sherbert v. Verner*, 374 U.S. 398, 83 S.Ct. 1790, 10 L.Ed.2d 965 (1963) and *Thomas v. Review Board of the Indiana Employment Sec. Div.*, 450 U.S. 707, 101 S.Ct. 1425, 67 L.Ed.2d 624 (1981).

In *Sherbert*, the plaintiff, a Seventh-Day Adventist, was discharged by her employer because she refused to work on Saturday, the Sabbath Day of her faith. The South Carolina Employment Security Commission refused the plaintiff's application for unemployment benefits, finding that her religious convictions did not constitute "good cause" for refusing available work. The South Carolina Supreme Court upheld the Commission's determination. The Supreme Court reversed. The fact that no criminal sanctions compelled the plaintiff to violate her beliefs, said the Court, did not end the free exercise inquiry. Instead, held the Court, the government burdens the free exercise of religion when it conditions receipt of a government benefit, such as unemployment compensation, on conduct inconsistent with the recipient's religious beliefs. In *Thomas*, the plaintiff, a Jehovah's Witness, quit his job at a factory producing tank turrets because he believed armaments production to be inconsistent with his faith. The Indiana Supreme Court held that the plaintiff's decision to quit employment because of his religious convictions did not

constitute "good cause" and denied him unemployment benefits. The Supreme Court reversed, holding, as it did in *Sherbert*, that the government burdens free exercise when it forces an individual to choose between a government benefit and fidelity to religious belief. The Court stated:

Where the state conditions receipt of an important benefit upon conduct proscribed by a religious faith, or where it denies such a benefit because of conduct mandated by religious belief, thereby putting substantial pressure on an adherent to modify his behavior and to violate his beliefs, a burden upon religion exists. While the compulsion may be indirect, the infringement upon free exercise is nonetheless substantial.

450 U.S. at 717-18, 101 S.Ct. at 1431-1432.

*Sherbert* and *Thomas* are not factually analogous to the present case. The government here has not conditioned any benefit upon conduct proscribed or mandated by the plaintiffs' beliefs. Acknowledging this factual distinction, the plaintiffs read *Sherbert* and *Thomas* broadly as condemning under the Free Exercise Clause governmental actions which strongly, if indirectly, encourage religious practitioners to modify their beliefs. Specifically, the plaintiffs argue that governmental actions which "desecrate and destroy the spiritual character of a religion's most sacred shrine" and which may thereby force practitioners "to fundamentally modify their religious doctrine to conform to the changed circumstance" create free exercise burdens under *Sherbert* and *Thomas*. We disagree. *Sherbert* and *Thomas* hold only that the government may not, by conditioning benefits, penalize adherence to religious belief. Many government actions may offend religious believers, and may cast doubt upon the veracity of religious beliefs, but unless such actions penalize faith, they do not burden religion. The Secretary of Agriculture has a statutory duty, see, e.g., 16 U.S.C. §§ 471, 528 (1976) to manage the National Forests in the public interest, and he has determined that the public interest would best be

impact upon our religious practices [will result]. The destruction of these practices will

also destroy our present way of life and culture.

served by expansion of the Snow Bowl ski area. In making that determination, the Secretary has not directly or indirectly penalized the plaintiffs for their beliefs. The construction approved by the Secretary is, indeed, inconsistent with the plaintiffs' beliefs, and will cause the plaintiffs spiritual disquiet, but such consequences do not state a free exercise claim under *Sherbert, Thomas*, or any other authority.<sup>3</sup> In sum, the plaintiffs have not shown that expansion of the Snow Bowl will burden their freedom to believe. A separate question, to which we now turn, is whether expansion will burden the plaintiffs in the practice of their religions.

The plaintiffs must have access to the San Francisco Peaks to practice their religions. Certain of the plaintiffs' ceremonies must be performed upon the Peaks and religious objects must be collected there. Because the plaintiffs' religions are, in this sense, site specific, development of the Peaks would severely impair the practice of the religions if it destroyed the natural conditions necessary for the performance of ceremonies and the collection of religious objects. The plaintiffs claim that the Preferred Alternative will impair their religious practices in precisely that manner. Few courts have considered whether the Free Exercise Clause prohibits the government from permitting land uses that impair

specific religious practices. Of the cases which have considered this problem, we find *Sequoyah v. TVA*, 620 F.2d 1159 (6th Cir.), cert. denied, 449 U.S. 953, 101 S.Ct. 357, 66 L.Ed.2d 216 (1980), to be particularly instructive.

In *Sequoyah*, a class action brought on behalf of practitioners of the Cherokee religion, the plaintiffs sought to halt construction of the Tellico Dam on the Little Tennessee River. The plaintiffs alleged that the dam, when completed, would flood the Cherokee "sacred homeland" along the river, and would destroy "sacred sites, medicine gathering sites, holy places and cemeteries," and "disturb the sacred balance of the land." 620 F.2d at 1160. The Sixth Circuit affirmed a grant of summary judgment to the defendant, ruling that the plaintiffs, to establish a burden on free exercise, had to prove that the valley to be flooded was indispensable or central to their ceremonies and practices. The plaintiffs' proof was insufficient, held the court, as the evidence indicated that medicines obtainable in the valley could be obtained elsewhere, and that the flooding would not prevent the plaintiffs from engaging in any particular religious observances.<sup>4</sup>

[6] Judge Richey relied upon the *Sequoyah* analysis in the present case, and held that the plaintiffs had failed to show

3. *Pillar of Fire v. Denver Urban Renewal Authority*, 181 Colo. 411, 509 P.2d 1250 (1973), is not to the contrary. In *Pillar of Fire*, the plaintiff church sought to enjoin the condemnation by an urban renewal project of its first permanent church building. The plaintiff alleged that its members revered the building for its historical and symbolic meaning in the birth of their sect. The Colorado Supreme Court held that the plaintiff was entitled to a court hearing at which its interests could be weighed against those of the renewal authority. "(R)eligious faith and tradition," said the court, "can invest certain structures and land sites with significance which deserves First Amendment protection." 181 Colo. at 419, 509 P.2d at 1254. A governmental taking of privately-owned religious property, however, involves different considerations than does a claimed First Amendment right to restrict the government's use of its own land.

4. Four cases in addition to *Sequoyah* have considered free exercise claims seeking to restrict development of government land. In *Badoni v.*

*Higginson*, 638 F.2d 172 (10th Cir.1980), cert. denied, 452 U.S. 954, 101 S.Ct. 3099, 69 L.Ed.2d 695 (1981), Navajo religious practitioners believed that the Rainbow natural bridge, a great arch of sandstone located in the Rainbow Bridge National Monument in Utah, was sacred. They complained that a government reservoir which had partially inundated the bridge had covered some of their gods and prayer sites, and that the noisy tourists who visited the bridge desecrated the site and made ceremonies impractical. As relief, the plaintiffs requested the court to order the government to lower the reservoir, to issue regulations controlling tourist behavior, and on appropriate notice, to close the monument to tourists so that ceremonies could be conducted. The Tenth Circuit affirmed a district court decision denying relief. The Tenth Circuit held that the government had a compelling interest in filling the reservoir that outweighed any First Amendment right the plaintiffs might assert, and that closing the Monument, or restricting tourist behavior, to accommodate the plaintiffs' beliefs

the indispensability of the Snow Bowl to the practice of their religions. The plaintiffs challenge Judge Richey's reliance upon *Sequoyah* on two grounds. They argue first that *Sherbert* and *Thomas*, and not *Sequoyah*, establish the standard applicable to their claim. They contend that governmental action which indirectly imposes a burden upon religious practice greater than the burdens involved in *Sherbert* and *Thomas* necessarily violates the First Amendment. Contending that the Snow Bowl ski area effectively prohibits the practice of their religions, the plaintiffs claim that their burden is greater than that of the practitioners in *Sherbert* and *Thomas*, who, the plaintiffs say, could have continued to practice their beliefs simply by choosing to forego government benefits. However, as we previously stated, *Sherbert* and *Thomas* considered only whether the government may legally condition benefits on a decision to forego or to adhere to religious belief or practice. Those cases did not purport to create a benchmark against which to test all indirect burden claims. Second, the plaintiffs argue that *Sequoyah* incorrectly interpreted the First Amendment. They argue that the First Amendment protects all religious practices, whether or not "cen-

would violate the Establishment Clause. Ruling as it did, the Tenth Circuit never considered in detail whether the Free Exercise Clause can create a right to restrict government land use. The decision in *Badoni* therefore offers little guidance here. In *Crow v. Gullet*, 541 F.Supp. 785 (D.S.D.1982), a class action on behalf of the Lakota and Tsistsistas nations, and Lakota and Tsistsistas religious practitioners, the plaintiffs objected to certain construction projects and park regulations at the Bear Butte State Park in South Dakota. The plaintiffs alleged, *inter alia*, that Bear Butte was a significant site in their religions that would be desecrated by the access roads, parking lot, and viewing platforms that the state had built or was planning to build. The district court denied relief, holding that "the free exercise clause places a duty upon a state to keep from prohibiting religious acts, not to provide the means or the environment for carrying them out." 541 F.Supp. at 791. It is uncertain, however, whether the court believed that the Free Exercise Clause can never restrict government land use, since the court specifically noted that the plaintiffs had "failed to establish that particular religious practices were dam-

aged by the construction." *Id.* In *Inupiat Community of Arctic Slope v. United States*, 548 F.Supp. 182, 188-89 (D.Alaska 1982), the Inupiat people of Alaska brought suit to quiet title to portions of the Beaufort and Chukchi Seas in which the United States had issued oil leases. The plaintiffs claimed, *inter alia*, that development would burden their right freely to practice their religion. The court rejected the plaintiffs' claim, finding that the plaintiffs had failed to show impairment of their religious practices, that the government had a compelling interest in developing energy resources, and that the Establishment Clause in any event barred relief. Finally, in *Northwest Indian Cemetery Protective Assoc. v. Peterson*, 552 F.Supp. 951 (N.D.Cal.1982), the plaintiffs, claiming that their religious activities would be disrupted, sought to enjoin the Forest Service from approving construction of a road upon land sacred to several Northwest Indian tribes. The court held for the defendants, and stated that the First Amendment does not obligate the government "to control or limit public access to public lands in order to facilitate" religious practices. 552 F.Supp. at 954.

tral," and that courts are not competent to rule upon the centrality of religious belief or practice. We agree that the First Amendment protection of religion "does not turn on the theological importance of the disputed activity," *Unitarian Church West v. McConnell*, 337 F.Supp. 1252, 1257 (E.D. Wis.1972), *affd.*, 474 F.2d 1351 (7th Cir. 1973), *vacated and remanded on other grounds*, 416 U.S. 932, 94 S.Ct. 1927, 40 L.Ed.2d 283 (1974) and that courts may not "dictate which practices are or are not required in a particular religion." *Geller v. Secretary of Defense*, 423 F.Supp. 16, 17 (D.D.C.1976). See *Thomas*, 450 U.S. at 715-16, 101 S.Ct. at 1430-1431; *Serbian Eastern Orthodox Diocese v. Milivojevich*, 426 U.S. 696, 708-20, 96 S.Ct. 2372, 2380-2385, 49 L.Ed.2d 151 (1976). These principles, however, are not contrary to *Sequoyah's* analysis. Far from requiring judicial evaluation of religious doctrine, *Sequoyah* focuses inquiry solely upon the importance of the geographic site in question to the practice of the plaintiffs' religion. If the plaintiffs cannot demonstrate that the government land at issue is indispensable to some religious practice, whether or not central to their religion, they have not justified a First Amendment claim. We agree with

*Sequoyah's* resolution of the conflict between the government's property rights and duties of public management, and a plaintiff's constitutional right freely to practice his religion. We thus hold that plaintiffs seeking to restrict government land use in the name of religious freedom must, at a minimum, demonstrate that the government's proposed land use would impair a religious practice that could not be performed at any other site.<sup>5</sup>

The plaintiffs argue that their proof establishes a denial of First Amendment rights even under the above standard. They rely principally upon the affidavits submitted by Hopi and Navajo religious practitioners, which establish that ceremonies conducted upon the Peaks are indispensable to the plaintiffs' religions; that ceremonial objects must be collected from the Peaks to be effective; that some ceremonial objects and medicinal herbs are collected from the Snow Bowl, and that expansion of the ski area could make those objects and herbs more difficult to find; that ceremonies and prayers have occasionally been conducted in the Snow Bowl, but that expansion of the ski area will destroy the natural conditions necessary for prayers and ceremonies to be effective; and that the mountain as a whole, and not just parts thereof, is considered sacred.

The plaintiffs' affidavits, together with other evidence in the record, establish the indispensability of the Peaks to the practice

of the plaintiffs' religions. The Forest Service, however, has not denied the plaintiffs access to the Peaks, but instead permits them free entry onto the Peaks and does not interfere with their ceremonies or the collection of ceremonial objects. At the same time, the evidence does not show the indispensability of that small portion of the Peaks encompassed by the Snow Bowl permit area. The plaintiffs have not proven that expansion of the ski area will prevent them from performing ceremonies or collecting objects that can be performed or collected in the Snow Bowl but nowhere else. The record evidence is, in fact, to the contrary. The Forest Service's Final Environmental Statement found, on the basis of comments submitted by Hopi and Navajo practitioners, that "religious practices, including collecting plant materials, may occur in many locations on the sacred mountain." The government submitted affidavits from two experts on Hopi and Navajo religion. One expert stated that expansion of the Snow Bowl should have little "direct" impact on the plaintiffs' religious practices; the other stated with respect to Hopi practices that "(g)uarantee of access to the mountain should permit the continuation of all essential ritual practices," and with respect to Navajo practices that "(n)o ceremonial items . . . are found only in the permit area." It must be remembered that the Snow Bowl permit area comprises only 777 of the 75,000 acres of the Peaks, and

5. We do not hold that such proof necessarily would establish a burden on free exercise. Instead, we hold only that the First Amendment requires, at a minimum, proof that the religious practice could not be performed at any site other than that to be developed. Because we agree with Judge Richey that the plaintiffs have not satisfied this minimum burden of proof, we need not consider what, if any, additional factors are necessary to establish a free exercise burden. At the same time, we decline to follow those cases which have placed primary reliance upon the government's property interest and which have held, apparently, that the Free Exercise Clause can never supersede the government's ownership rights and duties of public management. See *Crow v. Gullet*, 541 F.Supp. 785, 791 (D.S.D.1982); *Northwest Indian Protective Cemetery Assoc. v. Peterson*, 552 F.Supp. 951, 954 (N.D.Cal.1982). The government must manage its land in accord-

ance with the constitution, *Badoni v. Higginson*, 638 F.2d 172, 176 (10th Cir.1980), cert. denied, 452 U.S. 954, 101 S.Ct. 3099, 69 L.Ed.2d 695 (1981); *Sequoyah v. TVA*, 620 F.2d 1159, 1164 (6th Cir.1980), cert. denied, 449 U.S. 953, 101 S.Ct. 357, 66 L.Ed.2d 216 (1980), which nowhere suggests that the Free Exercise Clause is inapplicable to government land. This is not to say that the government's property rights, and its duty to manage its land for the public benefit, have no bearing upon the free exercise analysis. In holding that government land uses can never burden the right to freedom of belief, and can burden the right to freedom of practice only if site-specific religious practices are significantly impaired, we pay due regard to the government's rights and duties in its land. However, we see no basis for completely exempting government land use from the Free Exercise Clause.

that prior construction on the Peaks has not prevented the plaintiffs from practicing their religions.<sup>6</sup> Judge Richey found that "the Snow Bowl operation has been in existence for nearly fifty years and it appears that plaintiffs' religious practices and beliefs have managed to coexist with the diverse developments that have occurred there." (footnote omitted). The plaintiffs simply have not demonstrated that development will prevent them from engaging in any religious practices.<sup>7</sup>

As the plaintiffs have not shown that development will burden them in their religious beliefs or practices, we need not decide whether the ski area expansion is a compelling governmental interest, or whether the Preferred Alternative is the least restrictive means of achieving that interest.

## 2. American Indian Religious Freedom Act.

[7] The American Indian Religious Freedom Act, 42 U.S.C. § 1996 (Supp. IV 1980) (AIRFA), provides:

6. Among the structures currently on the Peaks are natural gas, telephone, and electric transmission lines, water tanks for stock, unpaved roads, and the present Snow Bowl ski resort. Cinder extraction and mining have been conducted on the Peaks for at least the past 30 years.

7. The plaintiffs urge that Judge Richey erred in granting the defendants summary judgment because material issues of fact were in dispute. They argue that when Judge Richey granted summary judgment the parties still disputed the effect development would have upon the plaintiffs' religions. We conclude, however, that in light of the case's procedural posture judgment was properly granted. On May 20, 1981, the parties filed with the district court a Joint Stipulation of Material Acts (supplemented on June 1, 1981). Although the stipulated facts did not dispose of one crucial factual issue—the indispensability of the permit area to the practice of the plaintiffs' religions—they did establish many of the principal facts underlying the plaintiffs' claim. The parties supplemented the stipulated facts with numerous affidavits concerning the religious significance of the Snow Bowl. The parties filed with their affidavits cross-motions for summary judgment which were argued before Judge Richey. When Judge Richey asked counsel for the Hopis whether the plaintiffs had "any reservations

On and after August 11, 1978 it shall be the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

The plaintiffs contend that AIRFA proscribes all federal land uses that conflict or interfere with traditional Indian religious beliefs or practices, unless such uses are justified by compelling governmental interests. They argue that the Snow Bowl ski resort expansion is not a compelling governmental interest, and is accordingly proscribed by AIRFA. Judge Richey refused to give AIRFA the broad reading urged by plaintiffs. He found that AIRFA requires federal agencies to evaluate their policies and procedures with the aim of protecting Indian religious freedom, to refrain from

about the Court deciding this on the merits by virtue of stipulation and the affidavits," he replied, "Not at all, Your Honor." We thus find that the plaintiffs agreed to the disposition of this claim on the written record. As the Ninth Circuit stated in *Gillespie v. Norris*, 231 F.2d 881, 883-84 (9th Cir.1956):

Now, while summary judgment cannot be granted where there are questions of fact to be disposed of, even by consent of all concerned, there is no reason why parties cannot agree to try a case upon affidavits, admissions and agreed documents. In effect, that is what was done here. No objection whatever was made at the time of submission that there were questions of fact which could not be decided upon the evidence before the trial court.

*Accord, Starsky v. Williams*, 512 F.2d 109, 111-13 (9th Cir.1975). Upon his review of the written record, Judge Richey found that the plaintiffs had not "shown that the permit area of the San Francisco Peaks is central or indispensable to their religion." This finding is not clearly erroneous and, indeed, is not significantly refuted by any evidence in the record. We must emphasize that evidence that all of San Francisco Peaks, including the Snow Bowl, is sacred, does not establish the indispensability of the permit area.

prohibiting access, possession and use of religious objects and the performance of religious ceremonies, and to consult with Indian organizations in regard to proposed actions, but that AIRFA does not require "Native traditional religious considerations always [to] prevail to the exclusion of all else." We agree. Judge Richey's interpretation of AIRFA<sup>8</sup> is fully supported by the legislative history, and the record supports his finding of Forest Service compliance.

[8] AIRFA affirms the protection and preservation of traditional Indian religions as a policy of the United States, but the statutory language does not indicate the extent to which Congress intended that policy to override other land use considerations. We therefore look for guidance to the legislative history, and, in particular, to the substantially identical committee reports prepared by the Senate Select Committee on Indian Affairs and the House Committee on Interior and Insular Affairs. These reports reveal that in AIRFA Congress addressed the unwarranted and often unintended intrusions upon Indian religious practices resulting from federal officials' ignorance and the inflexible enforcement of laws and regulations which, though intended to achieve valid secular goals, had directly affected Indian religious practices. The reports identify three areas of concern: (1) denial of access to religious sites; (2) restrictions on the possession of such substances as peyote; and (3) actual interference with religious events. The federal government, the reports note, had sometimes denied Indians access to religious sites on federal land; had failed to accommodate such federal statutes as the drug and endangered species laws to the Indians' religious needs, and had itself interfered, or permitted others to interfere, with religious observances. See S.Rep. No. 709, 95th Cong., 2d Sess. 2-4; H.R.Rep. No. 1308, 95th Cong., 2d Sess. 2-3, *reprinted in* 1978 U.S.Code Cong. & Ad.News 1262, 1263-64. Thus, the House Report stated that the

purpose of AIRFA is "to insure that the policies and procedures of various Federal agencies, as they may impact upon the exercise of traditional Indian religious practices, are brought into compliance with the constitutional injunction that Congress shall make no laws abridging the free exercise of religion." H.R.Rep. No. 1308, *supra*, at 1, 1978 U.S.Code Cong. & Ad.News at 1262.

It is clear from the reports, and from the statutory preamble, that AIRFA requires federal agencies to learn about, and to avoid unnecessary interference with, traditional Indian religious practices. Agencies must evaluate their policies and procedures in light of the Act's purpose, and ordinarily should consult Indian leaders before approving a project likely to affect religious practices. AIRFA does not, however, declare the protection of Indian religions to be an overriding federal policy, or grant Indian religious practitioners a veto on agency action. "The clear intent of [AIRFA]," the Senate report states, "is to insure for traditional native religions the same rights of free exercise enjoyed by more powerful religions. However, it is in no way intended to provide Indian religions with a more favorable status than other religions, only to insure that the U.S. Government treats them equally." S.Rep. No. 709, *supra*, at 6. The comments made during debate by Representative Udall of Arizona, the chairman of the Interior and Insular Affairs Committee and the sponsor of the House bill, similarly indicate that AIRFA does not supersede the many laws under which federal lands are managed for the public good. Representative Udall stated:

Mr. Speaker, it is not the intent of my bill to wipe out laws passed for the benefit of the general public or to confer special religious rights on Indians.

\* \* \* \* \*

Mr. Speaker, I have received a letter from Assistant Attorney General Patricia M. Wald which . . . states that it is the

8. Judge Richey's decision marked the first judicial interpretation of AIRFA. Courts in only two other circuits have since construed AIRFA, and both followed Judge Richey's interpreta-

tion. *Northwest Indian Cemetery Protective Assoc. v. Peterson*, 552 F.Supp. 951, 954 (N.D. Cal.1982); *Crow v. Gullet*, 541 F.Supp. 785, 793-94 (D.S.D.1982).

Department's understanding that this resolution, in and of itself, does not change any existing State or Federal law. That, of course, is the committee's understanding and intent.

124 Cong.Rec. 21,444 (1978).

All this simple little resolution says to the Forest Service, to the Park Service, to the managers of public lands is that if there is a place where Indians traditionally congregate to hold one of their rites and ceremonies, let them come on unless there is some overriding reason why they should not.

\* \* \* \* \*

(The resolution) simply says to our managers of public lands that they ought to be encouraged to use these places. It has no teeth in it. It is the sense of the Congress.

*Id.* at 21,445.

Thus AIRFA requires federal agencies to consider, but not necessarily to defer to, Indian religious values. It does not prohibit agencies from adopting all land uses that conflict with traditional Indian religious beliefs or practices. Instead, an agency undertaking a land use project will be in compliance with AIRFA if, in the decision-making process, it obtains and considers the views of Indian leaders, and if, in project implementation, it avoids unnecessary interference with Indian religious practices. This court's recent decision in *New Mexico Navajo Ranchers Assoc. v. ICC*, 702 F.2d 227 (D.C.Cir.1983) (per curiam), indicates that agencies will not be permitted to ignore their AIRFA duties. There, this court remanded for further consideration the ICC's approval of a rail line to be built across northwestern New Mexico because the ICC had failed properly to consider, *inter alia*, evidence that the railroad permittee would not fulfill its promise to protect Navajo sacred sites along the right-of-way.

Finally, we find that the Forest Service complied with AIRFA in the present case. Before approving the Preferred Alternative the Forest Service held many meetings with Indian religious practitioners and conducted public hearings on the Hopi and Navajo

reservations at which practitioners testified. The views there expressed were discussed at length in the Final Environmental Statement and were given due consideration in the evaluation of the alternative development schemes proposed for the Snow Bowl. Development of the Snow Bowl under the Preferred Alternative will not deny the plaintiffs access to the Peaks, nor will it prevent them from collecting religious objects. The Forest Service has not burdened the plaintiffs' religious practices in any manner prohibited by AIRFA.

### 3. Establishment Clause.

Judge Richey held that to grant the plaintiffs the relief they request would violate the Establishment Clause of the First Amendment. We think it unnecessary to reach that issue. As neither the Free Exercise Clause nor AIRFA entitles the plaintiffs to relief, we have no reason to consider whether relief is barred by a separate constitutional provision. We note, moreover, that where governmental action violates the Free Exercise Clause, the Establishment Clause ordinarily does not bar judicial relief. *See, e.g., Wisconsin v. Yoder*, 406 U.S. 205, 220-21 & 234 n. 22, 92 S.Ct. 1526, 1535-1536, & 1542 n. 22, 32 L.Ed.2d 15 (1972); *Sherbert v. Verner*, 374 U.S. 398, 409, 83 S.Ct. 1790, 1796, 10 L.Ed.2d 965 (1963).

### 4. Endangered Species Act.

The plaintiffs claim that the Forest Service violated section 7(a)(2) of the Endangered Species Act, 16 U.S.C. § 1536(a)(2) (Supp. IV. 1980), by failing to insure that the Preferred Alternative will not be likely to jeopardize the continued existence on the Peaks of a small yellow-flowered plant called *senecio franciscanus*, or the "San Francisco Peaks groundsel." *Senecio franciscanus* exists only in an elongated area of approximately 2.6 square kilometers at the top of the Peaks. This elongated area extends into the Snow Bowl permit area. As an alpine plant, *senecio franciscanus* is particularly susceptible to damage from human activity. The plant's population, once re-

duced by human activity, would not recover for decades or even centuries. The approved development will extend into a small portion of the plant's habitat and will destroy a small number of plants. The greatest threat to the plant's continued existence, however, is posed not by construction, or by skiers, but by summer hikers who walk off-trail and trample the fragile plants. Expansion of the ski lifts will significantly increase the threat to the plant by allowing a greater number of hikers to reach its habitat.

On June 16, 1976 the Secretary of the Interior proposed *senecio franciscanus* for formal listing as an endangered species under section 4 of the Endangered Species Act of 1973, 16 U.S.C. § 1533. Section 4 requires the Secretary to publish in the Federal Register a list of those species determined by him or by the Secretary of Commerce to be endangered or threatened within the meaning of the Act. The Endangered Species Act amendments of 1978 required the withdrawal of all listing proposals over two years old. A one year grace period was extended to proposals already over two years old. On December 10, 1979 the Secretary withdrew the proposal to list *senecio franciscanus* because no action had been taken on the proposal since its submission. At the time the plaintiffs commenced this suit *senecio franciscanus* was neither listed nor proposed for listing.

Section 7(a)(2) of the Endangered Species Act requires each federal agency, with the assistance of the Secretary, to insure that its actions are not likely to jeopardize the continued existence of any endangered or threatened species. Section 7(a)(2) provides:

Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered

species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical . . . In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

[9] Section 7(a)(2) requires an agency, prior to project implementation, formally to consult the Secretary about any agency action that might affect a protected species. Section 7(b), 16 U.S.C. § 1536(b), requires the Secretary to provide to an agency that consults him under section 7(a)(2) a written opinion indicating how the agency's proposed action would affect the protected species and identifying means of protecting the species. The Forest Service has not formally consulted the Secretary about *senecio franciscanus*, and it has not obtained the written opinion required by section 7(b). The plaintiffs' claim would therefore have merit if section 7(a)(2) in fact protected *senecio franciscanus*. We, however, agree with Judge Richey, who held that § 7(a)(2) applies only to species listed pursuant to section 4, and hence had no application to the unlisted *senecio franciscanus*.

To support their argument that § 7(a)(2) protects all endangered or threatened species, whether or not listed, the plaintiffs make four principal points. First, they point out that § 7(a)(2) refers to "any endangered species or threatened species," (emphasis supplied), and does not, unlike many other sections of Act, see, e.g., §§ 7(a)(1), (c)(1), 16 U.S.C. §§ 1536(a)(1), (c)(1), specifically refer to species which are "listed" or "proposed to be listed." Second, they note that § 7(a)(2)'s reference to "endangered . . . or threatened species" does not incorporate a listing requirement because the statutory definitions of "endangered species" and "threatened species" do not mention listing.<sup>9</sup> Third, they draw at-

9. 16 U.S.C. § 1532(6) defines "endangered species" as "any species which is in danger of extinction throughout all or a significant portion of its range other than [certain insects]."

16 U.S.C. § 1532(20) defines "threatened species" as "any species which is likely to become an endangered species within the foreseeable

tention to the difference between the 1973 and the 1978 versions of section 7. As enacted in 1973, section 7 in a single clause required federal agencies to carry out "programs for the conservation of *endangered species and threatened species listed pursuant to section 1533*" and to insure that agency actions did not jeopardize the continued existence "of *such* endangered species and threatened species." (emphasis supplied). The 1978 amendments to the Endangered Species Act divided that clause into two sentences. In the first sentence Congress again required agencies to conduct programs for the preservation of "listed" species, and in the second sentence again required agencies to insure the continued existence of endangered and threatened species. However, the amended section 7, in contrast to the original, did not, in restricting agency action, directly or indirectly refer to "listed" species. Instead, the 1978 amendments changed the word "such" in the original statute to "any" and required agencies to insure the existence of "any endangered species or threatened species." Finally, the plaintiffs note that in 1979 both houses of Congress considered proposed amendments to the Act which, *inter alia*, would have added an explicit listing requirement to § 7(a)(2). See S. 1143, 96th Cong., 1st Sess. § 6(a) (1979), 125 Cong.Rec. S7557 (daily ed. June 13, 1979); H.R. 2218, 96th Cong., 1st Sess. (amendment of Rep. Breaux) § 5 (1979), 125 Cong.Rec. H9648 (daily ed. October 24, 1979). Although Congress did amend the Endangered Species Act in 1979, it did not amend § 7(a)(2) to include a specific listing requirement.

[10] The plaintiffs claim that their points prove that Congress intended the 1978 amendments to extend § 7 protection

future throughout all or a significant portion of its range."

10. The plaintiffs' final point—Congress' failure in 1979 to amend § 7(a)(2) to refer specifically to listed or proposed species—adds little to their argument. Congress in 1979 clearly believed that § 7(a)(2) applied only to listed species. See the discussion *infra*. Thus the proposed amendments to § 7(a)(2) were intended

to unlisted species.<sup>10</sup> The legislative history, however, strongly indicates that Congress had no such intent. In its report on the 1978 amendments, the House Committee on Merchant Marine and Fisheries stated:

The protections provided to animal and plant species threatened with extinction are activated by the listing of a species as "endangered" or "threatened."

H.R.Rep. No. 1625, 95th Cong., 2nd Sess. 5, reprinted in 1978 U.S.Code Cong. & Ad. News, 9453, 9455. The House report further states: "The mandate of section 7 applies once a species is listed." *Id.*, at 7, 1978 U.S.Code Cong. & Ad.News at 9458. These statements, it is true, are contained in a section of the committee report that summarizes the operation of the 1973 Act, and thus are not direct evidence of Congress' intent regarding the 1978 amendments. That portion of the committee report which does discuss the effect of the 1978 amendments, see *Id.* at 19-25, 1978 U.S.Code Cong. & Ad.News at 9469-75, however, contains no indication that in amending section 7 Congress intended to broaden its coverage to protect species not protected by the 1973 Act. Instead, Congress principally intended in amending section 7 to define procedures that would facilitate agency compliance with the section and to establish a mechanism by which agencies could, in appropriate cases, be exempted from the section. Comments made in connection with the 1979 amendments are also significant. The Committee on Merchant Marine and Fisheries states in its report on the 1979 amendments: "The mandate of section 7 applies once a species is listed or once 'critical habitat' is designated for any listed species." H.R.Rep. No. 167, 96th Cong., 1st Sess. 5, reprinted in 1979 U.S.Code Cong. & Ad.

not to add a listing requirement, but to extend § 7 protection, for the first time, to species only proposed for listing. Although Congress did not amend § 7(a)(2) in this respect, it did protect proposed species by adding § 7(a)(3) to the Act. See H.R.Conf.Rep. No. 697, 96th Cong., 1st Sess. 13, reprinted in 1979 U.S.Code Cong. & Ad.News 2557, 2572, 2576.

News 2557, 2561 (1979). The House Conference Report on the amendments states:

The conferees note that the purpose of a listing proposal is to determine whether a species is endangered or threatened and should be listed as such. The protections of Section 7 should not apply until a species has been formally listed.

H.R.Conf.Rep. No. 697, 96th Cong., 1st Sess. 13, reprinted in 1979 U.S.Code Cong. & Ad. News 2572, 2577. We are aware that subsequent legislative history is not controlling evidence of the intent underlying previously enacted legislation. See *Consumer Product Safety Comm. v. GTE Sylvania, Inc.*, 447 U.S. 102, 118 n. 13, 100 S.Ct. 2051, 2061 n. 13, 64 L.Ed.2d 766 (1980). Nonetheless, we think that the 1979 committee and conference reports are entitled to significant weight in interpreting the effect of the 1978 amendment of section 7. Those reports were close in time to the 1978 amendments, and their interpretation of amended section 7 is consistent with the view apparent from the 1978 House report.

The structure of the Endangered Species Act confirms that § 7(a)(2) applies only to listed species. Of particular significance is the central role played by the Secretary of the Interior in the administration of the Act.<sup>11</sup> Section 4 requires the Secretary to determine by regulation which species are endangered or threatened, to publish a list of such species, and periodically to review the list for necessary changes. Section 5, 16 U.S.C. § 1534, authorizes the Secretary to acquire land for the protection of listed species and other plants and wildlife. Section 6, 16 U.S.C. § 1535, authorizes the Secretary to enter into agreements with the states to achieve the purposes of the Act. Section 7(b), as previously noted, requires the Secretary to advise agencies that con-

11. The Secretary of Commerce also has significant duties under the Act. Here, however, we are concerned only with the duties of the Secretary of the Interior.

12. The plaintiffs claim that individual federal agencies are qualified to decide whether the species their actions will affect are endangered or threatened. They rely upon that provision of § 7(a)(2) which states: "In fulfilling the re-

sult him under § 7(a)(2) on means of protecting covered species. These provisions show that under the Act the Secretary has primary responsibility to research the status of different species, to list those species that are in need of protection, and to act for the preservation of listed species. Thus it would be anomalous to construe § 7(a)(2) as requiring each federal agency, regardless of its inexpertise in matters of environmental protection or wildlife conservation, to decide for itself whether any of the species its proposed action would affect is endangered or threatened. It is more logical to conclude that § 7(a)(2) requires an agency, in consultation with the Secretary, to assess the impact of proposed agency action upon a listed species and to develop plans for the species' protection.<sup>12</sup>

We also note that the plaintiffs' interpretation of § 7(a)(2) would make a nullity of § 7(a)(3), 16 U.S.C. § 1536(a)(3), which requires each agency to consult the Secretary "on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed." Section 7(d), 16 U.S.C. 1536(d), prohibits an agency, pending the completion of a § 7(a)(2) consultation about a listed species, from making any "irretrievable commitment of resources" which would foreclose the formulation or implementation of any reasonable alternative for species protection that the Secretary might suggest under § 7(b). In contrast, § 7(a)(3), concerning proposed species, explicitly states that the consultation it requires does not include the § 7(d) limitation on the commitment of resources. The plaintiffs, however, would extend § 7(a)(2) protection, including the § 7(d) limitation, to all vulnerable species, whether or not listed or proposed for listing. They would thus extend to species not proposed for

requirements of this paragraph each agency shall use the best scientific and commercial data available." That language, the plaintiffs argue, requires agencies to use the best available data to determine species status. We think it clear, however, that the quoted language serves only partially to define the nature of an agency's duties once a listed species has brought § 7(a)(2) into play.

listing greater protection than § 7(a)(3) grants to proposed species. The plaintiffs' interpretation would make irrelevant the protection afforded by § 7(a)(3) and would violate the basic rule of statutory construction that courts should, if possible, give effect to every word used by Congress. See, e.g., *Reiter v. Sonotone Corp.*, 442 U.S. 330, 339, 99 S.Ct. 2326, 2331, 60 L.Ed.2d 931 (1979); *Symons v. Chrysler Corp. Loan Guarantee Bd.*, 670 F.2d 238, 242 (D.C.Cir. 1981). For these reasons we conclude that to be protected under § 7(a)(2) a species must be listed under § 4.

The plaintiffs claim that if listing is required under § 7(a)(2), we should treat *senecio franciscanus* as if it were listed. They rely upon the Forest Service's recognition in the Final Environmental Statement that the Preferred Alternative threatens the plant, and upon the fact that the Fish and Wildlife Service, since at least 1976, has been aware of the plant's vulnerability. They contend that the Secretary's failure formally to list the plant since 1976 constitutes unreasonable delay and a violation of the statutory mandate "to halt and reverse the trend towards species extinction, whatever the cost." *TVA v. Hill*, 437 U.S. 153, 184, 98 S.Ct. 2279, 2297, 57 L.Ed.2d 117 (1978). We agree with Judge Richey that there is no evidence of such bad faith or unreasonable conduct on the part of the Secretary as would warrant an injunction against the United States ordering the listing of *senecio franciscanus*.

[11] On November 22, 1982, approximately one month after we heard argument, the Secretary, through the Fish and Wildlife Service, proposed *senecio franciscanus* for listing as a threatened species. 47 Fed.Reg. 52,483 (1982). Because *senecio franciscanus* is now proposed for listing, § 7(a)(3) (discussed above) requires the Forest Service to consult the Secretary about the possible impact of the Preferred Alternative upon the plant. We do not think it necessary to remand this case to the district court to insure Forest Service compliance with § 7(a)(3). Section 7(a)(3) does not incorporate the § 7(d) limitation on commit-

ment of resources and thus does not prohibit development until consultation is completed. More important, we have no reason to believe that the Forest Service has not, or will not, comply with § 7(a)(3). The record indicates that appropriate measures can be taken to minimize the danger to *senecio franciscanus*. We are confident that the Forest Service will, in good faith, implement such measures.

#### 5. *Wilderness Act.*

[12] On May 2, 1979 President Carter, on the advice of the Secretary of Agriculture, recommended to Congress that it designate as wilderness under the National Wilderness Preservation System Act of 1964, 16 U.S.C. §§ 1131-36 (1976), some 14,650 acres of the San Francisco Peaks. Congress has not yet acted upon that recommendation. The area recommended for wilderness designation abuts the Snow Bowl permit area on the north, south, and east, but includes no part of the permit area. A substantial part of the permit area is still undeveloped; in particular, a strip of land approximately 500 feet wide along the area's northern border, adjacent to the recommended wilderness area, remains heavily forested. Under the Preferred Alternative that strip of land will be partially developed for skiing. The plaintiffs contend that the Secretary of Agriculture, in approving development of pristine land adjacent to a recommended wilderness area, infringed Congress' exclusive authority to determine wilderness area boundaries. The plaintiffs base their claim upon § 3(b) of the Wilderness Act, 16 U.S.C. § 1132(b) (1976), and argue that the Secretary may not, by authorizing expansion of the ski area, impair Congress' discretion to include undeveloped portions of the Snow Bowl in the San Francisco Peaks wilderness area. As Judge Richey found, the plaintiffs' claim is without merit.

Section 1132(b) authorizes the President to recommend for inclusion in designated wilderness areas lands contiguous to areas formerly designated as "primitive" by the Secretary of Agriculture. It provides:

The Secretary of Agriculture shall, within ten years after September 3, 1964, review, as to its suitability or nonsuitability for preservation as wilderness, each area in the national forests classified on September 3, 1964 by the Secretary of Agriculture or the Chief of the Forest Service as "primitive" and report his findings to the President. The President shall advise the United States Senate and House of Representatives of his recommendations with respect to the designation as "wilderness" or other reclassification of each area on which review has been completed . . . Each recommendation of the President for designation as "wilderness" shall become effective only if so provided by an Act of Congress . . . Any [primitive] area may be increased in size by the President at the time he submits his recommendations to the Congress by not more than five thousand acres with no more than one thousand two hundred and eighty acres of such increase in any one compact unit; if it is proposed to increase the size of any such area by more than five thousand acres or by more than one thousand two hundred and eighty acres in any one compact unit the increase in size shall not become effective until acted upon by Congress. *Nothing herein contained shall limit the President in proposing, as part of his recommendations to Congress, the alteration of existing boundaries of primitive areas or recommending the addition of any contiguous area of national forest lands predominantly of wilderness value.*

(emphasis supplied).

In *Parker v. United States*, 448 F.2d 793, 797 (10th Cir.1971), cert. denied, 405 U.S. 989, 92 S.Ct. 1252, 31 L.Ed.2d 455 (1972), the Tenth Circuit held that the italicized language reflects "the clear intent of Congress . . . that both the President and the Congress shall have a meaningful opportunity to add contiguous areas predominantly of wilderness value to existing primitive areas for final wilderness designation." A "meaningful opportunity" can be preserved

only if lands within the ambit of § 1132(b) remain undeveloped until such time as the President and Congress act. Thus in *Parker*, the Tenth Circuit affirmed a district court order enjoining the Secretary from authorizing lumbering of certain virgin land contiguous to a primitive area, where the President and Congress had not yet considered whether to designate the land in question as wilderness.

*Parker* indicates that § 1132(b) can restrict the Secretary's discretion to approve development of wilderness land contiguous to a designated primitive area. The defendants, however, contend that § 1132(b) does not apply to national forest land which is neither contained in nor contiguous to a primitive area, and that the plaintiffs' claim must therefore fail, as neither the Snow Bowl permit area nor any other part of the San Francisco Peaks has ever been designated primitive. We agree.

The clear focus of the statutory language is upon the Secretary's duties with respect to primitive areas. A brief review of the statute's background confirms that the statute has no broader application. In 1929 the Secretary of Agriculture, by regulation, established procedures for the designation of primitive areas in national forests. The 1929 regulation was superseded in 1939 by new regulations which authorized the Secretary of Agriculture to designate wilderness areas in excess of 100,000 acres and the Chief of the Forest Service to designate wild areas of between 5,000 and 100,000 acres. The Secretary of Agriculture then reviewed the 73 primitive areas designated between 1929 and 1939 to determine which should be designated in whole or in part as wilderness or wild areas. By 1964, when Congress considered legislation to create a statutory scheme for the protection of wilderness lands, 18 tracts of national forest land had been designated as wilderness areas, 35 as wild areas, and 34 remained in their original classification as primitive areas. See H.R.Rep. No. 1538, 88th Cong., 2d Sess. 7-8, reprinted in 1964 U.S.Code, &

Ad.News, 3615, 3616.<sup>13</sup> Congress concluded that the areas designated as wilderness or wild areas had been "defined with precision," *Id.* at 3617, and could be given statutory protection immediately. Accordingly, in § 3(a) of the Wilderness Act, 16 U.S.C. § 1132(a), Congress designated as wilderness all areas within the national forests that the Secretary of Agriculture had classified at least 30 days before September 3, 1964 as wilderness or wild. Congress believed, however, that the primitive areas had not been "defined with precision," and that such areas "should not be considered for inclusion in the wilderness system until completion of a thorough review." *Id.* Accordingly, in § 3(b) of the Act, 16 U.S.C. § 1132(b), Congress ordered the Secretary of Agriculture to review each designated primitive area as to its suitability for inclusion in the wilderness system. It thus is clear from § 1132(b)'s limited purpose that the statute applies only to primitive areas and lands contiguous thereto. Since the Snow Bowl permit area is neither contained in nor contiguous to any primitive area, the plaintiffs have no claim under § 1132(b).<sup>14</sup>

#### 6. National Historic Preservation Act.

[13] In his June 15, 1981 opinion, Judge Richey found that the Forest Service had committed three violations of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470 *et seq.* (1976), and implementing regulations. First, he found that the Forest Service had not, as required by 16 U.S.C. § 470f and Executive Order 11593,<sup>15</sup> examined the project area to identify prop-

erties eligible for inclusion in the National Register of Historic Places. See 16 U.S.C. § 470a. Second, he found that the Forest Service had not, as required by 36 C.F.R. § 800.4(b), consulted the Arizona State Historic Preservation Officer (SHPO) about the effect of the Preferred Alternative upon two National Register properties near the Snow Bowl—the Fern Mountain Ranch, owned by plaintiffs Jean and Richard Wilson, and the C. Hart Merriam Base Camp. Finally, he found that the Forest Service had not, as required by 36 C.F.R. § 800.4(a)(1), consulted the SHPO about the eligibility of the San Francisco Peaks themselves for inclusion in the National Register. Judge Richey remanded the case to the Forest Service for compliance with NHPA, and stayed development pending compliance. Upon remand, the Forest Service conducted archaeological surveys of the permit area and consulted the SHPO. On September 22, 1981, the Chief Forester determined that the project area contained no properties either listed or eligible for listing on the National Register; that expansion of the ski area would not affect the historic qualities of the Merriam Base Camp or the Fern Mountain Ranch; and that the San Francisco Peaks themselves were not eligible for listing. The SHPO had concurred in these findings by letter dated September 11, 1981. After the plaintiffs failed to obtain administrative reversal of the Chief Forester's determination, the defendants returned to court to show compliance to Judge Richey. On May 14, 1982 Judge Richey ruled that the Forest Service had com-

13. Also, one area had been designated as "canoe." *Id.*

14. Additionally, § 1132(b) applies only to forest land "predominantly of wilderness value." 16 U.S.C. § 1131(c) defines "wilderness" as "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation . . . with the imprint of man's work substantially unnoticeable. . . ." The permit area certainly is not wilderness under that definition. As Judge Richey noted, the permit area contains a ski lodge and ski runs and has been partially cleared of trees. The fact that portions of the permit area remain undeveloped cannot change the fact that the area is not "predominantly of

wilderness value." We therefore would reject the plaintiffs' § 1132(b) claim even were the statute otherwise applicable. The plaintiffs' reliance upon *Parker v. United States*, 309 F.Supp. 593 (D.Colo.1970), *affd.*, 448 F.2d 793 (10th Cir.1971), *cert. denied*, 405 U.S. 989, 92 S.Ct. 1252, 31 L.Ed.2d 455 (1972), is misplaced. Not only was the land at issue in that case contiguous to a designated primitive area, it also contained no development other than a short access road.

15. Executive Order 11593 is reprinted in 16 U.S.C.A. § 470 (1974) at 26, and at 36 F.R. 8921 (1971).

plied with NHPA in all respects. He granted the defendants final judgment on all counts and lifted the stay against development.

The plaintiffs claim that Judge Richey erred in finding compliance with NHPA. They contend that the Forest Service's efforts to identify eligible properties in the permit area were legally insufficient; that the Preferred Alternative will affect the historic qualities of the Fern Mountain Ranch;<sup>16</sup> and that the San Francisco Peaks are eligible for listing. The plaintiffs' three contentions will be considered in order.

16 U.S.C. § 470f and implementing regulations, see 36 C.F.R. § 800.4(a), together with Executive Order 11593, require federal agencies approving land use projects to identify all properties within and about the project area that are eligible for listing in the National Register and that may be affected by the project. See *Romero-Barcelo v. Brown*, 643 F.2d 835, 859 (1st Cir.1981), *reversed on other grounds*, 456 U.S. 305, 102 S.Ct. 1798, 72 L.Ed.2d 91 (1982). The specific area to be examined for eligible properties is the "area of the undertaking's potential environmental impact," 36 C.F.R. § 800.4(a), which is defined as the "geographical area within which direct and indirect effects generated by the undertaking could reasonably be expected to occur." 36 C.F.R. § 800.3(o). The agency must consult the SHPO when determining the area of potential environmental impact and the scope of surveys needed to identify eligible properties within that area. 36 C.F.R. §§ 800.3(o), 800.4(a)(1), (2). The Forest Service and the SHPO agreed that the Preferred Alternative's area of potential environmental impact included the 777 acre permit area, the Snow Bowl road, and 30-foot strips of land on both sides of the road. Forest Service and Northern Arizona University archaeologists in July, 1981 conducted archaeological surveys in which they intensively examined 272 acres, or 35% of the total permit area, including all 77 acres

proposed for development under the Preferred Alternative. The surveys revealed no evidence of Navajo or Hopi use and in fact discovered only one archaeological site—the foundation of the old Snow Bowl ski lodge that burned in 1952. The Forest Service found the lodge foundation to be ineligible for listing, and the plaintiffs do not argue to the contrary. The SHPO agreed that the surveys satisfied the Forest Service's affirmative obligation to locate and identify eligible properties in the impact area. See 36 C.F.R. § 800.4(a)(2).

[14] The plaintiffs argue that the Forest Service breached its NHPA duty to identify *all* eligible properties by failing to survey 100% of the impact area. They contend that the Forest Service's partial surveys may have left some eligible properties undetected. We think that the partial surveys were sufficient. The regulations do not expressly require agencies in all cases completely to survey impact areas, and in fact recognize that the need for surveys will vary from case to case. See C.F.R. §§ 800.4(a)(1), (2). We believe that a complete survey is not required where both the partial survey, and all other evidence, indicate that a complete survey would be fruitless. Here, the defendants' surveys discovered neither eligible properties nor any evidence to suggest that such properties might be present in areas not surveyed. The existing literature on the San Francisco Peaks gave the Forest Service no indication of historical or archaeological sites in the impact area. Additionally, the high altitude and steep slopes of the San Francisco Peaks made the impact area an unlikely site for past human habitation and hence an unlikely place in which to find eligible properties. Under these circumstances a complete survey was not required. We find support for our conclusion in the First Circuit's decision in *Romero-Barcelo, supra*, where the Navy conducted a partial archaeological survey of the island of Vieques off the Puerto Rican coast in connection with training operations

16. The plaintiffs have on appeal dropped their claim that development will impair the historic

qualities of the C. Hart Merriam Base Camp.

there to be conducted. The Navy's survey identified numerous eligible properties and suggested the probable existence of other archaeological sites not specifically located. The First Circuit held that § 470f and Executive Order 11593 required the Navy to conduct further surveys to locate the sites thought to be present. Significantly, however, the court stated that its decision did not require the Navy "to undertake a 100% survey of Vieques," or to survey parts of the island where the initial survey established "archeological sterility." 643 F.2d at 860.

As a second ground for reversal, the plaintiffs argue that the Forest Service erred in finding that the Preferred Alternative will have no effect upon the historic qualities of the Fern Mountain Ranch. Section 800.4(b) of 36 C.F.R. requires each agency, in consultation with the SHPO, to determine for each listed or eligible property within the potential environmental impact area, whether the agency project will affect the historical, archaeological, or other characteristic of the property that qualified it for inclusion in the National Register. The agency is to determine whether an effect is present according to the criteria of 36 C.F.R. § 800.3. If the agency determines that the project will have no effect, the project may proceed. 36 C.F.R. § 800.4(b)(1). If, however, the agency determines merely that the project will have no *adverse* effect, the agency's determination must be submitted to the Advisory Council on Historic Preservation for review and comment, 36 C.F.R. § 800.4(c), and if the agency determines that there will be an adverse effect, the agency must formally consult the Council. 36 C.F.R. §§ 800.4(d), 800.6(b). The plaintiffs argue that Judge Richey erred in failing to require formal consultation under § 800.6(b). We conclude, however, that Judge Richey properly upheld the Forest Service's finding of "no effect."

The Fern Mountain Ranch is located on the western slopes of the San Francisco Peaks, approximately one and one-half miles to the north of the Snow Bowl. The Ranch provides an excellent view of the Peaks' wooded slopes, and of the permit

area. Development under the Preferred Alternative will somewhat impair the Ranch's rustic setting since the new ski lifts and slopes will be readily visible from the Ranch. The plaintiffs argue that alteration of the Ranch's natural setting would constitute an "adverse effect" under the regulations. They rely upon 36 C.F.R. § 800.3(b), which defines "adverse effect" as including, *inter alia*, an "alteration of the property's surrounding environment," or the "(i)ntroduction of visual . . . or atmospheric elements that are out of character with the property." The plaintiffs' argument fails to recognize that the § 800.3 criteria are to be applied with reference only to those characteristics of the property that qualified it for National Register listing. See 36 C.F.R. § 800.4(b). The Ranch's natural setting is not one of the characteristics that qualified it for listing. Instead, the Nomination Form for the Ranch's listing indicates that the Ranch is historically significant for three reasons: (1) its original nineteenth-century buildings are still standing and in use; (2) it played an important role, as a rest stop, in the development of the Grand Canyon as a tourist attraction; and (3) it was the first ranch in Arizona to raise Arabian horses. Clearly, the Preferred Alternative will not affect the Ranch's three relevant characteristics and its effect upon the view from the Ranch is, under the circumstances, immaterial. The plaintiffs also argue that the Preferred Alternative will adversely effect the Ranch because the increased tourist traffic at the Snow Bowl will, they say, increase the dangers of trespassing, vandalism, and arson at the Ranch. The Forest Service, however, determined that increased use of the Snow Bowl would not endanger the Ranch. The Forest Service's determination of this factual issue is adequately supported.

The plaintiffs also argue that the Forest Service violated NHPA by finding that the San Francisco Peaks themselves were not eligible for listing. The plaintiffs rely upon the fact that several other mountains and properties which are historically significant principally because of their association with

Indian religion or culture have been listed. Those properties, however, may or may not have possessed the particular attributes of the San Francisco Peaks. The determination in each case of a property's eligibility is the responsibility of the agency and of the SHPO, see C.F.R. § 800.4(a)(3), and in the absence of an abuse of discretion, their application of the regulations to the facts must be sustained. We agree with Judge Richey that the plaintiffs have not shown an abuse of discretion.

Lastly, the plaintiffs argue that the Forest Service should have requested a final determination of the Peaks' eligibility from the Secretary of the Interior. Section 800.4(a)(3) of 36 C.F.R. states that when a "question" exists as to a property's eligibility, the Secretary shall be requested to make a final determination. Section 63.2(c) of 36 C.F.R. states that a "question" exists "when the agency and the State Historic Preservation Officer disagree or when the agency determines that a question exists." Here, the Forest Service and the SHPO agreed that the Peaks were not eligible, and the Forest Service did not otherwise determine that a question existed. The plaintiffs' argument that a question existed because the Forest Service and the SHPO relied upon different reasoning in reaching their identical conclusions has no merit. Section 800.4(a)(3), as clarified by § 63.2(c), is obviously intended not to require the agency and the SHPO to reason alike, but only to resolve disputes between the two, and to provide a means by which the Secretary can have the final say on properties of uncertain status.

#### 7. *Land Use Permits.*

[15, 16] In 1977 the Forest Service issued two permits to Northland for use of the Snow Bowl permit area, which on May 18, 1982 were amended to reflect the development approved under the Preferred Alternative. One of the amended permits, covering 24 acres, is a term permit valid until May 1, 1997. The Forest Service granted this permit under the Act of March 4, 1915, as amended, 16 U.S.C. § 497 (1976), which provides:

The Secretary of Agriculture is authorized, under such regulations as he may make and upon such terms and conditions as he may deem proper, (a) to permit the use and occupancy of suitable areas of land within the national forests, not exceeding eighty acres and for periods not exceeding thirty years, for the purpose of constructing or maintaining hotels, resorts, and any other structures or facilities necessary or desirable for recreation, public convenience, or safety; . . .

Northland will build the ski lodge and all other permanent facilities upon the land covered by the term permit. The other permit, an annual or revocable permit covering the remaining 753 acres of the permit area, was issued by the Forest Service under the authority of the Act of June 4, 1897, as amended, 16 U.S.C. § 551 (1976), which authorizes the Secretary of Agriculture to "make such rules and regulations . . . as will insure the objects of such reservations, namely, to regulate their occupancy and use and to preserve the forests thereon from destruction." The land covered by the revocable permit will be used only for ski slopes.

The plaintiffs challenge the validity of the "dual permit" system employed by the Forest Service. They contend that 16 U.S.C. § 497, which authorizes permit areas no larger than 80 acres, constitutes the sole authority under which the Secretary may grant permits for the private recreational development of national forest lands. They accordingly claim that the Forest Service exceeded its authority in issuing a revocable permit under 16 U.S.C. § 551 and in granting permits covering 777 acres to a single developer. We agree with Judge Richey that § 497 does not limit the Secretary's authority under § 551 and that Congress has sanctioned the use of dual permits.

In 1905 Congress transferred the management of the national forests from the Secretary of the Interior to the Secretary of Agriculture. Act Feb. 1, 1905, c. 288, § 1, 33 Stat. 628. As early as May 31, 1905 the Attorney General informed the Secretary of Agriculture that the Act of 1897, as amend-

ed, authorized him to grant revocable permits for the private, commercial use of national forest land. 25 Op.Atty.Gen. 470 (1905). The Secretary of Agriculture thereafter routinely granted revocable permits for many purposes, including summer houses and camping grounds, under the 1897 Act. In 1911 the Supreme Court upheld the authority of the Secretary to grant revocable grazing permits under the Act. *United States v. Grimaud*, 220 U.S. 506, 31 S.Ct. 480, 55 L.Ed. 563 (1911).

In 1915 Congress enacted legislation, now § 497, which, in contrast to the Act of 1897, expressly authorized the Secretary of Agriculture to grant private permits to national forest land. The 1915 Act authorized the Secretary to grant term permits to areas not larger than five acres for periods not exceeding 30 years. The plaintiffs claim that the 1915 Congress intended to repeal whatever permit authority the Secretary possessed under the 1897 Act. The plaintiffs' argument has no support in the legislative history, which instead suggests that Congress acted not to repeal the Secretary's existing powers, but to enable him, for the first time, to grant long-term permits. The Congress recognized that the permanent structures necessary for recreational use of the national forests would not be built unless private parties could obtain secure tenure. Congressman Hawley, the sponsor of the House bill, stated:

At present the people have an unlimited right to go upon the public land in the national forests. They can go there and build a temporary camp, put up a tent or a little camp of some kind. They are given now by the Secretary of Agriculture permission to construct temporary structures. But it does not enable them to put up any important building, or to justify any considerable expenditure. But if they could get permission for a period of years they can afford to put up a better building(.)

52 Cong.Rec. 1787 (1915). Significantly, the Congress had before it a letter from the Secretary of Agriculture which discussed the Secretary's practice of granting revocable permits under the 1897 Act.<sup>17</sup> The letter stated:

There is at the present time some hesitancy on the part of persons who want to use national-forest land upon which to construct summer residences, hotels, stores, and other structures involving a large expenditure, because of *the indefinite tenure of the permits to them which the present law provides for*. At the present time, however, *there are several thousand such permits in use*, upon which structures have been erected. In justice to those who desire to construct more substantial improvements, it is believed that the present law should be amended to give persons a better right than the *revocable permit now authorized*.

(emphasis supplied). We must therefore presume that when Congress acted in 1915 it had knowledge of the Secretary's practice under the 1897 Act. Accordingly, the absence in the Act and in the legislative history of any language expressly repudiating the Secretary's practice is strong evidence that Congress did not intend the 1915 Act to affect the Secretary's power to issue revocable permits. Certainly the plaintiffs have shown no reason to depart from the settled rule disfavoring repeal by implication. See *Watt v. Alaska*, 451 U.S. 259, 267, 101 S.Ct. 1673, 1678, 68 L.Ed.2d 80 (1981).

We conclude, therefore, that the 1915 Act neither limited the Secretary's power to issue revocable permits to areas larger than five acres nor prohibited him from issuing revocable and term permits simultaneously. Our conclusion is reinforced by Congress' awareness of, but failure to repudiate, the continuing practice of the Forest Service after 1915 to issue revocable permits under the 1897 Act. The Forest Service, following the 1915 Act, believed that the purposes of the Act could not be achieved unless it

17. The letter was both included in the House committee report, H.R.Rep. No. 1023, 63d Cong., 2d Sess. 2 (1915), and read during de-

bate by Congressman Hawley. 52 Cong.Rec. 1787 (1915).

had authority to issue term permits to areas larger than five acres. Congress in the 1930's and 1940's considered several bills that would have expanded the Forest Service's authority to grant term permits, but enacted none of them. These bills are nonetheless significant because the reports they generated gave Congress clear notice that the Forest Service was continuing to issue revocable permits for recreational uses, and further, was issuing dual permits. For example, the Senate report on S. 773 (72nd Cong., 1st Sess. (1932)), contains a letter from the Secretary of Agriculture to the Chairman of the Committee on Agriculture and Forestry, which states:

The general laws relating to the national forests do not authorize the issuance of permits *other than terminable at the discretion of the Secretary of Agriculture*. One act, that of March 4, 1915 . . . authorizes the issuance of permits for not to exceed 30 years and for areas of not to exceed 5 acres . . . Experience has proved that 5 acres is insufficient to permit of the proper development of the most modern types of outdoor camps, hotels, resorts, sanitoria, etc., which, in addition to the principal structures, usually require the related use of lands for the various necessary utilities, recreational services, etc., now regarded as essential to such services. *At present these are provided by the issuance of supplemental terminable permits*, which inject an undesirable element of uncertainty of tenure and add to routine requirements of administration.

S.Rep. No. 754, 72d Cong., 1st Sess. 2 (1932) (emphasis supplied). Similarly, in connection with H.R. 1809 (80th Cong., 1st Sess. (1948)), the Acting Secretary of Agriculture

18. H.R. 1809, as originally proposed, would have authorized the Secretary to grant term permits to areas not larger than 80 acres for periods not exceeding 30 years in all of the national forests. The House Committee on Agriculture amended the bill to apply only to Alaskan national forests, because it believed that broadening the Secretary's powers as to other national forests might have undesirable results. See H.R.Rep. No. 805, 80th Cong., 1st Sess. 1 (1948). The bill passed as amended. 16 U.S.C. § 497a (1976). The plaintiffs argue

sent the Chairman of the Committee on Agriculture a letter, which stated:

Of course, the large majority of . . . permitted uses [in the national forests] are of relatively short duration or entail only small capital investments. In such circumstances *the type of terminable permit, renewable from year to year, which this Department is authorized to issue without limitation as to character of use or area*, is adequate.

H.R.Rep. No. 805, 80th Cong., 1st Sess. 2 (1948) U.S.Code Cong. & Admin.News, pp. 1337, 1338 (emphasis supplied).<sup>18</sup>

In 1956 Congress finally amended the 1915 Act to grant the Secretary broader power to issue term permits. The amendment increased the acreage limitation in § 497 from five acres to 80 because effective recreational development of the national forests had been stymied by the five-acre limitation on term permits. See H.R.Rep. No. 2792, 84th Cong., 2d Sess., *reprinted in* 1956 U.S.Code Cong. & Ad.News 3634. The committee reports, far from repudiating the Secretary's practice of issuing revocable permits, expressly approved the practice:

The Department of Agriculture now has adequate authority to issue revocable permits for *all* purposes under the act of June 4, 1897 (16 U.S.C. § 551). Its authority to issue term permits . . . would be broadened by S. 2216(.

S.Rep. No. 2511, 84th Cong., 2d Sess. 1, (emphasis supplied), *quoted in* H.R.Rep. No. 2792, *supra*, at 2, 1956 U.S.Code Cong. & Ad.News at 3635. Congress has not amended either § 497 or § 551 in relevant part since 1956.

that the amendment to H.R. 1809 reflects Congress' intent not to allow the Secretary to issue permits to large areas in the lower 48 states. The better interpretation, however, is that Congress was not yet ready to authorize the Secretary to grant *term* permits to areas larger than 5 acres. The legislative history of H.R. 1809 nowhere disapproves of the Secretary's practice of issuing dual permits and revocable permits to areas larger than 5 acres. As the quoted letter illustrates, Congress knew of that practice.

We conclude, then, that the Secretary has consistently interpreted the Act of 1915 as *not* limiting his authority to issue revocable permits under the Act of 1897; that Congress has for decades had knowledge of the Secretary's interpretation, but has never objected; and that on the one occasion when Congress did comment on the Secretary's interpretation and practice, in 1956, it expressed approval. Under these circumstances the Secretary's authority to issue revocable permits under § 551, whether or not exercised in connection with dual permits, cannot be doubted. As this court stated in *Kay v. FCC*, 443 F.2d 638, 646-47 (1970), "a consistent administrative interpretation of a statute, shown clearly to have been brought to the attention of Congress and not changed by it, is almost conclusive evidence that the interpretation has congressional approval." (footnote omitted).

In *Sierra Club v. Hickel*, 433 F.2d 24, 35 (9th Cir.1970), *affd. on other grounds sub nom. Sierra Club v. Morton*, 405 U.S. 727, 92 S.Ct. 1361, 31 L.Ed.2d 636 (1972), the Ninth Circuit approved the practice of issuing dual permits to ski resort operators<sup>19</sup> and, in language highly instructive here, stated:

The fact that the record discloses that there are now a total of at least eighty-four recreational developments on national forest lands in which there is such a combination of the term permit and the revocable permit is convincing proof of their legality. Many of these developments are ski developments making use of the maximum acres of the term permit plus revocable permits for additional acreage in amounts in some cases in excess of 6,000 acres . . . It seems apparent, as was obvious to both [the 1956] Senate and House Committees, that the

eighty-acre long-term permit was a necessity to obtain proper financing for substantial permanent improvements, while developments of less magnitude and permanency, such as trails, slopes, corrals, could be placed upon lands held under revocable permits.

(footnote omitted). The Forest Service has continued, following the decision in *Sierra Club*, to grant dual permits to ski resort operators. There are presently about 200 ski developments in the national forests and most of them employ dual permits.<sup>20</sup>

The case of *Wilderness Society v. Morton*, 479 F.2d 842 (D.C.Cir.) (en banc), *cert. denied*, 411 U.S. 917, 93 S.Ct. 1550, 36 L.Ed.2d 309 (1973), cited by the plaintiffs, does not support their argument. In *Wilderness Society*, the plaintiffs challenged the issuance of rights-of-way and special land use permits by the Secretary of the Interior to a consortium of oil companies for the construction of the Alaska pipeline. The permits covered land greater in width than the express limitation contained in § 28 of the Mineral Leasing Act of 1920, 30 U.S.C. § 185. This court found that § 28 constituted the Secretary's sole authority to issue permits for the use of federal land for oil pipelines, and held that the Secretary had exceeded his authority in failing to adhere to the width limitations. The plaintiffs also contended that the permits issued by the Secretary violated § 497. The court found it unnecessary to decide that claim, and declined to comment on the Ninth Circuit's decision in *Sierra Club*. The court did, however, note that § 497 had "no provision comparable to that in Section 28 of the Mineral Leasing Act expressly stating that no rights-of-way for the uses in question shall be granted except under the provisions, conditions and limitations of the stat-

19. *Sierra Club* vacated a preliminary injunction enjoining the Secretaries of Interior and Agriculture from authorizing a large-scale, private recreational development in the Sequoia National Forest. Because *Sierra Club* involved an interlocutory appeal it required the Ninth Circuit to decide only whether the plaintiffs had shown a strong likelihood of success on the merits. Although the Ninth Circuit found that the plaintiffs had shown little or no likelihood

of success, it did not make a final determination of the validity of dual permits. That issue therefore technically remains open in the Ninth Circuit. See *Sierra Club v. Morton*, 348 F.Supp. 219, 220 (N.D.Cal.1972). *Sierra Club* did, however, give detailed consideration to the legality of dual permits.

20. S.Rep.No. 1019, 94th Cong., 2d Sess. 8 (1976).

ute." 479 F.2d at 870. That distinction between the language of § 497 and of § 28, together with the legislative history recounted above, indicate clearly enough that § 497, unlike § 28, cannot be read as an exclusive grant of authority as to the uses in question.<sup>21</sup>

Finally, the plaintiffs claim that even if the Secretary had authority under §§ 497 and 551 to issue dual permits to Northland, the 753-acre permit issued under § 551 is invalid because not actually revocable. We see no merit in this claim. The Forest Service's continuing power to revoke the § 551 permit is apparent from the permit's terms, which state that the permit will terminate on May 1, 1997 unless previously terminated "upon breach of any of the conditions herein or at the discretion of the regional forester or the Chief, Forest Service." (emphasis supplied). The plaintiffs argue that the permit is not truly revocable because the Forest Service's own regulations require a rational basis for the revocation of such permits, see 36 C.F.R. § 251.60(b) (1982), and subject revocations to administrative review. 36 C.F.R. § 211.19 (1982). The plaintiffs have not, however, cited any authority holding that a permit, to be "revocable," must be revocable at the mere arbitrary will of the issuing authority, and we decline to read such a requirement into the authorizing statute. *Cf. Sierra Club, supra*, 433 F.2d at 35. The plaintiffs also argue that the permit is not revocable because the Forest Service is unlikely to revoke it before the term permit expires. The short answer is that the Forest Service has power to revoke.

#### CONCLUSION

We also agree with Judge Richey's disposition of the plaintiffs' remaining claims.

21. In both 1975 and 1977 the Senate considered bills which would have substantially revised the Forest Service's authority to issue permits for the private recreational use of national forest land. The bills expressly authorized the Forest Service to grant term permits to ski resort operators to areas larger than 80 acres. S. 1338, 95th Cong., 1st Sess. § 3, 123 Cong. Rec. 11,643 (1977); S. 2125, 94th Cong., 2d Sess. § 3 (1976). The bills never became law. Although the bills were intended to achieve a

Accordingly, we affirm the judgment of the district court.



### U.S. SOUTHWEST AFRICA/NAMIBIA TRADE & CULTURAL COUNCIL, Appellant,

v.

UNITED STATES of America, et al.

No. 81-2199.

United States Court of Appeals,  
District of Columbia Circuit.

Argued Sept. 16, 1982.

Decided May 27, 1983.

Appeal was taken from refusal by official of the Federal Aviation Administration to approve advertisement as suitable for public display in various advertising areas at federally-owned airports. The United States District Court for the District of Columbia, Oliver Gasch, J., affirmed, and appeal was taken. The Court of Appeals, Mikva, Circuit Judge, held that refusal to approve advertisement infringed upon First Amendment rights.

Reversed and remanded.

number of goals, they were proposed, in part, because of concern that under *Wilderness Society v. Morton* the Forest Service's practice of issuing dual permits might be illegal. See 123 Cong. Rec. 11,641 (1977) (Remarks of Sen. Haskell); S.Rep. No. 324, 95th Cong., 1st Sess. 11-12 (1977); S.Rep. No. 1019, 94th Cong., 2d Sess. 8-9 (1976). However, as stated above, *Wilderness Society* does not preclude the issuance of dual permits under §§ 497 and 551.

# Appendix U

# [Employment Div., Dep't of Human Res. v. Smith](#)

Supreme Court of the United States

December 8, 1987, Argued ; April 27, 1988, Decided \*

Nos. 86-946; 86-947

## Reporter

485 U.S. 660; 108 S. Ct. 1444; 99 L. Ed. 2d 753; 1988 U.S. LEXIS 1984; 56 U.S.L.W. 4357; 46 Fair Empl. Prac. Cas. (BNA) 1061; Unemployment Ins. Rep. (CCH) P21,890

EMPLOYMENT DIVISION, DEPARTMENT OF HUMAN RESOURCES OF THE STATE OF OREGON, ET AL. v. SMITH

**Prior History:** CERTIORARI TO THE SUPREME COURT OF OREGON.

**Disposition:** [No. 86-946, 301 Ore. 209, 721 P. 2d 445](#), and [No. 86-947, 301 Ore. 221, 721 P. 2d 451](#), vacated and remanded.

## Syllabus

On the basis of their employer's policy prohibiting its employees from using illegal nonprescription drugs, respondent drug and alcohol abuse rehabilitation counselors were discharged for ingesting a small quantity of peyote, a hallucinogenic drug, for sacramental purposes during a religious ceremony of the Native American Church. It is undisputed that respondents are members of that church and that their religious beliefs are sincere. Respondents applied for and were denied unemployment compensation by petitioner Employment Division under an Oregon statute disqualifying employees discharged for work-connected misconduct. The State Court of Appeals reversed. The State Supreme Court affirmed, reasoning that, although the benefits denials were proper under Oregon law, [Sherbert v. Verner, 374 U.S. 398](#), and [Thomas v. Review Bd., Indiana Employment Security Div., 450 U.S. 707](#), required the court to hold that the denials significantly burdened respondents' religious freedom in violation of the Free Exercise Clause of the First Amendment to the Federal Constitution. In reaching that conclusion, the court attached no significance to the fact that peyote possession is a felony in Oregon, declaring that the legality of ingesting peyote did not affect its analysis of the State's interest in denying benefits, which must be found in the unemployment compensation, rather than the criminal, statutes.

*Held:* These cases must be remanded to the State Supreme Court for a definitive ruling as to whether the religious use of peyote is legal in Oregon, since that question is relevant to the federal constitutional analysis. Although [Sherbert, Thomas, and Hobbie v. Unemployment Appeals Comm'n, 480 U.S. 136](#), prohibited the denial of unemployment compensation to employees required to choose between fidelity to their religious beliefs and cessation of work, those cases all involved employee conduct that was perfectly legal. Their results might well have been different had the employees been discharged for criminal conduct, since the First Amendment protects "legitimate claims to the free exercise of religion," see [Hobbie, 480 U.S., at 142](#), not conduct that a State has validly proscribed. If Oregon does prohibit the religious use of peyote, and if that prohibition is consistent with the Federal Constitution (a question that is not decided here), there is no federal right to engage in that conduct in Oregon, and the State is free to withhold unemployment compensation from respondents. If, on the other hand, Oregon is among those States that exempt the religious use of peyote from statutory controlled substances prohibitions, respondents' conduct may well be entitled to constitutional protection. Pp. 669-674.

**Counsel:** William F. Gary, Deputy Attorney General of Oregon, argued the cause for petitioners. With him on the briefs were Dave Frohnmayer, Attorney General of Oregon, Virginia L. Linder, Solicitor General, Michael D. Reynolds, Assistant Solicitor General, and Christian Chute, Assistant Attorney General.

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\* Together with No. 86-947, Employment Division, Department of Human Resources of the State of Oregon, et al. v. Black, also on certiorari to the same court.

Suanne Lovendahl argued the cause and filed a brief for respondents. <sup>+</sup>

**Judges:** STEVENS, J., delivered the opinion of the Court, in which REHNQUIST, C. J., and WHITE, O'CONNOR, and SCALIA, JJ., joined. BRENNAN, J., filed a dissenting opinion, in which MARSHALL and BLACKMUN, JJ., joined, post, p. 674. KENNEDY, J., took no part in the consideration or decision of the case.

**Opinion by:** STEVENS

## Opinion

[\*\*758] [\*661] [~~\*\*1446~~] JUSTICE STEVENS delivered the opinion of the Court.

[1A] [2A] Respondents are drug and alcohol abuse rehabilitation counselors who were discharged after they ingested peyote, a hallucinogenic drug, during a religious ceremony of the Native American Church. Both applied for and were denied unemployment compensation by petitioner Employment Division. The Oregon Supreme Court held that this denial, although [\*662] proper as a matter of Oregon law, violated the *Free Exercise Clause of the First Amendment to the Federal Constitution*.<sup>1</sup> In reaching that conclusion the state court attached no significance to the fact that the

possession of peyote is a felony under Oregon law punishable by imprisonment for up to 10 years.<sup>2</sup> Because we are persuaded that the alleged illegality of respondents' conduct is relevant to the constitutional analysis, we granted certiorari, *480 U.S. 916 (1987)*, and now vacate the judgments and remand for further proceedings.

[\*\*759] I

Respondents Alfred Smith and Galen Black were employed by the Douglas County Council on Alcohol and Drug Abuse Prevention and Treatment (ADAPT), a nonprofit corporation that provides treatment for alcohol and drug abusers. Both were qualified to be counselors, in part, because they had former drug and alcohol dependencies. As a matter of policy, ADAPT required its recovering counselors to abstain from the use of alcohol and nonprescription drugs.<sup>3</sup> ADAPT terminated [\*663] respondents' employment because they violated that policy. As to each of them the violation consisted of a single act of ingesting a small quantity of peyote for sacramental purposes at a ceremony of the Native American Church. It is undisputed that respondents are members of that church, that their religious beliefs are sincere, and that those beliefs motivated the "misconduct" that led to their discharge.

<sup>+</sup> Briefs of amici curiae urging affirmance were filed for the American Civil Liberties Union Foundation et al. by Charles A. Horsky, David H. Remes, John A. Powell, and David B. Goldstein; for the American Jewish Congress et al. by Amy Adelson, Lois C. Waldman, and Marc D. Stern; and for the Native American Church of North America et al. by Walter R. Echo-Hawk and Steven C. Moore.

<sup>1</sup> "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof . . . ." *U.S. Const., Amdt. 1*.

<sup>2</sup> *Ore. Rev. Stat. §§ 475.992(4)(a), 161.605(2)* (1987); see *301 Ore. 209, 219, n. 2, 721 P. 2d 445, 450, n. 2 (1986)* (quoted at n. 10, *infra*).

<sup>3</sup> This policy reflected ADAPT's treatment philosophy that successful recovery from addiction requires complete abstinence from the use of alcohol and nonprescription drugs. The policy also served to assure that counselors were appropriate role models for their clients. ADAPT's policy statement on drug and alcohol abuse provided, in pertinent part:

"POLICY STATEMENT

ALCOHOL AND OTHER DRUG USE BY EMPLOYEES

"In keeping with our drug-free philosophy of treatment, and our belief in the disease concept of alcoholism, and associated complex issues involved in both alcoholism and drug addiction, we require the following of our employees:

"1. Use of an illegal drug or use of prescription drugs in a nonprescribed manner is grounds for immediate termination from employment.

. . . .

"3. Any use of alcohol by recovering staff will not be allowed, and is grounds for immediate disciplinary action, up to and including termination. Use shall be defined as any ingestion of an alcoholic beverage, in *any* situation." App. 11.

Both respondents applied for unemployment compensation. Petitioner Employment Division considered the applications in a series of administrative hearings and appeals,<sup>4</sup> at the conclusion of which it determined that the applications should be **[\*\*1447]** denied.<sup>5</sup> Petitioner considered and rejected respondents' constitutional claim and concluded that they were **[\*664]** **[\*\*\*760]** ineligible for benefits because they had been discharged for work-related "misconduct."<sup>6</sup>

The Oregon Court of Appeals, considering the constitutional issue en banc, reversed the Board's

decisions.<sup>7</sup> The Oregon Supreme Court granted the State's petitions for review in both cases to consider whether the denial of benefits violated the Oregon Constitution<sup>8</sup> or the *First Amendment to the Federal Constitution*. The cases were argued together, but the court issued separate opinions, fully analyzing the constitutional issues only in *Smith*.

**[\*665]** In accordance with its usual practice,<sup>9</sup> the court first addressed the Oregon constitutional issue. The court concluded:

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<sup>4</sup> Raising identical legal issues and presenting almost identical facts, these two cases proceeded in tandem through state administrative proceedings and through the state courts. They were consolidated upon order of this Court when the State's petitions for certiorari were granted. **480 U.S. 916 (1987)**.

<sup>5</sup> Each respondent requested a hearing after his application for benefits was denied because he had been discharged for work-related misconduct. After separate hearings, a referee decided that both respondents were entitled to unemployment compensation benefits. In Black's case, the referee held that his ingestion of peyote was "an isolated incident of poor judgment" rather than misconduct. App. 3-5. In Smith's case, the referee concluded that because "there is no evidence in the hearing record to indicate that granting benefits to claimants whose unemployment is caused by adherence to religious beliefs would have any significant impact on the trust fund, it cannot be held that the alleged State interest warrants interference with the claimant's freedom of religion." App. to Pet. for Cert. in No. 86-946, p. A25. On review the Employment Appeals Board disagreed with the referee and concluded that benefits should be denied in both cases. As to Smith, the Board ruled that the State had shown a compelling state interest in denying benefits. That interest was "in the proscription of illegal drugs, not merely in the burden upon the Unemployment Compensation Trust Fund." *Id.*, at A19-A20. In Black's case the Board merely reversed the referee's finding that Black had not been fired for misconduct without reaching the *First Amendment* issue. App. to Pet. for Cert. in No. 86-947, pp. A23-A24.

<sup>6</sup> [Oregon Rev. Stat. § 657.176\(2\)\(a\)](#) (1987) provides that "an individual shall be disqualified from the receipt of benefits . . . if . . . the individual . . . has been discharged for misconduct connected with work."

Oregon Admin. Rule 471-30-038(3) (1987) provides:

"Under the provisions of [ORS 657.176\(2\)\(a\)](#) and [\(b\)](#), misconduct is a wilful violation of the standards of behavior which an employer has the right to expect of an employe. An act that amounts to a wilful disregard of an employer's interest, or recurring negligence which demonstrates wrongful intent is misconduct. Isolated instances of poor judgment, good faith errors, unavoidable accidents, absences due to illness or other physical or mental disabilities, or mere inefficiency resulting from lack of job skills or experience are not misconduct for purposes of denying benefits under [ORS 657.176](#)."

<sup>7</sup> In Black's case the majority concluded that the denial of benefits to persons who were discharged for engaging in a religious act constituted a substantial burden on free exercise rights that was not justified by the State's interest in protecting the Unemployment Compensation Fund from depletion and remanded for further factual findings on the religious nature of respondent's conduct. The dissenting judges expressed the opinion that because the ingestion of peyote was prohibited by Oregon law respondent had no protectible constitutional right on which to base his claim. [75 Ore. App. 735, 707 P. 2d 1274 \(1985\)](#). Smith's case was reversed and remanded for further consideration in light of the decision in *Black*. **75 Ore. App. 764, 709 P. 2d 246 (1985)**.

<sup>8</sup> Art. I of the Oregon Constitution provides, in part:

"Section 2. Freedom of worship. All men shall be secure in the Natural right, to worship Almighty God according to the dictates of their own consciences.

"Section 3. Freedom of religious opinion. No law shall in any case whatever control the free exercise, and enjoyment of religious opinions, or interfere with the rights of conscience."

<sup>9</sup> The Oregon Supreme Court stated in [Sterling v. Cupp, 290 Ore. 611, 614, 625 P. 2d 123, 126 \(1981\)](#):

"Under the Oregon Constitution's freedom of religion provisions, claimant has not shown that his right to worship according to the dictates of his conscience has been infringed upon by the denial of [\*\*1448] unemployment benefits. We do not imply that a governmental rule or policy disqualifying a person from employment or from public services or benefits by reason of conduct that rests on a religious belief or a religious practice could not impinge on the religious freedom guaranteed by Article I, sections 2 and 3. Nor do we revive a distinction between constitutional 'rights' and 'privileges.' But here it was not the government that disqualified claimant from his job for ingesting peyote. And the rule [\*\*\*761] denying unemployment benefits to one who loses his job for what an employer permissibly considers misconduct, conduct incompatible with doing the job, is itself a neutral rule, as we have said. As long as disqualification by reason of the religiously based conduct is peculiar to the particular employment and most other jobs remain open to the worker, we do not believe that the state is denying the worker a vital necessity in applying the 'misconduct' exception of the unemployment compensation law." [301 Ore. 209, 216, 721 P. 2d 445, 448-449 \(1986\)](#).

Turning to the federal issue, the court reasoned that our decisions in [Sherbert v. Verner, 374 U.S. 398 \(1963\)](#), and [\*666] [Thomas v. Review Bd., Indiana Employment Security Div., 450 U.S. 707 \(1981\)](#), required it to hold that the denial of unemployment benefits significantly burdened respondent's religious freedom. The court also concluded that the State's interest in denying benefits was not greater in this case than in *Sherbert* or *Thomas*. This conclusion rested on the premise that the Board had erroneously relied on the State's interest in proscribing the use of dangerous drugs rather than just

its interest in the financial integrity of the compensation fund. Whether the state court believed that it was constrained by *Sherbert* and *Thomas* to disregard the State's law enforcement interest, or did so because it believed petitioner to have conceded that the legality of respondent's conduct was not in issue, is not entirely clear. The relevant paragraph in the court's opinion reads as follows:

"Nor is the state's interest in this case a more 'overriding' or 'compelling' interest than in *Sherbert* and *Thomas*. The Board found that the state's interest in proscribing the use of dangerous drugs was the compelling interest that justified denying the claimant unemployment benefits. However, the legality of ingesting peyote does not affect our analysis of the state's interest. The state's interest in denying unemployment [\*\*1454] benefits to a claimant discharged for religiously motivated misconduct must be found in the unemployment compensation statutes, not in the criminal statutes proscribing the use of peyote. The Employment Division concedes that 'the commission of an illegal act is not, in and of itself, grounds for disqualification from unemployment benefits. [ORS 657.176\(3\)](#) permits disqualification only if a claimant commits a felony in connection with work. . . . The legality of [claimant's] ingestion of peyote has little direct bearing on this case." [301 Ore., at 218-219, 721 P. 2d, at 450](#).

[\*667] The court noted that although the possession of peyote is a crime in Oregon, such possession is lawful in many jurisdictions.<sup>10</sup>

[\*\*\*762] [\*\*1449] In its opinion in *Black*, the court rejected the Court of Appeals' conclusion that the case should be remanded for factual findings on the religious character of respondent's peyote use. Although the

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"The proper sequence is to analyze the state's law, including its constitutional law, before reaching a federal constitutional claim. This is required, not for the sake either of parochialism or of style, but because the state does not deny any right claimed under the federal Constitution when the claim before the court in fact is fully met by state law."

See also Linde, E Pluribus -- Constitutional Theory and State Courts, [18 Ga. L. Rev. 165, 178-179 \(1984\)](#).

<sup>10</sup> The court commented in a footnote:

"Under [ORS 475.992\(4\)](#) and OAR 855-80-020, the possession of peyote is a crime. Peyote (*Lophophora williamsii*) is a cactus that 'contains a number of active alkaloids with varying properties; the chief hallucinogen among these alkaloids is mescaline.' Note, *Hallucinogens*, 68 Colum L Rev 521, 525 (1968). The Oregon Court of Appeals, construing a previous statute, has held that religious users of peyote are not exempt from criminal sanctions. [State v. Soto, 21 Or App 794, 537 P2d 142 \(1975\)](#), cert den [424 US 955 \(1976\)](#). The federal government and several states exempt the religious use of peyote through caselaw, statute or regulation. See [State v. Whittingham, 19 Ariz App 27, 504 P2d 950 \(1973\)](#), cert den [417 US 946 \(1974\)](#); [People v. Woody, 61 Cal 2d 716, 40 Cal Rptr 69, 394 P2d 813 \(1964\)](#); [Whitehorn v. State, 561 P2d 539 \(Okla Crim App 1977\)](#); [21 CFR § 1307.31 \(1985\)](#); Iowa Code Ann § 204.204(8) (1986); NM Stat Ann § 30-31-6(D) (1980); SD Comp Laws Ann § 34-20B-14(17) (1977); Tex Stat Ann 4476-15 § 4.11 (1976)." [301 Ore., at 219, n. 2, 721 P. 2d, at 450, n. 2](#).

referee's findings concerning the use of peyote were somewhat sparse, the court found them sufficient to support the conclusions that the Native American Church is a recognized religion, that peyote is a sacrament of that church, and that respondent's beliefs were sincerely held. The court noted that other courts had acknowledged the role of peyote in the Native American Church and quoted at length from a decision of the California Supreme Court.<sup>11</sup> [\*668] This extensive quotation from an opinion that explains [\*\*\*763] why the religious use of peyote is permitted in California raises the question whether the Oregon court might reach a similar conclusion.

[3] Respondents contend that the sacramental use of small quantities of peyote in the Native American Church is comparable to the sacramental use of small quantities of alcohol in Christian religious ceremonies. Even though the State may generally prohibit the use of hallucinogenic drugs and alcohol for recreational purposes and strictly regulate their use for medicinal purposes, respondents assert that the Constitution requires some measure of accommodation for religious use. Alternatively, they argue that Oregon's general prohibition against the possession of peyote is not applicable to its use in a genuine religious ceremony. Even if peyote use is a crime in Oregon, since the State does not administer its unemployment compensation

[\*669] [\*\*1450] II

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<sup>11</sup> [301 Ore. 221, 225-227, 721 P. 2d 451, 453-454 \(1986\)](#), quoting [People v. Woody, 61 Cal. 2d 716, 720-721, 394 P. 2d 813, 817-818 \(1964\)](#):

"Peyote, as we shall see, plays a central role in the ceremony and practice of the Native American Church, a religious organization of Indians. Although the church claims no official prerequisites to membership, no written membership rolls and no recorded theology, estimates of its membership range from 30,000 to 250,000, the wide variance deriving from differing definitions of a "member." As the anthropologists have ascertained through conversations with members, the theology of the church combines certain Christian teachings with the belief that peyote embodies the Holy Spirit and that those who partake of peyote enter into direct contact with God.

"Peyotism discloses a long history. A reference to the religious use of peyote in Mexico appears in Spanish historical sources as early as 1560. Peyotism spread from Mexico to the United States and Canada; American anthropologists describe it as well established in this country during the latter part of the nineteenth century. Today, Indians of many tribes practice Peyotism. Despite the absence of recorded dogma, the several tribes follow surprisingly similar ritual and theology; the practices of Navajo members in Arizona practically parallel those of adherents in California, Montana, Oklahoma, Wisconsin, and Saskatchewan.

"The "meeting," a ceremony marked by the sacramental use of peyote, composes the cornerstone of the peyote religion. The meeting convenes in an enclosure and continues from sundown Saturday to sunrise Sunday. To give thanks for the past good fortune or find guidance for future conduct, a member will "sponsor" a meeting and supply to those who attend both the peyote and the next morning's breakfast. The "sponsor," usually but not always the "leader," takes charge of the meeting; he decides the order of events and the amount of peyote to be consumed. Although the individual leader exercises an absolute control of the meeting, anthropologists report a striking uniformity of its ritual.

"A meeting connotes a solemn and special occasion. Whole families attend together, although children and young women participate only by their presence. Adherents don their finest clothing, usually suits for men and fancy dresses for the women, but sometimes ceremonial Indian costumes. At the meeting the members pray, sing, and make ritual use of drum, fan, eagle bone, whistle, rattle and prayer cigarette, the symbolic emblems of their faith. The central event, of course, consists of the use of peyote in quantities sufficient to produce an hallucinatory state.

"At an early but fixed stage in the ritual the members pass around a ceremonial bag of peyote buttons. Each adult may take four, the customary number, or take none. The participants chew the buttons, usually with some difficulty because of extreme bitterness; later, at a set time in the ceremony any member may ask for more peyote; occasionally a member may take as many as four more buttons. At sunrise on Sunday the ritual ends; after a brief outdoor prayer, the host and his family serve breakfast. Then the members depart. By morning the effects of the peyote disappear; the users suffer no after-effects.

"Although peyote serves as a sacramental symbol similar to bread and wine in certain Christian churches, it is more than a sacrament. Peyote constitutes in itself an object of worship; prayers are directed to it much as prayers are devoted to the Holy Ghost. On the other hand, to use peyote for nonreligious purposes is sacrilegious. Members of the church regard peyote also as a "teacher" because it induces a feeling of brotherhood with other members; indeed it enables the participant to experience the Deity. Finally, devotees treat peyote as a "protector." Much as a Catholic carries his medallion, an Indian G. I. often wears around his neck a beautifully beaded pouch containing one large peyote button" (footnote omitted).

program for law enforcement purposes, they conclude that our decisions in *Sherbert* and *Thomas* require that they be awarded benefits.

The Oregon Supreme Court agreed with respondents' conclusion, but it did not endorse all of their reasoning. The state court appears to have assumed, without specifically deciding, that respondents' conduct was unlawful. That assumption did not influence the court's disposition of the cases because, as a matter of state law, the commission of an illegal act is not itself a ground for disqualifying a discharged employee from benefits. It does not necessarily follow, [\*670] however, that the illegality of an employee's misconduct is irrelevant to the analysis of the federal constitutional claim. For if a State has prohibited through its criminal laws certain kinds of religiously motivated conduct without violating the *First Amendment*, it certainly follows that it may impose the lesser burden of denying unemployment compensation benefits to persons who engage in that conduct.

[4][5A]There is no absolute "constitutional right to unemployment benefits on the part of all persons whose religious convictions are the cause of their unemployment." *Sherbert v. Verner*, 374 U.S. 398, 409-410 (1963). On three separate occasions, however, we have held that an employee who is required to choose between fidelity to religious belief and cessation

of work may not be denied unemployment compensation because he or she is faithful to the tenets of his or her church. As we explained in *Sherbert*:

"Governmental imposition of such a choice puts the same kind of burden upon the free exercise of religion as would a fine imposed against appellant for her Saturday [\*\*\*764] worship." *Id.*, at 404.

In *Sherbert*, as in *Thomas and Hobbie v. Unemployment Appeals Comm'n of Fla.*, 480 U.S. 142 (1987), the conduct that gave rise to the termination of employment was perfectly legal;<sup>12</sup> indeed, the Court assumed that it was immune from state regulation.<sup>13</sup>

[5B]

[\*671] [\*\*1451] [5C]The results we reached in *Sherbert*, *Thomas*, and *Hobbie* might well have been different if the employees had been discharged for engaging in criminal conduct. We have held that bigamy may be forbidden, even when the practice is dictated by sincere religious convictions. *Reynolds v. United States*, 98 U.S. 145 (1879). If a bigamist may be sent to jail despite the religious motivation for his misconduct, surely a State may refuse to pay unemployment compensation to a marriage counselor who was discharged because he or she entered into a bigamous relationship. The protection that the *First Amendment* provides to

<sup>12</sup> In *Sherbert v. Verner*, the appellant was discharged because she would not work on Saturday, the Sabbath Day of her faith. When the petitioner in *Thomas v. Review Bd., Indiana Employment Security Div.*, 450 U.S. 707 (1981), was required to work on turrets for military tanks, he terminated his employment because his religious beliefs prevented him from participating in the production of war materials. And in *Hobbie v. Unemployment Appeals Comm'n of Fla.*, the appellant's religion precluded work between sundown on Friday and sundown on Saturday; she was discharged because she therefore could not work all of her scheduled shifts.

<sup>13</sup> The distinction between the absolute constitutional protection against governmental regulation of religious beliefs on the one hand, and the qualified protection against the regulation of religiously motivated conduct, on the other, was carefully explained in our opinion in *Sherbert*:

"The door of the **Free Exercise Clause** stands tightly closed against any governmental regulation of religious *beliefs* as such, *Cantwell v. Connecticut*, 310 U.S. 296, 303. Government may neither compel affirmation of a repugnant belief, *Torcaso v. Watkins*, 367 U.S. 488; nor penalize or discriminate against individuals or groups because they hold religious views abhorrent to the authorities, *Fowler v. Rhode Island*, 345 U.S. 67; nor employ the taxing power to inhibit the dissemination of particular religious views, *Murdock v. Pennsylvania*, 319 U.S. 105; *Follett v. McCormick*, 321 U.S. 573; cf. *Grosjean v. American Press Co.*, 297 U.S. 233. On the other hand, the Court has rejected challenges under the **Free Exercise Clause** to governmental regulation of certain overt acts prompted by religious beliefs or principles, for 'even when the action is in accord with one's religious convictions, [it] is not totally free from legislative restrictions.' *Braunfeld v. Brown*, 366 U.S. 599, 603. The conduct or actions so regulated have invariably posed some substantial threat to public safety, peace or order. See, e. g., *Reynolds v. United States*, 98 U.S. 145; *Jacobson v. Massachusetts*, 197 U.S. 11; *Prince v. Massachusetts*, 321 U.S. 158; *Cleveland v. United States*, 329 U.S. 14.

"Plainly enough, appellant's conscientious objection to Saturday work constitutes no conduct prompted by religious principles of a kind within the reach of state legislation." 374 U.S., at 402-403.

"legitimate claims to the free exercise of religion," see [Hobbie, 480 U.S., at 142](#) (quoting [Wisconsin v. Yoder, 406 U.S. 205, 215 \(1972\)](#)) (emphasis added), does not extend to conduct that a State has validly proscribed.

[\*672] [1B] [2B] Neither the Oregon Supreme Court nor this Court has confronted the question whether the [\*\*\*765] ingestion of peyote for sincerely held religious reasons is a form of conduct that is protected by the Federal Constitution from the reach of a State's criminal laws. It may ultimately be necessary to answer that federal question in this case, but it is inappropriate to do so without first receiving further guidance concerning the status of the practice as a matter of Oregon law.<sup>14</sup> A substantial number of jurisdictions have exempted the use of peyote in religious ceremonies from legislative prohibitions against the use and possession of controlled substances.<sup>15</sup> If Oregon is one of those States, respondents' conduct may well be entitled to constitutional protection. On the other hand, if Oregon does prohibit the religious use of peyote, and if that prohibition is consistent with the Federal Constitution, there is no federal right to engage in that conduct in Oregon. If that is the case, the State is free to withhold unemployment compensation from respondents for engaging in work-related misconduct, despite its religious motivation. Thus, paradoxical as it may first appear, a necessary predicate to a correct evaluation of respondents' federal claim is an understanding of the legality of their conduct as a matter of state law.

[1C][2C][6] Relying on the fact that Oregon statutes prohibit the possession of peyote, see [Ore. Rev. Stat. § 475.992\(4\)](#) (1987), rather than its use, and the further fact that the Oregon Court of Appeals held that the ingestion of a controlled substance [\*673] into the blood

stream did not constitute "possession" within the meaning of the predecessor [\*\*1452] statute, [State v. Downes, 31 Ore. App. 1183, 572 P. 2d 1328 \(1977\)](#), respondents argue that their ceremonial use of the drug was not unlawful.<sup>16</sup> The Attorney General of the State advises us that this argument is without merit. But in the absence of a definitive ruling by the Oregon Supreme Court we are unwilling to disregard the possibility that the State's legislation regulating the use of controlled substances may be construed to permit peyotism or that the State's Constitution may be interpreted to protect the practice.<sup>17</sup> That the Oregon Supreme Court's opinions in these cases not only noted that other States "exempt the religious use of peyote through caselaw,"<sup>18</sup> but also quoted extensively from a California [\*\*\*766] opinion that did so, lends credence to the possibility that this conduct may be lawful in Oregon.

[2D]

[1D][2E] Because we are uncertain about the legality of the religious use of peyote in Oregon, it is not now appropriate for us to decide whether the practice is protected by the Federal Constitution. See [Ashwander v. TVA, 297 U.S. 288, 346-347 \(1936\)](#) (Brandeis, J., concurring). The possibility that respondents' conduct would be unprotected if it violated the State's criminal code is, however, sufficient to counsel against affirming the state court's holding that the Federal Constitution requires the award of benefits to these respondents. If the Oregon Supreme Court's holding rests on the [\*674] unstated premise that respondents' conduct is entitled to the same measure of federal constitutional protection regardless of its criminality, that holding is erroneous. If, on the other hand, it rests on the unstated premise that

<sup>14</sup> See nn. 10 and 11, *supra*.

<sup>15</sup> See [21 CFR § 1307.31 \(1987\)](#) (exempting use of peyote in bona fide religious ceremonies of the Native American Church); Iowa Code § 204.204(8) (1985) (same); [N. M. Stat. Ann. § 30-31-6\(D\)](#) (1987) (exempting use of peyote in bona fide religious ceremonies by bona fide religious organizations); [S. D. Codified Laws § 34-20B-14\(17\)](#) (1987) (exempting sacramental use of peyote in services of the Native American Church); [Tex. Rev. Civ. Stat. Ann., Art. 4476-15 § 4.11](#) (Supp. 1988) (exempting use of peyote by Native American Church members with not less than 25% Indian blood in bona fide religious ceremonies). These authorities were cited by the Oregon Supreme Court. See n. 10, *supra*.

<sup>16</sup> At the time *Downes* was decided, Oregon law proscribed both the use and possession of controlled substances. In 1977, the Oregon Legislature passed the Uniform Controlled Substances Act, [Ore. Rev. Stat. § 475.005 et seq.](#) (1987), which repealed the use and possession statutes discussed in *Downes* and enacted a provision that addresses only the possession of controlled substances. See [§ 475.992\(4\)](#).

<sup>17</sup> Our concern, of course, is not with whether some fact unique to respondents' cases bars their prosecution, but with whether Oregon law provides a general exemption from the scope of its criminal laws for the religious use of peyote.

<sup>18</sup> See n. 10, *supra*.

the conduct is not unlawful in Oregon, the explanation of that premise would make it more difficult to distinguish our holdings in *Sherbert*, *Thomas*, and *Hobbie*. We therefore vacate the judgments of the Oregon Supreme Court and remand the cases for further proceedings not inconsistent with this opinion.

*It is so ordered.*

JUSTICE KENNEDY took no part in the consideration or decision of this case.

**Dissent by:** BRENNAN

## Dissent

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JUSTICE BRENNAN, with whom JUSTICE MARSHALL and JUSTICE BLACKMUN join, dissenting.

Respondents Smith and Black were fired for practicing their religion. The Employment Division of the Oregon Department of Human Resources deemed respondents' worship "misconduct connected with work," *Ore. Rev. Stat. § 657.176(2)(a)* (1987), and accordingly denied them unemployment benefits. Citing a "compelling state interest . . . in the proscription of illegal drugs," the Employment Appeals Board rejected the assertion that the *Free Exercise Clause* prohibited the denial of unemployment benefits to an employee discharged for religious use of peyote. App. to Pet. for Cert. in No. 86-946, p. A20. The Oregon Supreme Court, disavowing any state interest in enforcing its criminal laws through the denial of unemployment benefits, found the State's interest indistinguishable from those asserted in *Sherbert v. Verner*, 374 U.S. 398, 403 (1963), and *Thomas v. Review Bd., Indiana Employment Security Div.*, 450 U.S. 707 (1981). On the authority of those cases it held that the denial violated respondents' *First Amendment* right to exercise their religion freely. *Smith v. Employment Division*, 301 Ore. 209, 212, 721 [\*1453] P. 2d 445, 446 (1986); *Black v. Employment Division*, 301 Ore. 221, 721 P. 2d 451 (1986). This Court today strains the state court's opinion to transform the straightforward question that is presented into a question of first impression that is not.

A generation ago, we established that a State may not deny unemployment benefits to an employee discharged for her adherence to religious [\*675] practices unless the "incidental burden on the free exercise of [her] religion [is] justified by a 'compelling

state interest in the regulation of a subject within the State's constitutional power to regulate . . . ." *Sherbert, supra*, at 403 (citation omitted). In *Thomas, supra*, and again as recently as last Term, see *Hobbie v. Unemployment Appeals Comm'n of Fla.*, 480 U.S. 142 (1987), we reaffirmed *Sherbert's* holding that, where the "state . . . denies . . . a benefit because of conduct mandated by religious belief," the resultant burden on the free exercise of religion "must be subjected to strict scrutiny and could be justified only by proof by the State of a compelling interest." 480 U.S., at 141 (quoting *Thomas, supra*, at 717-718) (emphasis omitted). Where the burden on religion is imposed pursuant to a statute, we have an independent obligation to ascertain that the legislature in fact intended to advance the asserted interest through the statutory scheme. Cf. *Sherbert, supra*, at 407. We may not, particularly when engaging in strict scrutiny, blindly accept the interest that the State asserts in court. See, e. g., *Mississippi University for Women v. Hogan*, 458 U.S. 718, 730 (1982) (all-women state university fails intermediate scrutiny because, "although the State recited a 'benign, compensatory purpose,' it failed to establish that the alleged objective is the actual purpose underlying the discriminatory [statutory] classification") (footnote omitted); *Hampton v. Mow Sun Wong*, 426 U.S. 88, 103-104 (1976) ("When the Federal Government asserts an overriding national interest as justification for a discriminatory rule . . . , due process requires that there be a legitimate basis for presuming that the rule was actually intended to serve that [\*676] interest"); *Weinberger v. Wiesenfeld*, 420 U.S. 636, 648, n. 16 (1975) (under rationality review, "this Court need not . . . accept at face value assertions of legislative purposes, when an examination of the legislative scheme and its history demonstrates that the asserted purpose could not have been a goal of the legislation").

Smith and Black -- like *Sherbert*, *Thomas*, and *Hobbie* -- were discharged from their employment because their religious practices conflicted with their employer's interests. The only difference between the cases before us and the situations we faced in *Sherbert*, *Thomas*, and *Hobbie* is that here the Employment Division has asserted in court a "compelling state interest . . . in the proscription of illegal drugs," not merely the interest in avoiding the financial "burden upon the Unemployment Compensation Trust Fund" that we found not compelling in *Sherbert*. *Smith, supra*, at 212, 721 P. 2d, at 446 (quoting opinion of Employment Appeals Board). Such an interest in criminal law enforcement would present a novel issue if it were in fact an interest that Oregon had

sought to advance in its unemployment compensation statute.

Far from validating any such state interest, however, the State's highest court has disavowed it. In the paragraph that this Court quotes at length, *ante*, at 666, [\*\*\*768] the Oregon Supreme Court could scarcely have been clearer. The state court understood that the Employment Division may not overcome the burden on religion by invoking a theoretically plausible interest that in fact the state legislature had no intention of furthering when it enacted the unemployment compensation statute: "The state's interest in denying unemployment benefits to a claimant discharged for religiously motivated misconduct must be found in the unemployment compensation statutes, not in the criminal statutes proscribing the use of peyote." *Smith, supra, at 219, 721 P. 2d at 450* (footnote omitted); see also *Black, supra*, (relying on *Smith's* analysis). The state court could find no legislative [\*677] intent expressed in the unemployment statute to reinforce criminal drug-abuse laws. Although we are not bound by a state-court determination that a state legislature was actually motivated by a particular validating purpose, see *Stone v. Graham, 449 U.S. 39, 41 (1980)*, we have never attributed to a state legislature a validating purpose that the State's highest court could find nowhere in the statute. To do so would be inconsistent with our responsibility to scrutinize strictly state-imposed burdens on fundamental rights. At any rate, this Court offers no reason to discount the Oregon Supreme Court's disavowal of the validating purpose. Nor has Employment Division asserted any further interest other than those that *Sherbert, Thomas*, and *Hobbie* have rejected. I would therefore affirm the Oregon Supreme Court.

The Court avoids this straightforward analysis, proclaiming instead that it has difficulty discerning "whether the state court believed that it was constrained by *Sherbert* and *Thomas* to disregard the State's law enforcement interest, or did so because it believed petitioner to have conceded that the legality of respondent's conduct was not in issue," *ante*, at 666. The difficulty, however, is entirely of this Court's own making, for it poses two entirely implausible interpretations of the opinions below and overlooks the only natural one.

The Oregon Supreme Court both introduced and concluded the relevant passage by stressing the *similarity* between the state interests asserted here and

those asserted in *Sherbert* and *Thomas*. See *Smith, 301 Ore., at 218, 721 P. 2d, at 450* (the "state's interest in this case [is no] more 'overriding' or 'compelling' . . . than in *Sherbert* and *Thomas*"); *id., at 219-220, 721 P. 2d, at 450-451* ("The state's interest is simply the financial interest in the payment of benefits from the unemployment insurance fund to this claimant and other claimants similarly situated," which "*Sherbert* and *Thomas* did not find . . . 'compelling' when weighed against the free exercise rights of the claimant"). At no point in the comparison did [\*678] the state court suggest, as this Court's first alternative interpretation does, that it could discern an additional state interest (namely the interest in enforcing criminal drug-abuse laws) that *Sherbert* and *Thomas* "constrained" it to "disregard." Moreover, the state court did not so much as suggest why *Sherbert* and *Thomas* would so constrain the State. Even the State's attorney could not in good conscience offer the interpretation that [\*\*\*769] this Court adopts, without the caveat "that it is not entirely apparent from the face of the opinion," Tr. of Oral Arg. 7.

Nor is it accurate to read the passage, as this Court's second alternative interpretation does, as merely binding the Employment Division to a concession "that the legality of respondent's conduct was not in issue." The Employment Division conceded only the patently obvious point that the asserted interest in criminal law enforcement is nowhere to "be found in the unemployment compensation statutes," *301 Ore., at 219, 721 P. 2d, at 450*, and that the legality of peyote use was therefore irrelevant to the determination whether the *statute* purported to deny benefits. The Employment Division hotly disputed the proposition that it could not answer respondents' *free exercise challenge* by asserting an interest that appears nowhere in its unemployment compensation scheme. The very passage that the Court quotes demonstrates as much: "The Board found that the state's interest in proscribing the use of dangerous drugs was the compelling interest that justified denying the claimant [\*\*\*1455] unemployment benefits." *Smith, 301 Ore., at 218-219, 721 P. 2d, at 450*. The remand in these cases thus rests on a purported ambiguity that has no basis in the opinions below.

Perhaps more puzzling than the imagined ambiguity is the Court's silence as to its relevance. The Court merely remands these cases to the Oregon Supreme Court for further proceedings after concluding that a "necessary predicate" to its analysis is a pronouncement by the state court on whether respondents' conduct was

criminal. *Ante*, at 672. It seems [\*679] to me that the state court on remand could readily resolve these cases without reaching that issue. The Court has expressed no intention to depart from the longstanding rule that, in strictly scrutinizing state-imposed burdens on fundamental rights, courts may not assert on a State's behalf interests that the State does not have. See *supra*, at 675-676. Accordingly, I must assume that the Court has tacitly left the Oregon Supreme Court the option to dispose of these cases by simply reiterating its initial opinion and appending, "And we really mean it," or words to that effect.

A slot on this Court's calendar is both precious and costly. Inevitably, each Term this Court discovers only after painstaking briefing and oral argument that some cases do not squarely present the issues that the Court sought to resolve. There is always the temptation to trivialize the defect and decide the novel case that we *thought* we had undertaken rather than the virtual clone of precedent that we *actually* undertook. Here, however, the Court's belated effort to recoup sunk costs is not worth the price. Today's foray into the realm of the hypothetical will surely cost us the respect of the State Supreme Court whose words we misconstrue. That price is particularly exorbitant where, as here, the state court is most likely to respond to our efforts by merely reiterating what it has already stated with unmistakable clarity.

I dissent.

## References

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25 Am Jur 2d, Drugs, Narcotics, and Poisons 16, 17; [76 Am Jur 2d, Unemployment Compensation 57](#)USCS, [Constitution, Amendment 1](#)US L Ed Digest, Appeal 727, 1692.1; Constitutional Law 967Index to Annotations, Discharge from Employment or Office; Drugs and Narcotics; Freedom of Religion; Indians; Peyote; Religion and Religious Societies; Unemployment Compensation Annotation  
References:Establishment and free exercise of religion clauses of [Federal Constitution's First Amendment](#) as applied to employment. [86 L Ed 2d 797](#).Supreme Court cases involving establishment and freedom of religion clauses of Federal Constitution. 37 L Ed 2d 1147.Conduct or activities of employees during off-duty hours as misconduct barring unemployment compensation benefits . [35 ALR4th 691](#).Leaving or refusing employment for religious reasons as barring unemployment compensation. [12 ALR4th 611](#).Marijuana, psilocybin, peyote, or similar drugs of vegetable origin as narcotics for purposes of drug prosecution. [50 ALR3d 1164](#).Free exercise of religion as defense to prosecution for narcotic or psychedelic drug offense. [35 ALR3d 939](#).

# Appendix V

# Lyng v. Northwest Indian Cemetery Protective Ass'n

Supreme Court of the United States

November 30, 1987, Argued ; April 19, 1988, Decided

No. 86-1013

## Reporter

485 U.S. 439; 108 S. Ct. 1319; 99 L. Ed. 2d 534; 1988 U.S. LEXIS 1871; 56 U.S.L.W. 4292; 18 ELR 21043

Richard E. Lyng, Secretary of Agriculture, et al.,  
Petitioners v. Northwest Indian Cemetery Protective  
Association et al.

**Prior History:** ON WRIT OF CERTIORARI TO THE  
UNITED STATES COURT OF APPEALS FOR THE  
NINTH CIRCUIT.

**Disposition:** [795 F.2d 688](#), reversed and remanded.

## Syllabus

In 1982, the United States Forest Service prepared a final environmental impact statement for constructing a paved road through federal land, including the Chimney Rock area of the Six Rivers National Forest. This area, as reported in a study commissioned by the Service, has historically been used by certain American Indians for religious rituals that depend upon privacy, silence, and an undisturbed natural setting. Rejecting the study's recommendation that the road not be completed through the Chimney Rock area because it would irreparably damage the sacred areas, and also rejecting alternative routes outside the National Forest, the Service selected a route through the Chimney Rock area that avoided archeological sites and was removed as far as possible from the sites used by the Indians for specific spiritual activities. At about the same time, the Service also adopted a management plan allowing for timber harvesting in the same area, but providing for protective zones around all the religious sites identified in the study. After exhausting administrative remedies, respondents -- an Indian organization, individual Indians, nature organizations and members thereof, and the State of California -- filed suit in Federal District Court challenging both the road-building and timber-harvesting decisions. The court issued a permanent injunction that prohibited the Government from constructing the Chimney Rock section of the road or putting the timber-harvesting plan into effect, holding, *inter alia*, that such actions would violate respondent Indians' right under the Free Exercise Clause of the First Amendment and would violate certain federal

statutes. The Court of Appeals affirmed in pertinent part.

## *Held:*

1. The courts below did not clearly explain whether -- in keeping with the principle requiring that courts reach constitutional questions only when necessary -- they determined that a decision on the First Amendment issue was necessary because it might entitle respondents to relief beyond that to which they were entitled on their statutory claims. The structure and wording of the District Court's injunction, however, suggest that the statutory holding would not have supported all the relief granted, and the Court of Appeals' silence as to the necessity of reaching the First Amendment issue may have reflected its understanding that the District Court's injunction necessarily rested in part on constitutional grounds. Because it appears reasonably likely that the First Amendment issue was necessary to the decisions below, and because the Government is confident that it can cure the statutory defects identified below, it would be inadvisable for this Court to vacate and remand without addressing the constitutional question on the merits. Pp. 445-447.

2. The Free Exercise Clause does not prohibit the Government from permitting timber harvesting in the Chimney Rock area, or constructing the proposed road. Pp. 447-458.

(a) In Bowen v. Roy, 476 U. S. 693 -- which held that a federal statute requiring States to use Social Security numbers in administering certain welfare programs did not violate Indian religious rights under the Free Exercise Clause -- this Court rejected the same kind of challenge that respondents assert. Just as in Roy, the affected individuals here would not be coerced by the Government's action into violating their religious beliefs; nor would the governmental action penalize the exercise of religious rights by denying religious adherents an equal share of the rights, benefits, and privileges enjoyed by other citizens. Incidental effects of government programs, which may interfere with the

practice of certain religions, but which have no tendency to coerce individuals into acting contrary to their religious beliefs, do not require government to bring forward a compelling justification for its otherwise lawful actions. The *Free Exercise Clause* is written in terms of what the government cannot do to the individual, not in terms of what the individual can exact from the government. Even assuming that the Government's actions here will virtually destroy the Indians' ability to practice their religion, the Constitution simply does not provide a principle that could justify upholding respondents' legal claims. Pp. 447-453.

(b) The Government's right to the use of its own lands need not and should not discourage it from accommodating religious practices like those engaged in by the Indian respondents. The Government has taken numerous steps to minimize the impact that construction of the road will have on the Indians' religious activities -- such as choosing the route that best protects sites of specific rituals from adverse audible intrusions, and planning steps to reduce the visual impact of the road on the surrounding country. Such solicitude accords with the policy and requirements of the American Indian Religious Freedom Act. Contrary to respondents' contention, however, that Act does not create any enforceable legal right that could authorize the District Court's injunction. Pp. 453-455.

**Counsel:** Andrew J. Pincus argued the cause for petitioners. With him on the briefs were Solicitor General Fried, Acting Assistant Attorney General Marzulla, Deputy Solicitor General Ayer, Robert L. Klarquist, and Jacques B. Gelin.

Marilyn B. Miles argued the cause for respondents. With her on the brief for the Indian respondents was Stephen V. Quesenberry. John K. Van de Kamp, Attorney General, R.H. Connett, Assistant Attorney General, and Edna Walz, Deputy Attorney General filed a brief for respondent State of California.\*

**Judges:** O'CONNOR, J., delivered the opinion of the Court, in which REHNQUIST, C.J., and WHITE, STEVENS, and SCALIA, JJ., joined. BRENNAN, J., filed a dissenting opinion, in which MARSHALL and BLACKMUN, JJ., joined, *post*, p. 458. KENNEDY, J., took no part in the consideration or decision of the case.

**Opinion by:** O'CONNOR

## Opinion

[\*441] [\*\*\*542] [\*\*1321] JUSTICE O'CONNOR delivered the opinion of the Court.

[1A] This case requires us to consider whether the *First Amendment's Free Exercise Clause* forbids the Government from permitting timber harvesting in, or constructing a road through, a portion of a National Forest that has traditionally [\*442] been used for religious purposes by members of three American Indian tribes in northwestern California. We conclude that it does not.

I

As part of a project to create a paved 75-mile road linking two California towns, Gasquet and Orleans, the United States Forest Service has upgraded 49 miles of previously unpaved roads on federal land. In order to complete this project (the G-O road), the Forest Service must build a 6-mile paved segment through the Chimney [\*1322] Rock section of the Six Rivers National Forest. That section of the forest is situated between two other portions of the road that are already complete.

In 1977, the Forest Service issued a draft environmental impact statement that discussed proposals for upgrading an existing unpaved road that runs through the Chimney Rock area. In response to comments on the draft statement, the Forest Service commissioned a

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\* Briefs of amici curiae urging reversal were filed for the State of Hawaii et al. by Kenneth O. Eikenberry, Attorney General of Washington, Timothy R. Malone, Nixon Handy, and Mark S. Green, Assistant Attorneys General, Warren Price III, Attorney General of Hawaii, Roger A. Tellinghuisen, Attorney General of South Dakota, and David Wilkinson, Attorney General of Utah; for the Colorado Mining Association et al. by Lawrence E. Stevens and Patrick J. Garver; for the Howonquet Community Association et al. by Ronald A. Zumbrun and Robin L. Rivett; and for the city of Williams, Arizona, by Gary Verburg.

Briefs of amici curiae urging affirmance were filed for the American Civil Liberties Union Foundation et al. by John A. Powell, Steven R. Shapiro, Paul L. Hoffman, Mark D. Rosenbaum, Alan L. Schlosser, Edward M. Chen, Matthew A. Coles, and Stephen L. Pevar; for the American Jewish Congress et al. by Marc D. Stern, Lois C. Waldman, and Amy Adelson; and for the Christian Legal Society et al. by Michael J. Woodruff, Samuel Rabinove, Richard T. Foltin, and Jordan Lorence.

Steven C. Moore filed a brief for the National Congress of American Indians et al. as amici curiae.

study of American Indian cultural and religious sites in the area. The Hoopa Valley Indian reservation adjoins the Six Rivers National Forest, and the Chimney Rock area has historically been used for religious purposes by Yurok, Karok, and Tolowa Indians. The commissioned study, which was completed in 1979, found that the entire area "is significant as an integral and indispensable [sic] part of Indian religious conceptualization and practice." App. 181. Specific sites are used for certain rituals, and "successful use of the [area] is dependent upon and facilitated by certain qualities of the physical environment, the most important of which are privacy, silence, and an undisturbed natural setting." *Ibid.* (footnote omitted). The study concluded that constructing a road along any of the available routes "would cause serious and irreparable damage to the sacred areas which are an integral and necessary part of the belief systems and lifeway of Northwest California Indian peoples." *Id.*, at 182. Accordingly, the report recommended that the G-O road not be completed.

[\*443] In 1982, the Forest Service decided not to adopt this recommendation, and it prepared a final environmental impact statement for construction of the road. The Regional Forester selected a route that avoided archeological sites and was removed as far as possible from the sites used by contemporary Indians for specific spiritual activities. Alternative routes that would have avoided the Chimney Rock area altogether were rejected because they would have required the acquisition of private land, had serious soil stability problems, [\*\*\*543] and would in any event have traversed areas having ritualistic value to American Indians. See App. 217-218. At about the same time, the Forest Service adopted a management plan allowing for the harvesting of significant amounts of timber in this area of the forest. The management plan provided for one-half mile protective zones around all the religious sites identified in the report that had been commissioned in connection with the G-O road.

After exhausting their administrative remedies, respondents -- an Indian organization, individual Indians, nature organizations and individual members of those organizations, and the State of California -- challenged both the road-building and timber-harvesting decisions in the United States District Court for the Northern District of California. Respondents claimed that the Forest Service's decisions violated [\*444] the *Free Exercise Clause*, the Federal Water Pollution Control Act (FWPCA), 86 Stat. 896, as amended, [33 U.](#)

[S. C. § 1251 et seq.](#), the National Environment Policy Act of 1969 (NEPA), 83 Stat. 852, [42 U. S. C. § 4321 et seq.](#), several other federal statutes, and governmental trust responsibilities to Indians living on the Hoopa Valley Reservation.

After a trial, the District Court issued a permanent injunction forbidding the Government from constructing the Chimney Rock section of the G-O road or putting the timber-harvesting management plan into effect. See [Northwest Indian Cemetery Protective Assn. v. Peterson, 565 F. Supp. 586 \(ND Cal. 1983\)](#). The court found that both actions would violate the *Free Exercise Clause* because they "would seriously damage the salient visual, aural, and environmental qualities of the high country." *Id.*, at 594-595. The court also found that both proposed actions would violate the FWPCA, and that the environmental impact statements for construction of the road were deficient under the National Environment Policy Act. Finally, the court concluded that both projects would breach the Government's [\*\*1323] trust responsibilities to protect water and fishing rights reserved to the Hoopa Valley Indians.

While an appeal was pending before the United States Court of Appeals for the Ninth Circuit, Congress enacted the California Wilderness Act of 1984, Pub. L. 98-425, 98 Stat. 1619. Under that statute, much of the property covered by the Forest Service's management plan is now designated a wilderness area, which means that commercial activities such as timber harvesting are forbidden. The statute exempts a narrow strip of land, coinciding with the Forest Service's proposed route for the remaining segment of the G-O road, from the wilderness designation. The legislative history indicates that this exemption was adopted "to enable the completion of the Gasquet-Orleans Road project if the responsible authorities so decide." S. Rep. No. 98-582, p. 29 (1984). The existing unpaved section of road, however, lies within the wilderness area and is therefore now closed to general traffic.

A panel of the Ninth Circuit affirmed in part. [Northwest Indian Cemetery Protective Assn. v. Peterson, 795 F.2d 688 \(1986\)](#). The panel unanimously rejected the District Court's conclusion that the Government's [\*\*\*544] proposed actions would breach its trust responsibilities to Indians on the Hoopa Valley Reservation. The panel also vacated the injunction to the extent that it had been rendered moot by the California Wilderness Act, which now prevents timber harvesting in certain areas covered

by the District Court's order. The District Court's decision, to the extent that it rested on statutory grounds, was otherwise unanimously affirmed.

[\*445] By a divided decision, the District Court's constitutional ruling was also affirmed. Relying primarily on the Forest Service's own commissioned study, the majority found that construction of the Chimney Rock section of the G-O road would have significant, though largely indirect, adverse effects on Indian religious practices. The majority concluded that the Government had failed to demonstrate a compelling interest in the completion of the road, and that it could have abandoned the road without thereby creating "a religious preserve for a single group in violation of the *establishment clause*." *Id.*, at 694. The majority apparently applied the same analysis to logging operations that might be carried out in portions of the Chimney Rock area not covered by the California Wilderness Act. See *id.*, at 692-693 ("Because most of the high country has now been designated by Congress as a wilderness area, the issue of logging becomes less significant, although it does not disappear").

The dissenting judge argued that certain of the adverse effects on respondents' religious practices could be eliminated by less drastic measures than a ban on building the road, and that other actual or suggested adverse effects did not pose a serious threat to the Indians' religious practices. He also concluded that the injunction against timber harvesting needed to be reconsidered in light of the California Wilderness Act: "It is not clear whether the district court would have issued an injunction based upon the development of the remaining small parcels. Accordingly, I would remand to allow the district court to reevaluate its injunction in light of the Act." *Id.*, at 704.

II

[2]We begin by noting that the courts below did not articulate the bases of their decisions with perfect clarity. A fundamental and long-standing principle of judicial restraint requires that courts avoid reaching constitutional questions in advance of the necessity of deciding them. See *Three [\*\*446] Affiliated Tribes of Ft. Berthold Reservation v. Wold Engineering, P. C.*, 467 U.S. 138, 157-158 (1984); see also, e. g., *Jean v. Nelson*, 472 U.S. 846, 854 (1985); *Gulf Oil Co. v. Bernard*, 452 U.S. 89, 99 (1981); [\*\*1324] *Ashwander v. TVA*, 297 U.S. 288, 346-348 (1936) (Brandeis, J., concurring). This principle required the courts below to determine, before

addressing the constitutional issue, whether a decision on that question could have entitled respondents to relief beyond that to which they were entitled on their statutory claims. If no additional relief would have been warranted, a constitutional decision would have been unnecessary and therefore inappropriate.

[\*\*\*545] [3]Neither the District Court nor the Court of Appeals explained or expressly articulated the necessity for their constitutional holdings. Were we persuaded that those holdings were unnecessary, we could simply vacate the relevant portions of the judgment below without discussing the merits of the constitutional issue. The structure and wording of the District Court's injunctive order, however, suggests that the statutory holdings would not have supported all the relief granted. The order is divided into four sections. Two of those sections deal with a 31,100-acre tract referred to as the Blue Creek Roadless Area. The injunction forbids the Forest Service from engaging in timber harvesting or road building anywhere on the tract "unless and until" compliance with the NEPA and the FWPCA have been demonstrated. *565 F. Supp.*, at 606-607. The sections of the injunction dealing with the smaller Chimney Rock area (i. e. the area affected by the *First Amendment* challenge) are worded differently. The Forest Service is permanently enjoined, without any qualifying language, from constructing the proposed portion of the G-O road "and/or any alternative route" through that area; similarly, the injunction forbids timber harvesting or the construction of logging roads in the Chimney Rock area pursuant to the Forest Service's proposed management plan "or any other land management plan." [\*447] *Id.*, at 606 (emphasis added). These differences in wording suggest, without absolutely implying, that an injunction covering the Chimney Rock area would in some way have been conditional, or narrower in scope, if the District Court had not decided the *First Amendment* issue as it did. Similarly, the silence of the Court of Appeals as to the necessity of reaching the *First Amendment* issue may have reflected its understanding that the District Court's injunction necessarily rested in part on constitutional grounds.

Because it appears reasonably likely that the *First Amendment* issue was necessary to the decisions below, we believe that it would be inadvisable to vacate and remand without addressing that issue on the merits. This conclusion is strengthened by considerations of judicial economy. The Government, which petitioned for certiorari on the constitutional issue alone, has informed us that it believes it can cure the statutory defects

identified below, intends to do so, and will not challenge the adverse statutory rulings. Tr. of Oral Arg. 9-10. In this circumstance, it is difficult to see what principle would be vindicated by sending this case on what would almost certainly be a brief round trip to the courts below.

III

A

[1B]The *Free Exercise Clause of the First Amendment* provides that "Congress shall make no law . . . prohibiting the free exercise [of religion]." *U. S. Const., Amdt. 1*. It is undisputed that the Indian respondents' beliefs are sincere and that the Government's proposed actions will have severe adverse effects on the practice of their religion. Respondents contend that the burden on their religious practices is heavy enough to violate the *Free Exercise Clause* unless the Government can demonstrate a compelling need to [\*\*\*546] complete the G-O road or to engage in timber harvesting in the Chimney Rock area. We disagree.

[\*448] In *Bowen v. Roy, 476 U. S. 693 (1986)*, we considered a challenge to a federal statute that required the States to use Social Security numbers in administering certain welfare [\*\*1325] programs. Two applicants for benefits under these programs contended that their religious beliefs prevented them from acceding to the use of a Social Security number for their two-year-old daughter because the use of a numerical identifier would "rob the spirit" of [their] daughter and prevent her from attaining greater spiritual power." *Id., at 696*. Similarly, in this case, it is said that disruption of the natural environment caused by the G-O road will diminish the sacredness of the area in question and create distractions that will interfere with "training and ongoing religious experience of individuals using [sites within] the area for personal medicine and growth . . . and as integrated parts of a system of religious belief and practice which correlates ascending degrees of personal power with a geographic hierarchy of power." App. 181. Cf. *id., at 178* ("Scarred hills and mountains, and disturbed rocks destroy the purity of the sacred areas, and [Indian] consultants repeatedly stressed the need of a training doctor to be undistracted by such disturbance"). The Court rejected this kind of challenge in *Roy*:

"The *Free Exercise Clause* simply cannot be understood to require the Government to conduct its own internal affairs in ways that comport with the religious beliefs of

particular citizens. Just as the Government may not insist that [the Roys] engage in any set form of religious observance, so [they] may not demand that the Government join in their chosen religious practices by refraining from using a number to identify their daughter . . . .

". . . The *Free Exercise Clause* affords an individual protection from certain forms of governmental compulsion; it does not afford an individual a right to dictate the conduct of the Government's internal procedures." *476 U. S., at 699-700*.

[\*449] The building of a road or the harvesting of timber on publicly owned land cannot meaningfully be distinguished from the use of a Social Security number in *Roy*. In both cases, the challenged government action would interfere significantly with private persons' ability to pursue spiritual fulfillment according to their own religious beliefs. In neither case, however, would the affected individuals be coerced by the Government's action into violating their religious beliefs; nor would either governmental action penalize religious activity by denying any person an equal share of the rights, benefits, and privileges enjoyed by other citizens.

We are asked to distinguish this case from *Roy* on the ground that the infringement on religious liberty here is "significantly greater," or on the ground that the government practice in *Roy* was "purely mechanical" whereas this case involves "a case-by-case substantive determination as to how a particular unit of land will be managed." Brief for Indian Respondents 33-34. Similarly, [\*\*\*547] we are told that this case can be distinguished from *Roy* because "the government action is not at some physically removed location where it places no restriction on what a practitioner may do." Brief for Respondent State of California 18. The State suggests that the Social Security number in *Roy* "could be characterized as interfering with *Roy's* religious tenets from a subjective point of view, where the government's conduct of its own internal affairs' was known to him only secondhand and did not interfere with his ability to practice his religion." *Id.*, at 19 (footnote omitted; internal citation omitted). In this case, however, it is said that the proposed road will "physically destroy the environmental conditions and the privacy without which the [religious] practices cannot be conducted." *Ibid.*

[4]These efforts to distinguish *Roy* are unavailing. This Court cannot determine the truth of the underlying

beliefs that led to the religious objections here or in Roy, see [Hobbie v. Unemployment Appeals Comm'n of Fla.](#), [480 U. S. 136, 144, n. 9 \(1987\)](#), and [\[\\*\\*1326\]](#) accordingly cannot weigh the adverse effects on the Roy [\[\\*450\]](#) and compare them with the adverse effects on respondents. Without the ability to make such comparisons, we cannot say that the one form of incidental interference with an individual's spiritual activities should be subjected to a different constitutional analysis than the other.

Respondents insist, nonetheless, that the courts below properly relied on a factual inquiry into the degree to which the Indians' spiritual practices would become ineffectual if the G-O road were built. They rely on several cases in which this Court has sustained free exercise challenges to government programs that interfered with individuals' ability to practice their religion. See [Wisconsin v. Yoder](#), [406 U. S. 205 \(1972\)](#) (compulsory school-attendance law); [Sherbert v. Verner](#), [374 U. S. 398 \(1963\)](#) (denial of unemployment benefits to applicant who refused to accept work requiring her to violate the Sabbath); [Thomas v. Review Board, Indiana Employment Security Div.](#), [450 U. S. 707 \(1981\)](#) (denial of unemployment benefits to applicant whose religion forbade him to fabricate weapons); [Hobbie, supra](#) (denial of unemployment benefits to religious convert who resigned position that required her to work on the Sabbath).

[\[5A\]](#)Even apart from the inconsistency between Roy and respondents' reading of these cases, their interpretation will not withstand analysis. It is true that this Court has repeatedly held that indirect coercion or penalties on the free exercise of religion, not just outright prohibitions, are subject to scrutiny under the [First Amendment](#). Thus, for example, ineligibility for unemployment benefits, based solely on a refusal to violate the Sabbath, has been analogized to a fine imposed on Sabbath worship. [Sherbert, supra, at 404](#). This does not and cannot imply that incidental effects of government programs, which may make it more difficult to practice certain religions but which have no tendency to coerce individuals into acting contrary to their religious beliefs, require government to bring forward a compelling justification [\[\\*451\]](#) for its otherwise lawful actions. The crucial [\[\\*\\*\\*548\]](#) word in the constitutional text is "prohibit": "For the [Free Exercise Clause](#) is written in terms of what the government cannot do to the individual, not in terms of what the individual can exact from the government." [Sherbert, supra, at 412](#) (Douglas, J., concurring).

[\[1C\]\[5B\]\[6\]](#)Whatever may be the exact line between unconstitutional prohibitions on the free exercise of religion and the legitimate conduct by government of its own affairs, the location of the line cannot depend on measuring the effects of a governmental action on a religious objector's spiritual development. The Government does not dispute, and we have no reason to doubt, that the logging and road-building projects at issue in this case could have devastating effects on traditional Indian religious practices. Those practices are intimately and inextricably bound up with the unique features of the Chimney Rock area, which is known to the Indians as the "high country." Individual practitioners use this area for personal spiritual development; some of their activities are believed to be critically important in advancing the welfare of the tribe, and indeed, of mankind itself. The Indians use this area, as they have used it for a very long time, to conduct a wide variety of specific rituals that aim to accomplish their religious goals. According to their beliefs, the rituals would not be efficacious if conducted at other sites than the ones traditionally used, and too much disturbance of the area's natural state would clearly render any meaningful continuation of traditional practices impossible. To be sure, the Indians themselves were far from unanimous in opposing the G-O road, see App. 180, and it seems less than certain that construction of the road will be so disruptive that it will doom their religion. Nevertheless, we can assume that the threat to the efficacy of at least [\[\\*\\*1327\]](#) some religious practices is extremely grave.

[\[1D\]\[7\]](#)Even if we assume that we should accept the Ninth Circuit's prediction, according to which the G-O road will "virtually destroy the Indians' ability to practice their religion," [795 F. 2d, at 693](#) [\[\\*452\]](#) (opinion below), the Constitution simply does not provide a principle that could justify upholding respondents' legal claims. However much we might wish that it were otherwise, government simply could not operate if it were required to satisfy every citizen's religious needs and desires. A broad range of government activities -- from social welfare programs to foreign aid to conservation projects -- will always be considered essential to the spiritual well-being of some citizens, often on the basis of sincerely held religious beliefs. Others will find the very same activities deeply offensive, and perhaps incompatible with their own search for spiritual fulfillment and with the tenets of their religion. The [First Amendment](#) must apply to all citizens alike, and it can give to none of them a veto over public programs that do not prohibit the free exercise of religion. The Constitution does not, and courts cannot, offer to reconcile the

various competing demands on government, many of them rooted in sincere religious belief, that inevitably arise in so diverse a society as ours. That task, to the extent that it is feasible, is for the legislatures and other institutions. Cf. The Federalist No. 10 (suggesting that the effects of religious [\*\*\*549] factionalism are best restrained through competition among a multiplicity of religious sects).

One need not look far beyond the present case to see why the analysis in *Roy*, but not respondents' proposed extension of *Sherbert* and its progeny, offers a sound reading of the Constitution. Respondents attempt to stress the limits of the religious servitude that they are now seeking to impose on the Chimney Rock area of the Six Rivers National Forest. While defending an injunction against logging operations and the construction of a road, they apparently do not at present object to the area's being used by recreational visitors, other Indians, or forest rangers. Nothing in the principle for which they contend, however, would distinguish this case from another lawsuit in which they (or similarly situated religious objectors) might seek to exclude all human activity but [\*453] their own from sacred areas of the public lands. The Indian respondents insist that "privacy during the power quests is required for the practitioners to maintain the purity needed for a successful journey." Brief for Indian Respondents 8 (emphasis added; citation to record omitted). Similarly: "The practices conducted in the high country entail intense meditation and require the practitioner to achieve a profound awareness of the natural environment. Prayer seats are oriented so there is an unobstructed view, and the practitioner must be surrounded by undisturbed naturalness." *Id.*, at 8, n. 4 (emphasis added) (citations to record omitted). No disrespect for these practices is implied when one notes that such beliefs could easily require de facto beneficial ownership of some rather spacious tracts of public property. Even without anticipating future cases, the diminution of the Government's property rights, and the concomitant subsidy of the Indian religion, would in this case be far from trivial: the District Court's order permanently forbade commercial timber harvesting, or the construction of a two-lane road, anywhere within an area covering a full 27 sections (i. e. more than 17,000 acres) of public land.

[1E][8]The Constitution does not permit government to discriminate against religions that treat particular physical sites as sacred, and a law forbidding the Indian respondents from visiting the Chimney Rock area would

raise a different set of constitutional questions. Whatever rights the Indians may have to the use of the area, however, those rights do not divest the Government of its right to use what is, after all, its land. Cf. [Bowen v. Roy, 476 U. S., at 724-727](#) (O'CONNOR, J., concurring in part and dissenting in [\*\*\*1328] part) (distinguishing between the Government's use of information in its possession and the Government's requiring an individual to provide such information).

## B

[9]Nothing in our opinion should be read to encourage governmental insensitivity to the religious needs of any citizen. [\*454] The Government's rights to the use its own land, for example, need not and should not discourage it from accommodating religious practices like those engaged in by the Indian respondents. Cf. [Sherbert, 374 U. S., at 422-423](#) (Harlan, J., dissenting). It is worth emphasizing, therefore, that the Government has taken numerous [\*\*\*550] steps in this very case to minimize the impact that construction of the G-O road will have on the Indians' religious activities. First, the Forest Service commissioned a comprehensive study of the effects that the project would have on the cultural and religious value of the Chimney Rock area. The resulting 423-page report was so sympathetic to the Indians' interests that it has constituted the principal piece of evidence relied on by respondents' throughout this litigation.

Although the Forest Service did not in the end adopt the report's recommendation that the project be abandoned, many other ameliorative measures were planned. No sites where specific rituals take place were to be disturbed. In fact, a major factor in choosing among alternative routes for the road was the relation of the various routes to religious sites: the route selected by the Regional Forester is, he noted, "the farthest removed from contemporary spiritual sites; thus, the adverse audible intrusions associated with the road would be less than all other alternatives." App. 102. Nor were the Forest Service's concerns limited to "audible intrusions." As the dissenting judge below observed, ten specific steps were planned to reduce the visual impact of the road on the surrounding country. See [795 F. 2d, at 703](#) (Beezer, J., dissenting in part).

Except for abandoning its project entirely, and thereby leaving the two existing segments of road to deadend in the middle of a National Forest, it is difficult to see how the Government could have been more solicitous. Such

solicitude accords with "the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions [\*455] of the American Indian . . . including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites." American Indian Religious Freedom Act (AIRFA), Pub. L. 95-341, 92 Stat. 469, [42 U. S. C. § 1996](#).

[10] Respondents, however, suggest that AIRFA goes further and in effect enacts their interpretation of the *First Amendment* into statutory law. Although this contention was rejected by the District Court, they seek to defend the judgment below by arguing that AIRFA authorizes the injunction against completion of the G-O road. This argument is without merit. After reciting several legislative findings, AIRFA "resolves" upon the policy quoted above. A second section of the statute, 92 Stat. 470, required an evaluation of federal policies and procedures, in consultation with native religious leaders, of changes necessary to protect and preserve the rights and practices in question. The required report dealing with this evaluation was completed and released in 1979. Reply Brief for Petitioners 2, n. 3. Nowhere in the law is there so much as a hint of any intent to create a cause of action or any judicially enforceable individual rights.

What is obvious from the face of the statute is confirmed by numerous indications in the legislative history. The sponsor of the bill that became AIRFA, Representative Udall, called it "a sense of Congress joint resolution," aimed at ensuring that "the basic right of the Indian people to exercise their traditional [\*\*\*551] religious practices is not infringed without a clear decision on [\*\*1329] the part of the Congress or the administrators that such religious practices must yield to some higher consideration." 124 Cong. Rec. 21444 (1978). Representative Udall emphasized that the bill would not "confer special religious rights on Indians," would "not change any existing State or Federal law," and in fact "has no teeth in it." *Id.*, at 21444-21445.

[\*456] C

The dissent proposes an approach to the *First Amendment* that is fundamentally inconsistent with the principles on which our decision rests. Notwithstanding the sympathy that we all must feel for the plight of the Indian respondents, it is plain that the approach taken by the dissent cannot withstand analysis. On the

contrary, the path towards which it points us is incompatible with the text of the Constitution, with the precedents of this Court, and with a responsible sense of our own institutional role.

[11] The dissent begins by asserting that the "constitutional guarantee we interpret today . . . is directed against any form of government action that frustrates or inhibits religious practice." *Post*, at 459 (emphasis added). The Constitution, however, says no such thing. Rather, it states: "Congress shall make no law . . . prohibiting the free exercise [of religion]." *U. S. Const., Amdt. 1* (emphasis added).

As we explained above, *Bowen v. Roy* rejected a *First Amendment* challenge to government activities that the religious objectors sincerely believed would "rob the spirit" of [their] daughter and prevent her from attaining greater spiritual power." See *supra*, at 448 (quoting *Roy*, 476 U. S., at 696). The dissent now offers to distinguish that case by saying that the Government was acting there "in a purely internal manner," whereas land-use decisions "are likely to have substantial external effects." *Post*, at 470. Whatever the source or meaning of the dissent's distinction, it has no basis in *Roy*. Robbing the spirit of a child, and preventing her from attaining greater spiritual power, is both a "substantial external effect" and one that is remarkably similar to the injury claimed by respondents in the case before us today. The dissent's reading of *Roy* would effectively overrule that decision, without providing any compelling justification for doing so.

The dissent also misreads *Wisconsin v. Yoder*, 406 U. S. 205 (1972). The statute at issue in that case prohibited the [\*457] Amish parents, on pain of criminal prosecution, from providing their children with the kind of education required by the Amish religion. *Id.*, at 207-209, 223. The statute directly compelled the Amish to send their children to public high schools "contrary to the Amish religion and way of life." *Id.*, at 209. The Court acknowledged that the statute might be constitutional, despite its coercive nature, if the state could show with sufficient "particularity how its admittedly strong interest in compulsory education would be adversely affected by granting an exemption to the Amish." *Id.*, at 236 [\*\*\*552] (citation omitted). The dissent's out-of-context quotations notwithstanding, there is nothing whatsoever in the *Yoder* opinion to support the proposition that the "impact" on the Amish religion would have been constitutionally problematic if the statute at issue had not been coercive in nature. Cf. *post*, at 466.

[12] Perceiving a "stress point in the longstanding conflict between two disparate cultures," the dissent attacks us for declining to "balance these competing and potentially irreconcilable interests, choosing instead to turn this difficult task over to the federal legislature." *Post*, at 473. Seeing the Court as the arbiter, the dissent proposes a legal test under which it would decide which public lands are "central" or "indispensable" to which religions, and by implication which are "dispensable" or "peripheral," and would then decide which government programs are "compelling [\*\*1330]" enough to justify "infringement of those practices." *Post*, at 475. We would accordingly be required to weigh the value of every religious belief and practice that is said to be threatened by any government program. Unless a "showing of 'centrality,'" *post*, at 474, is nothing but an assertion of centrality, see *post*, at 475, the dissent thus offers us the prospect of this Court holding that some sincerely held religious beliefs and practices are not "central" to certain religions, despite protestations to the contrary from the religious objectors who brought the lawsuit. In other words, the dissent's approach would [\*458] require us to rule that some religious adherents misunderstand their own religious beliefs. We think such an approach cannot be squared with the Constitution or with our precedents, and that it would cast the judiciary in a role that we were never intended to play.

#### IV

[1F] [13] The decision of the court below, according to which the *First Amendment* precludes the Government from completing the G-O road or from permitting timber harvesting in the Chimney Rock area, is reversed. In order that the District Court's injunction may be reconsidered in light of this holding, and in the light of any other relevant events that may have intervened since the injunction issued, the case is remanded for further proceedings consistent with this opinion.

*It is so ordered.*

Justice KENNEDY took no part in the consideration or decision of this case.

**Dissent by:** BRENNAN

## Dissent

JUSTICE BRENNAN, with whom JUSTICE MARSHALL and JUSTICE BLACKMUN join, dissenting.

"The *Free Exercise Clause*," the Court explains today, "is written in terms of what the government cannot do to the individual, not in terms of what the individual can exact from the government." Ante, at 451 (quoting *Sherbert v. Verner*, 374 U. S. 398, 412 (1963) (Douglas, J., concurring)). Pledging fidelity to this unremarkable constitutional principle, the Court nevertheless [\*\*\*553] concludes that even where the Government uses federal land in a manner that threatens the very existence of a Native American religion, the Government is simply not "doing" anything to the practitioners of that faith. Instead, the Court believes that Native Americans who request that the Government refrain from destroying their religion effectively seek to exact from the Government de facto beneficial ownership of federal property. These two astonishing conclusions follow naturally from the Court's determination [\*459] that federal land-use decisions that render the practice of a given religion impossible do not burden that religion in a manner cognizable under the *Free Exercise Clause*, because such decisions neither coerce conduct inconsistent with religious belief nor penalize religious activity. The constitutional guarantee we interpret today, however, draws no such fine distinctions between types of restraints on religious exercise, but rather is directed against any form of governmental action that frustrates or inhibits religious practice. Because the Court today refuses even to acknowledge the constitutional injury respondents will suffer, and because this refusal essentially leaves Native Americans with absolutely no constitutional protection against perhaps the gravest threat to their religious practices, I dissent.

I

For at least 200 years and probably much longer, the Yurok, Karok, and Tolowa Indians have held sacred an approximately 25 square-mile area of land situated in what is today the Blue Creek Unit of Six Rivers National Forest in northwestern California. As the Government readily concedes, regular visits to this area, known to respondent Indians as the "high country," have played and continue to play a "critical" role in the religious practices and rituals of these tribes. [\*\*1331] Brief for Petitioner 3. Those beliefs, only briefly described in the Court's opinion, are crucial to a proper understanding of respondents' claims.

As the Forest Service's commissioned study, the Theodoratus Report, explains, for Native Americans religion is not a discrete sphere of activity separate from all others, and any attempt to isolate the religious

aspects of Indian life "is in reality an exercise which forces Indian concepts into non-Indian categories." App. 110; D. Theodoratus, *Cultural Resources of the Chimney Rock Section, Gasquet-Orleans Road, Six Rivers National Forest* (1979). Thus, for most Native Americans, "the area of worship cannot be delineated from [\*460] social, political, cultural and other areas of Indian lifestyle." American Indian Religious Freedom, Hearings on S. J. Res. 102 before the Select Committee on Indian Affairs, 95th Cong., 2d Sess., 86 (statement of Barney Old Coyote, Crow Tribe). A pervasive feature of this lifestyle is the individual's relationship with the natural world; this relationship, which can accurately though somewhat incompletely be characterized as one of stewardship, forms the core of what might be called, for want of a better nomenclature, the Indian religious experience. While traditional western religions view creation as the work of a deity "who institutes natural laws which then govern the operation of physical nature," tribal religions regard creation as an ongoing process in which they are morally [\*\*\*554] and religiously obligated to participate. U. S. Federal Agencies Task Force, *American Indian Religious Freedom Act Report 11* (1979) (Task Force Report). Native Americans fulfill this duty through ceremonies and rituals designed to preserve and stabilize the earth and to protect humankind from disease and other catastrophes. Failure to conduct these ceremonies in the manner and place specified, adherents believe, will result in great harm to the earth and to the people whose welfare depends upon it. *Id.*, at 10.

In marked contrast to traditional western religions, the belief systems of Native Americans do not rely on doctrines, creeds, or dogmas. Established or universal truths -- the mainstay of western religions -- play no part in Indian faith. Ceremonies are communal efforts undertaken for specific purposes in accordance with instructions handed down from generation to generation. Commentaries on or interpretations of the rituals themselves are deemed absolute violations of the ceremonies, whose value lies not in their ability to explain the natural world or to enlighten individual believers but in their efficacy as protectors and enhancers of tribal existence. *Ibid.* Where dogma lies at the heart of western religions, Native American faith is inextricably [\*461] bound to the use of land. The site-specific nature of Indian religious practice derives from the Native American perception that land is itself a sacred, living being. See Suagee, *American Indian Religious Freedom and Cultural Resources Management: Protecting Mother Earth's Caretakers*, 10

*Am. Ind. L. Rev.* 1, 10 (1982). Rituals are performed in prescribed locations not merely as a matter of traditional orthodoxy, but because land, like all other living things, is unique, and specific sites possess different spiritual properties and significance. Within this belief system, therefore, land is not fungible; indeed, at the time of the Spanish colonization of the American southwest, "all . . . Indians held in some form a belief in a sacred and indissoluble bond between themselves and the land in which their settlements were located." E. Spicer, *Cycle of Conquest: The Impact of Spain, Mexico, and the United States on the Indians of the United States* 576 (1962).

For respondent Indians, the most sacred of lands is the high country where, they believe, pre-human spirits moved with the coming of humans to the earth. Because these spirits are seen as the source of religious power, or "medicine," many of the tribes' rituals and practices require frequent journeys to the area. Thus, for example, [\*\*1332] religious leaders preparing for the complex of ceremonies that underlie the tribes' World Renewal efforts must travel to specific sites in the high country in order to attain the medicine necessary for successful renewal. Similarly, individual tribe members may seek curative powers for the healing of the sick, or personal medicine for particular purposes such as good luck in singing, hunting, or love. A period of preparation generally precedes such visits, and individuals must select trails in the sacred area according to the medicine they seek and their abilities, gradually moving to increasingly more powerful sites, which are typically located at higher altitudes. Among the most powerful of sites are Chimney Rock, Doctor Rock, and Peak 8, all of which are elevated rock outcroppings.

[\*462] [\*\*\*555] According to the Theodoratus Report, the qualities "of silence, the aesthetic perspective, and the physical attributes, are an extension of the sacredness of [each] particular site." App. 148. The act of medicine making is akin to meditation: the individual must integrate physical, mental and vocal actions in order to communicate with the pre-human spirits. As a result, "successful use of the high country is dependent upon and facilitated by certain qualities of the physical environment, the most important of which are privacy, silence, and an undisturbed natural setting." *Id.*, at 181. Although few tribe members actually make medicine at the most powerful sites, the entire tribe's welfare hinges on the success of the individual practitioners.

Beginning in 1972, the Forest Service began preparing a multiple-use management plan for the Blue Creek

Unit. The plan's principal features included the harvesting of 733 million board feet of Douglas fir over an 80-year period and the completion of a 6-mile segment of paved road running between two northern California towns, Gasquet and Orleans (the G-O road). The road's primary purpose was to provide a route for hauling the timber harvested under the management plan; in addition, it would enhance public access to the Six Rivers and other national forests, and allow for more efficient maintenance and fire control by the Forest Service itself. In the mid-1970s, the Forest Service circulated draft environmental impact statements evaluating the effects of several proposed routes for the final segment of the G-O road, including at least two that circumnavigated the high country altogether. Ultimately, however, the Service settled on a route running along the Chimney Rock Corridor, which traverses the Indians' sacred lands.

Respondent Indians brought suit to enjoin implementation of the plan, alleging that the road construction and timber harvesting would impermissibly interfere with their religious practices in violation of the *Free Exercise Clause of the First* [\*463] *Amendment*.<sup>1</sup> Following a trial, the District Court granted the requested injunctive relief. The court found that "use of the high country is essential to [respondents'] 'World Renewal' ceremonies . . . which constitute the heart of the Northwest Indian religious belief system," and that "intrusions on the sanctity of the Blue Creek high country are . . . potentially destructive of the very core of Northwest [Indian] religious beliefs and practices." *Northwest Indian Cemetery Protective Assn. v. Peterson*, 565 F. Supp. 586, 594-595 (ND Cal. 1983) (quoting the Theodoratus Report, at 420). Concluding that these burdens on respondents' religious practices were sufficient to trigger the protections of the *Free Exercise Clause*, the court found that the interests served by the G-O road and the management plan were insufficient to justify those burdens. In particular, the court found that the road would not improve access to

timber resources in the Blue Creek Unit and indeed was unnecessary to the harvesting of that timber; that [\*1333] it would not significantly improve the [\*556] administration of the Six Rivers National Forest; and that it would increase recreational access only marginally, and at the expense of the very pristine environment that makes the area suitable for primitive recreational use in the first place. *Id.*, at 595-596. The court further found that the unconnected segments of the road had independent utility,<sup>2</sup> and that although completion of the [\*464] Chimney Rock segment would reduce timber hauling costs, it would not generate new jobs but would instead merely shift work from one area of the region to another. *Id.*, at 596. Finally, in enjoining the proposed harvesting activities, the court found that the Blue Creek Unit's timber resources were but a small fraction of those located in the entire national forest and that the local timber industry would not suffer seriously if access to this fraction were foreclosed. *Ibid.*

While the case was pending on appeal before the Court of Appeals for the Ninth Circuit, Congress passed the California Wilderness Act of 1984, Pub. L. 98-425, 98 Stat. 1619, which designates most of the the Blue Creek Unit a wilderness area, and thus precludes logging and all other commercial activities in most of the area covered by the Forest Service's management plan. Thereafter, the Court of Appeals affirmed the District Court's determination that the proposed harvesting and construction activities violated respondents' constitutional rights. Recognizing that the high country is "indispensable" to the religious lives of the approximately 5,000 tribe members who reside in the area, *Northwest Indian Cemetery Protective Assn. v. Peterson*, 795 F. 2d 688, 692 (CA9 1986), the court concluded "that the proposed government operations would virtually destroy the . . . Indians' ability to practice their religion." *Id.*, at 693 (emphasis added).<sup>3</sup> Like the lower court, the Court of Appeals found [\*465] the Government's interests in building the road and permitting limited timber harvesting-interests which of

<sup>1</sup> Respondent Indians were joined in this suit by the State of California as well as various environmental groups. For the sake of simplicity, I use the term "respondents" to refer exclusively to the effected Native American religious practitioners.

<sup>2</sup> The Court overlooks this finding when it suggests that the only protective measure the Service did not take was the untenable one of "abandoning its project entirely, and thereby leaving the two existing segments of road to deadend in the middle of a National Forest." *Ante*, at 454. Far from finding that option untenable, the District Court expressly concluded that the segments had independent economic and administrative utility, and thus that past investments in the paved sections did not justify construction of the Chimney Rock segment. See 565 F. Supp., at 596.

<sup>3</sup> Remarkably, the Court treats this factual determination as nothing more than an assumption or "prediction," *ante*, at 451, and suggests that it is "less than certain that construction of the road will be so disruptive that it will doom [respondents'] religion." *Ibid.* Such speculation flies in the face of the most basic principles of appellate review, see *Fed. Rule Civ. Proc. 52(a)*

course were considerably undermined by passage of the California Wilderness [\*\*\*557] Act -- did not justify the destruction of respondents' religion. *Id.*, at 695.

II

The Court does not for a moment suggest that the interests served by the G-O road are in any way compelling, or that they outweigh the destructive effect construction of the road will have on respondents' religious practices. Instead, the Court embraces the Government's contention that its prerogative as landowner should always take precedence over a claim that a particular use of federal property infringes religious practices. Attempting to justify this rule, the Court argues that [\*\*1334] the *First Amendment* bars only outright prohibitions, indirect coercion, and penalties on the free exercise of religion. All other "incidental effects of government programs," it concludes, even those "which may make it more difficult to practice certain religions but which have no tendency to coerce individuals into acting contrary to their religious beliefs," simply do not give rise to constitutional concerns. See ante, at 450. Since our recognition nearly half a century ago that restraints on religious conduct implicate the concerns of the *Free Exercise Clause*, see *Prince v. Massachusetts*, 321 U. S. 158 (1944), we have never suggested that the protections of the guarantee are limited to so narrow a range of governmental burdens. The land-use decision challenged here will restrain respondents from practicing their religion as surely and as completely as any of the governmental actions we have struck down in the past, and the Court's efforts simply to define away respondents' injury [\*466] as nonconstitutional is both unjustified and ultimately unpersuasive.

A

The Court ostensibly finds support for its narrow formulation of religious burdens in our decisions in *Hobbie v. Unemployment Appeals Comm'n of Fla.*, 480 U. S. 136 (1987), *Thomas v. Review Bd., Indiana Employment Security Division*, 450 U. S. 707 (1981), and *Sherbert v. Verner*, 374 U. S. 398 (1963). In those

cases, the laws at issue forced individuals to choose between adhering to specific religious tenets and forfeiting unemployment benefits on the one hand, and accepting work repugnant to their religious beliefs on the other. The religions involved, therefore, lent themselves to the coercion analysis the Court espouses today, for they proscribed certain conduct such as munitions work (Thomas) or working on Saturdays (Sherbert, Hobbie) that the unemployment benefits laws effectively compelled. In sustaining the challenges to these laws, however, we nowhere suggested that such coercive compulsion exhausted the range of religious burdens recognized under the *Free Exercise Clause*.

Indeed, in *Wisconsin v. Yoder*, 406 U. S. 205 (1972), we struck down a state compulsory school attendance law on free exercise grounds not so much because of the affirmative coercion the law exerted on individual religious practitioners, but because of "the impact that compulsory high school attendance could have on the continued survival of Amish communities." *Id.*, at 209 (emphasis added). Like respondents here, the Amish view [\*\*\*558] life as pervasively religious and their faith accordingly dictates their entire lifestyle. See *id.*, at 210. Detailed as their religious rules are, however, the parents in Yoder did not argue that their religion expressly proscribed public education beyond the eighth grade; rather, they objected to the law because "the values . . . of the modern secondary school are in sharp conflict with the fundamental mode of life mandated by the Amish religion." *Id.*, at 217 (emphasis added). By exposing Amish children "to a [\*467] 'worldly' influence in conflict with their beliefs," and by removing those children "from their community, physically and emotionally, during the crucial and formative adolescent period of life" when Amish beliefs are inculcated, *id.*, at 211, the compulsory school law posed "a very real threat of undermining the Amish community and religious practice." *Id.*, at 218. Admittedly, this threat arose from the compulsory nature of the law at issue, but it was the "impact" on religious practice itself, not the source of that impact, that led us to invalidate the law.

I thus cannot accept the Court's premise that the form of the Government's restraint on religious practice, rather than its effect, controls our constitutional analysis.

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("Findings of fact . . . shall not be set aside unless clearly erroneous"), and is wholly at odds with the well-settled rule that this Court will not disturb findings of facts agreed upon by both lower courts unless those findings are clearly in error. *United States v. Ceccolini*, 435 U. S. 268, 273 (1978). Even if our review were not governed by such rules, however, the mere fact that a handful of the Native Americans who reside in the effected area do not oppose the road in no way casts doubt upon the validity of the lower courts' amply supported factual findings, particularly where the members of this minority did not indicate whether their lack of objection reflected their assessment of the religious significance of the high country, or their own apathy towards religious matters generally.

Respondents [**\*\*1335**] here have demonstrated that construction of the G-O road will completely frustrate the practice of their religion, for as the lower courts found, the proposed logging and construction activities will virtually destroy [**\*468**] respondents' religion, and will therefore necessarily force them into abandoning those practices altogether. Indeed, the Government's proposed activities will restrain religious practice to a far greater degree here than in any of the cases cited by the Court today. None of the religious adherents in *Hobbie*, *Thomas*, and *Sherbert*, for example, claimed or could have claimed that the denial of unemployment benefits rendered the practice of their religions impossible; at most, the challenged laws made those practices more expensive. Here, in stark contrast, respondents have claimed -- and proved -- that the desecration of the high country will prevent religious leaders from attaining the religious power or medicine indispensable to the success of virtually all their rituals and ceremonies. Similarly, in *Yoder* the compulsory school law threatened to "undermine the Amish community and religious practice," and thus to force adherents to "abandon belief . . . or . . . to migrate to some other and more tolerant religion." [406 U. S., at 218](#). Here the threat posed by the desecration of sacred lands that are indisputably essential to respondents' religious practices is both more direct and more substantial than that raised by a compulsory school law that simply exposed Amish children to an alien value system. And of course respondents here do not even have the option, however unattractive it might be, of migrating to more hospitable locales; the site-specific nature of their belief system renders it non-transportable.

Ultimately, the Court's coercion test turns on a distinction between governmental actions that compel affirmative conduct inconsistent with religious belief, and those governmental actions that prevent conduct [**\*\*\*559**] consistent with religious belief. In my view, such a distinction is without constitutional significance. The crucial word in the constitutional text, as the Court itself acknowledges, is "prohibit," see ante, at 451, a comprehensive term that in no way suggests that the

intended protection is aimed only at governmental actions that coerce affirmative conduct.<sup>4</sup> Nor does the Court's distinction comport with the principles animating the constitutional guarantee: religious freedom is threatened no less by governmental action that makes the practice of one's chosen faith impossible than by governmental programs that pressure one to engage in conduct inconsistent with religious beliefs. The Court attempts to explain the line it draws by arguing that the protections of the *Free Exercise Clause* "cannot depend on measuring the effects of a governmental action on a religious objector's spiritual development," *ibid.*, [**\*469**] for in a society as diverse as ours, the Government cannot help but offend the "religious needs and desires" of some citizens. Ante, at 452. While I agree that governmental action that simply offends religious sensibilities may not be challenged under the Clause, we have recognized that laws that affect spiritual development by impeding the integration of children into the religious community or by increasing the expense of adherence to religious principles -- in short, laws that frustrate or inhibit religious practice -- trigger the protections of the constitutional guarantee. Both common sense and our prior [**\*\*1336**] cases teach us, therefore, that governmental action that makes the practice of a given faith more difficult necessarily penalizes that practice and thereby tends to prevent adherence to religious belief. The harm to the practitioners is the same regardless of the manner in which the Government restrains their religious expression, and the Court's fear that an "effects" test will permit religious adherents to challenge governmental actions they merely find "offensive" in no way justifies its refusal to recognize the constitutional injury citizens suffer when governmental action not only offends but actually restrains their religious practices. Here, respondents have demonstrated that the Government's proposed activities will completely prevent them from practicing their religion, and such a showing, no less than those made out in *Hobbie*, *Thomas*, *Sherbert*, and *Yoder*, entitles them to the protections of the *Free Exercise Clause*.

B

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<sup>4</sup> The Court is apparently of the view that the term "prohibit" in the *Free Exercise Clause* somehow limits the constitutional protection such that it cannot possibly be understood to reach "any form of government action that frustrates or inhibits religious practice." Ante, at 456 (quoting [supra, at 459](#)) (emphasis added by majority). Although the dictionary is hardly the final word on the meaning of constitutional language, it is noteworthy that Webster's includes, as one of the two accepted definitions of "prohibit," "to prevent from doing something." Webster's Ninth New Collegiate Dictionary 940 (1983). Government action that frustrates or inhibits religious practice fits far more comfortably within this definition than does the Court's affirmative compulsion test.

Nor can I agree with the Court's assertion that respondents' constitutional claim is foreclosed by our decision in *Bowen v. Roy*, 476 U. S. 693 (1986). [\*\*\*560] There, applicants for certain welfare benefits objected to the use of a Social Security number in connection with the administration of their two year old daughter's application for benefits, contending that such use would "rob the [child's] spirit" and thus interfere with her spiritual development. In rejecting that challenge, [\*470] we stated that "the *Free Exercise Clause* simply cannot be understood to require the Government to conduct its own internal affairs in ways that comport with the religious beliefs of particular citizens." *Id.*, at 699 (emphasis added); see also *id.*, at 716-717 (STEVENS, J., concurring in part) ("The *Free Exercise Clause* does not give an individual the right to dictate the Government's method of recordkeeping"). Accordingly, we explained that Roy could

"no more prevail on his religious objection to the Government's use of a Social Security number for his daughter than he could on a sincere religious objection to the size or color of the Government's filing cabinets. The *Free Exercise Clause* affords an individual protection from certain forms of governmental compulsion; it does not afford an individual a right to dictate the conduct of the Government's internal procedures." *Id.*, at 700 (emphasis added).

Today the Court professes an inability to differentiate Roy from the present case, suggesting that "the building of a road or the harvesting of timber on publicly owned land cannot be meaningfully distinguished from the use of a Social Security number." Ante, at 449. I find this inability altogether remarkable. In Roy, we repeatedly stressed the "internal" nature of the Government practice at issue: noting that Roy objected to "the widespread use of the social security number by the federal or state governments in tar computer systems," *supra*, at 697 (citation omitted; internal quotation marks omitted; emphasis added), we likened the use of such recordkeeping numbers to decisions concerning the

purchase of office equipment. When the Government processes information, of course, it acts in a purely internal manner, and any free exercise challenge to such internal recordkeeping in effect seeks to dictate how the Government conducts its own affairs.

Federal land-use decisions, by contrast, are likely to have substantial external effects that government decisions concerning [\*471] office furniture and information storage obviously will not, and they are correspondingly subject to public scrutiny and public challenge in a host of ways that office equipment purchases are not.<sup>5</sup> Indeed, [\*\*\*1337] in the American Indian Religious Freedom Act (AIRFA), 42 U. S. C. § 1996, [\*\*\*561] Congress expressly recognized the adverse impact land-use decisions and other governmental actions frequently have on the site-specific religious practices of Native Americans, and the Act accordingly directs agencies to consult with Native American religious leaders before taking actions that might impair those practices. Although I agree that the Act does not create any judicially enforceable rights, see ante, at 455, the absence of any private right of action in no way undermines the statute's significance as an express congressional determination that federal land management decisions are not "internal" government "procedures," but are instead governmental actions that can and indeed are likely to burden Native American religious practices. That such decisions should be subject to constitutional challenge, and potential constitutional limitations, should hardly come as a surprise.

The Court today, however, ignores Roy's emphasis on the internal nature of the government practice at issue there, [\*472] and instead construes that case as further support for the proposition that governmental action that does not coerce conduct inconsistent with religious faith simply does not implicate the concerns of the *Free Exercise Clause*. That such a reading is wholly untenable, however, is demonstrated by the cruelly surreal result it produces here: governmental action

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<sup>5</sup> Thus, for example, agencies proposing to use or permit activities on federal lands must comply with various public notice, consultation, and impact evaluation requirements imposed by the National Historic Preservation Act, 16 U. S. C. §§ 470f, 470h-2(f); the Archaeological Resources Protection Act, 16 U. S. C. § 470aa et seq.; the National Environmental Policy Act of 1969, 42 U. S. C. §§ 4321 et seq.; the Wilderness Act, 16 U. S. C. § 1131 et seq.; and the Federal Water Pollution Control Act, 33 U. S. C. §§ 1251 et seq. Concededly, these statutes protect interests in addition to the religious interests Native Americans may have in a pristine environment, and of course the constitutional protection afforded those religious interests is not dependent upon these congressional enactments. Nevertheless, the laws stand as evidence, if indeed any were needed, that federal land-use decisions are fundamentally different from government decisions concerning information management, and that, under Roy, this difference in external effects is of constitutional magnitude.

that will virtually destroy a religion is nevertheless deemed not to "burden" that religion. Moreover, in AIRFA Congress explicitly acknowledged that federal "policies and regulations" could and often did "intrude upon [and] interfere with" site-specific Native American religious ceremonies, Pub. L. 95-341, 92 Stat. 469, and in Roy we recognized that this Act -- "with its emphasis on protecting the freedom to believe, express, and exercise a religion -- accurately identifies the mission of the *Free Exercise Clause* itself." [476 U.S., at 700](#). Ultimately, in Roy we concluded that, however much the Government's recordkeeping system may have offended Roy's sincere religious sensibilities, he could not challenge that system under the *Free Exercise Clause* because the Government's practice did not "in any degree impair his freedom to believe, express, and exercise' his religion." *Id., at 700-701* (quoting AIRFA, [42 U. S. C. § 1996](#)) (emphasis added). That determination distinguishes the injury at issue here, which the Court finds so "remarkably similar" to Roy's, ante, at 456, for respondents have made an uncontroverted showing that the proposed construction and logging activities will impair their freedom to exercise their religion in the greatest degree imaginable, and Congress has "accurately identified" such injuries as falling within the scope of the *Free Exercise Clause*. The Court's reading of Roy, therefore, simply cannot be squared with our [\*\*\*562] endorsement -- in that very same case -- of this congressional determination. More important, it lends no support to the Court's efforts to narrow both the reach and promise of the *Free Exercise Clause* itself.

[\*473] C

In the final analysis, the Court's refusal to recognize the constitutional dimension of respondents' injuries stems from its concern that acceptance of respondents' claim could potentially strip the Government of its ability to manage and use vast tracts of [\*\*1338] federal property. See ante, at 452-453. In addition, the nature of respondents' site-specific religious practices raises the specter of future suits in which Native Americans seek to exclude all human activity from such areas. *Ibid.* These concededly legitimate concerns lie at the very heart of this case, which represents yet another stress point in the longstanding conflict between two disparate cultures -- the dominant western culture, which views land in terms of ownership and use, and that of Native Americans, in which concepts of private property are not only alien, but contrary to a belief system that holds land sacred. Rather than address this conflict in any

meaningful fashion, however, the Court disclaims all responsibility for balancing these competing and potentially irreconcilable interests, choosing instead to turn this difficult task over to the federal legislature. Such an abdication is more than merely indefensible as an institutional matter: by defining respondents' injury as "non-constitutional," the Court has effectively bestowed on one party to this conflict the unilateral authority to resolve all future disputes in its favor, subject only to the Court's toothless exhortation to be "sensitive" to affected religions. In my view, however, Native Americans deserve -- and the Constitution demands -- more than this.

Prior to today's decision, several courts of appeals had attempted to fashion a test that accommodates the competing "demands" placed on federal property by the two cultures. Recognizing that the Government normally enjoys plenary authority over federal lands, the courts of appeals required Native Americans to demonstrate that any land-use decisions they challenged involved lands that were "central" or "indispensable" to their religious practices. See, e. g., [Northwest \[\\*474\] Indian Cemetery Protective Ass'n v. Peterson, 795 F. 2d 688 \(CA9 1986\)](#) (case below); [Wilson v. Block, 228 U.S. App. D.C. 166, 708 F. 2d 735](#), cert. denied, [464 U. S. 956 \(1983\)](#); [Badoni v. Higginson, 638 F. 2d 172 \(CA10 1980\)](#), cert. denied, [452 U. S. 954 \(1981\)](#); [Sequoyah v. TVA, 620 F. 2d 1159 \(CA6\)](#), cert. denied, [449 U. S. 953 \(1980\)](#); [Crow v. Gullet, 541 F. Supp. 785 \(SD 1982\)](#), aff'd, [706 F. 2d 856 \(CA8\)](#), cert. denied, [464 U. S. 977 \(1983\)](#). Although this requirement limits the potential number of free exercise claims that might be brought to federal land management decisions, and thus forestalls the possibility that the Government will find itself ensnared in a host of lilliputian lawsuits, it has been criticized as inherently ethnocentric, for it incorrectly assumes that Native American belief systems ascribe religious significance to land in a traditionally western hierarchical manner. See Michaelsen, American [\*\*\*563] Indian Religious Freedom Litigation: Promise and Perils, 3 J. Law & Rel. 47 (1985); Pepper, Conundrum of the *Free Exercise Clause* -- Some Reflections on Recent Cases, 9 N. Ky. L. Rev. 265, 283-284 (1982). It is frequently the case in constitutional litigation, however, that courts are called upon to balance interests that are not readily translated into rough equivalents. At their most absolute, the competing claims that both the Government and Native Americans assert in federal land are fundamentally incompatible, and unless they are tempered by compromise, mutual accommodation will remain impossible.

I believe it appropriate, therefore, to require some showing of "centrality" before the Government can be required either to come forward with a compelling justification for its proposed use of federal land or to forego that use altogether. "Centrality," however, should not be equated with the survival or extinction of the religion itself. In *Yoder*, for example, we treated the objection to the compulsory school attendance of adolescents as "central" to the Amish faith even though such attendance did not prevent or otherwise render the practice of that religion impossible, and instead simply [\*475] threatened to "undermine" that faith. Because of their perceptions [\*\*1339] of and relationship with the natural world, Native Americans consider all land sacred. Nevertheless, the Theodoratus Report reveals that respondents here deemed certain lands more powerful and more directly related to their religious practices than others. Thus, in my view, while Native Americans need not demonstrate, as respondents did here, that the Government's land-use decision will assuredly eradicate their faith, I do not think it is enough to allege simply that the land in question is held sacred. Rather, adherents challenging a proposed use of federal land should be required to show that the decision poses a substantial and realistic threat of frustrating their religious practices. Once such a showing is made, the burden should shift to the Government to come forward with a compelling state interest sufficient to justify the infringement of those practices.

The Court today suggests that such an approach would place courts in the untenable position of deciding which practices and beliefs are "central" to a given faith and which are not, and invites the prospect of judges advising some religious adherents that they "misunderstand their own religious beliefs." Ante, at 458. In fact, however, courts need not undertake any such inquiries: like all other religious adherents, Native Americans would be the arbiters of which practices are central to their faith, subject only to the normal requirement that their claims be genuine and sincere. The question for the courts, then, is not whether the Native American claimants understand their own religion, but rather, whether they have discharged their burden of demonstrating, as the Amish did with respect to the compulsory school law in *Yoder*, that the land-use decision poses a substantial and realistic threat of undermining or frustrating their religious practices. Ironically, the Court's apparent solicitude for the integrity of religious belief and its desire to forestall the possibility that courts might second-guess the [\*476] claims of religious adherents leads to far greater [\*\*\*564]

inequities than those the Court postulates: today's ruling sacrifices a religion at least as old as the Nation itself, along with the spiritual well-being of its approximately 5,000 adherents, so that the Forest Service can build a six-mile segment of road that two lower courts found had only the most marginal and speculative utility, both to the Government itself and to the private lumber interests that might conceivably use it.

Similarly, the Court's concern that the claims of Native Americans will place "religious servitudes" upon vast tracts of federal property cannot justify its refusal to recognize the constitutional injury respondents will suffer here. It is true, as the Court notes, that respondents' religious use of the high country requires privacy and solitude. The fact remains, however, that respondents have never asked the Forest Service to exclude others from the area. Should respondents or any other group seek to force the Government to protect their religious practices from the interference of private parties, such a demand would implicate not only the concerns of the *Free Exercise Clause*, but those of the *Establishment Clause* as well. That case, however, is most assuredly not before us today, and in any event cannot justify the Court's refusal to acknowledge that the injuries respondents will suffer as a result of the Government's proposed activities are sufficient to state a constitutional cause of action.

### III

Today, the Court holds that a federal land-use decision that promises to destroy an entire religion does not burden the practice of that faith in a manner recognized by the *Free Exercise Clause*. Having thus stripped respondents and all other Native Americans of any constitutional protection against perhaps the most serious threat to their age-old religious practices, and indeed to their entire way of life, the Court assures us that nothing in its decision "should be read to encourage governmental [\*\*1340] insensitivity to the religious [\*477] needs of any citizen," Ante at, 453. I find it difficult, however, to imagine conduct more insensitive to religious needs than the Government's determination to build a marginally useful road in the face of uncontradicted evidence that the road will render the practice of respondents' religion impossible. Nor do I believe that respondents will derive any solace from the knowledge that although the practice of their religion will become "more difficult" as a result of the Government's actions, they remain free to maintain their religious beliefs. Given today's ruling, that freedom

485 U.S. 439, \*477; 108 S. Ct. 1319, \*\*1340; 99 L. Ed. 2d 534, \*\*\*564

amounts to nothing more than the right to believe that their religion will be destroyed. The safeguarding of such a hollow freedom not only makes a mockery of the "policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise their traditional religions," ante, at 454 (quoting AIRFA), it fails utterly to accord with the dictates of the *First Amendment*. I dissent.

[1](#); [42 USCS 1996](#)US L Ed Digest, Constitutional Law 961, 974; Indians 59Index to Annotations, Freedom of Religion; Indians; National Forests; Religion and Religious Societies Annotation  
References:Supreme Court cases involving establishment and freedom of religion clauses of Federal Constitution. 37 L Ed 2d 1147. Free exercise of religion as defense to prosecution for narcotic or psychedelic drug offense. [35 ALR3d 939](#).

## References

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[16A Am Jur 2d, Constitutional Law 471, 472, 482](#); 41 Am Jur 2d, Indians 50USCS, [Constitution, Amendment](#)

# Appendix W

## [Badoni v. Higginson](#)

United States Court of Appeals for the Tenth Circuit  
January 24, 1980, Argued ; November 3, 1980, Decided  
No. 78-1517

### Reporter

638 F.2d 172; 1980 U.S. App. LEXIS 12661; 15 ERC (BNA) 1305; 11 ELR 20204

Lamarr BADONI, Teddy Holiday, Betty Holiday, Jessie Yazzie Black, Jimmy Goodman, Begay Bitsinnie, Shonto Chapter of the Navajo Nation, Navajo Mountain Chapter of the Navajo Nation, and Inscription House Chapter of the Navajo Nation, Plaintiffs-Appellants, v. R. Keith HIGGINSON, Commissioner, Bureau of Reclamation; Ronald H. Walker, Director, National Park Service; Cecil V. Andrus, Secretary of the Interior, Defendants-Appellees, State of Utah; Central Utah Water Conservancy District; Colorado River Conservation District; Southwestern Water Conservation District; and State of Colorado, Defendants in Intervention-Appellees.

**Subsequent History:** **[\*\*1]** Rehearing Denied December 19, 1980.

**Counsel:** Richard W. Hughes of Luebben, Hughes & Kelly, Albuquerque, N. M. (Eric P. Swenson, Mexican Hat, Utah, with him on brief), for plaintiffs-appellants.

Anne S. Almy, Atty., Dept. of Justice, Washington, D. C. (Anthony C. Liotta, Acting Asst. Atty. Gen., Ronald L. Rencher, U. S. Atty., Salt Lake City, Utah, and Robert L. Klarquist, Atty., Dept. of Justice, Washington, D. C., with her on brief), for defendants-appellees.

Dallin W. Jensen, Asst. Atty. Gen., State of Utah, Salt Lake City, Utah (Richard L. Dewsnap, Asst. Atty. Gen., State of Utah, and Edward W. Clyde, Salt Lake City, Utah, with him on brief, for appellees-in-intervention State of Utah and Central Utah Water Conservancy District.

Frank E. Maynes, Durango, Colo., and Andrew R. Hurley, Salt Lake City, Utah, for appellee-in-intervention Southwestern Water Conservation District.

Clyde O. Martz, Sp. Asst. Atty. Gen., State of Colorado, Denver, Colo., for appellee-in-intervention State of Colorado.

Kenneth Balcomb, Glenwood Springs, Colo., and Andrew R. Hurley, Salt Lake City, Utah, for appellee-in-intervention Colorado River Water Conservation District.

**Judges:** Before McWILLIAMS, **[\*\*2]** BREITENSTEIN and LOGAN, Circuit Judges.

**Opinion by:** LOGAN

### Opinion

**[\*175]** This is an appeal from an order granting summary judgment, which effectively denied relief to Indian plaintiffs making constitutional and statutory claims against federal officials. We are asked to determine whether the religion clauses of the *First Amendment* apply to the government's management of the Rainbow Bridge National Monument and the Glen Canyon Dam and Reservoir, and whether an environmental impact statement concerning operation of the Glen Canyon Dam and Reservoir is required under the National Environmental Policy Act, [42 U.S.C. § 4321 et seq.](#) The trial court's order and opinion is reported at [455 F. Supp. 641 \(D.Utah 1977\)](#).

The Rainbow Bridge National Monument is a 160-acre tract of land in southern Utah, set aside by executive order for scientific and historical purposes. 36 Stat. 2703 (1910). Within this parcel is Rainbow Bridge, a great sandstone arch 309 feet high with a span of 278 feet. The Monument, which is surrounded by the Navajo reservation, is administered by the National Park Service. Glen Canyon Dam, located on the Colorado River fifty-eight miles below the Monument, is a 710-foot **[\*\*3]** high structure built pursuant to Congressional authorization. <sup>1</sup> See [43 U.S.C. § 620](#). Glen Canyon Reservoir, known as Lake Powell, formed behind the dam after its completion in 1963. By 1970 the lake had entered the 160-acre tract of the Monument and by

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<sup>1</sup> For a comprehensive description of the statutory scheme governing Glen Canyon Dam and Reservoir, see [Friends of the Earth v. Armstrong](#), 485 F.2d 1 (10th Cir. 1973), cert. denied, [414 U.S. 1171](#), [94 S. Ct. 933](#), [39 L. Ed. 2d 120](#) (1974).

1977 the water had a peak depth of 20.9 feet directly under the Bridge. If the lake fills to its maximum capacity, the water apparently will be 46 feet deep under the Bridge.

Glen Canyon Dam and Lake Powell are operated by the Bureau of Reclamation under the direction of the Secretary of the Interior. [43 U.S.C. § 620](#). The federal lands adjacent to Lake Powell, other than the Monument, comprise the Glen Canyon National Recreation Area, see [16 U.S.C. § 460dd](#), and are administered by the National Park Service. See id. [§§ \[\\*\\*4\] 1, 460dd-3](#).

Prior to the creation of Lake Powell, Rainbow Bridge National Monument was isolated and was visited by few tourists. The lake now provides convenient access to the Monument. Boats licensed by the Commissioner of the Bureau of Reclamation and the Director of the National Park Service bring tourists to the Monument. Docking facilities have been constructed near the Bridge to serve tour boats and private boats.<sup>2</sup> Visitors to the Monument are subject to the regulation and control of the National Park Service. See [16 U.S.C. § 1 et seq.](#)

The individual plaintiffs are Indians residing in the general area of Rainbow Bridge National Monument in southern Utah and are enrolled members of the Navajo Tribe. Three of these plaintiffs are recognized among their people as medicine men, "religious leaders of considerable [\[\\*\\*5\]](#) stature among the Navajo, learned in Navajo history, mythology and culture, and practitioners of traditional rites and ceremonies of ancient origin." [455 F. Supp. at 642](#). Three plaintiffs are Navajo chapters, which are local organizations of the Navajo Nation, [\[\\*176\]](#) each consisting of the adult members of its respective community.

In 1974 plaintiffs commenced this action for declaratory and injunctive relief against the Secretary of the Interior, the Commissioner of the Bureau of Reclamation and the Director of the National Park Service.<sup>3</sup> In their amended complaint plaintiffs asserted two claims for relief relevant to this appeal: First, that defendants' operation of Glen Canyon Dam and Reservoir and

management of Rainbow Bridge National Monument violated plaintiffs' rights under the *Free Exercise Clause of the First Amendment*; second, that defendants are required by [42 U.S.C. § 4332\(2\)\(C\)](#) to provide an environmental impact statement concerning the operation of Glen Canyon Dam and Reservoir and that the continuing operation of the Dam and Reservoir without such a statement violates [42 U.S.C. §§ 4331-35](#). After consideration of the pleadings, affidavits and discovery documents [\[\\*\\*6\]](#) in the record, the trial court granted defendants' motions for summary judgment, from which this appeal was taken.

I

In essence, plaintiffs' free exercise claim is that government action has infringed the practice of their religion in two respects: (1) by impounding water to form Lake Powell, the government has drowned some of plaintiffs' gods and denied plaintiffs access to a prayer spot sacred to them; and (2) by allowing tourists to visit Rainbow Bridge, the government has permitted desecration of the sacred nature of the site and has denied plaintiffs' right to conduct religious [\[\\*\\*7\]](#) ceremonies at the prayer spot.

The trial court gave two reasons for granting summary judgment against plaintiffs. First, the court ruled that plaintiffs do not have a cognizable free exercise claim because they have no property interest in the Monument. [455 F. Supp. at 644-45](#). In the alternative, it held that the federal government's interests in the Glen Canyon Dam and Reservoir as a major water and power project outweigh plaintiffs' religious interests in the Monument. [455 F. Supp. at 645-47](#). While we affirm the summary judgment in defendants' favor, our reasoning differs somewhat from that of the trial court.

At the outset, we reject the conclusion that plaintiffs' lack of property rights in the Monument is determinative. The government must manage its property in a manner that does not offend the Constitution. See [Sequoyah v. TVA, 620 F.2d 1159, 1164 \(6th Cir. 1980\)](#) (lack of property interest not conclusive, but is a factor in weighing free exercise and competing interests). We

<sup>2</sup> The Park Service also permitted operation of a floating marina near the Bridge. The government states, however, that the marina has been moved to a different canyon. Appellee's Br. 20 n.6.

<sup>3</sup> The court also granted motions of the Colorado River Water Conservation District, the Southwestern Water Conservation District, the State of Colorado, the State of Utah, and the Central Utah Water Conservancy District to intervene. The interests of these intervenors concern only the operation of Glen Canyon Dam and Reservoir. In this appeal, their arguments are substantially the same as those presented by the government.

must look to the nature of the government action and the quality of plaintiffs' positions to determine whether they have stated a free exercise claim. See [Wisconsin v. Yoder, 406 U.S. 205, 215, 92 S. Ct. \[\\*\\*8\] 1526, 1533, 32 L. Ed. 2d 15 \(1972\)](#).

Analysis of a free exercise claim involves a two-step process. We first determine whether government action creates a burden on the exercise of plaintiffs' religion. "(I)t is necessary in a free exercise case to show the coercive effect of the enactment as it operates against ... the practice of (their) religion." [School Dist. of Abington v. Schempp, 374 U.S. 203, 223, 83 S. Ct. 1560, 1572, 10 L. Ed. 2d 844 \(1963\)](#). The practice allegedly infringed upon must be based on a system of belief that is religious, see, e. g., [Wisconsin v. Yoder, 406 U.S. at 215-16, 92 S. Ct. at 1533](#); [Kennedy v. Meacham, 540 F.2d 1057, 1060-61 \(10th Cir. 1976\)](#), and sincerely held by the person asserting the infringement, see, e. g., [United States v. Ballard, 322 U.S. 78, 64 S. Ct. 882, 88 L. Ed. 1148 \(1944\)](#). If such a burden is found, the action is violative of the *Free Exercise Clause*, unless the government establishes an interest of "sufficient magnitude [\*177] to override the interest claiming protection under the *Free Exercise Clause*." [Wisconsin v. Yoder, 406 U.S. at 214, 92 S. Ct. at 1532](#). "(Only) those interests of the highest order and those not otherwise served [\*\*9] can overbalance legitimate claims to the free exercise of religion." [Id. at 215, 92 S. Ct. at 1533](#).

In reviewing a summary judgment, we view the facts and reasonable inferences drawn therefrom in the light most favorable to plaintiffs. The pertinent facts in this case are as follows. Rainbow Bridge and a nearby spring, prayer spot and cave have held positions of central importance in the religion of some Navajo people living in that area for at least 100 years. These shrines are regarded as the incarnate forms of Navajo gods, which provide protection and rain-giving functions. For generations Navajo singers have performed ceremonies near the Bridge and water from the spring has been used for other ceremonies. Plaintiffs believe that if humans alter the earth in the area of the Bridge, plaintiffs' prayers will not be heard by the gods and their ceremonies will be ineffective to prevent evil and disease. Because of the operation of the Dam and Lake Powell, the springs and prayer spot are under water. Tourists visiting the sacred area have desecrated it by

noise, litter and defacement of the Bridge itself. Because of the flooding and the presence of tourists, plaintiffs no longer hold [\*\*10] ceremonies in the area of the Bridge.

A

With respect to the government action of impounding water in Lake Powell the stated infringement is the drowning of the Navajo gods, the increased tourist presence attributable to the level at which the lake is kept, and the denial of access to the prayer spot now under water. We agree with the trial court that the government's interest in maintaining the capacity of Lake Powell at a level that intrudes into the Monument outweighs plaintiffs' religious interest. This Court has previously considered the importance of the Glen Canyon Dam and Reservoir as a crucial part of a multi-state water storage and power generation project. See [Friends of the Earth v. Armstrong, 485 F.2d 1 \(10th Cir. 1973\)](#), cert. denied, [414 U.S. 1171, 94 S. Ct. 933, 39 L. Ed. 2d 120 \(1974\)](#). In the instant case un rebutted evidence, by affidavit, shows that the storage capacity of the lake would be cut in half if the surface level were dropped to an elevation necessary to alleviate the complained of infringements. The required reduction would significantly reduce the water available to the Upper Basin States of Colorado, New Mexico, Utah and Wyoming from the Colorado River. [\*\*11]

Such a reduction of use in each of the above Upper Colorado River Basin States would among other things limit and reduce the development of water supplies within these States on either a permanent basis or on a limited long-term basis for irrigation purposes, for development of mineral and other natural resources, and for municipal and industrial water supplies.

Aff. of David L. Crandall, Regional Director of the Upper Colorado Region of the Bureau of Reclamation. Moreover, it is reasonable to conclude that no action other than reducing the water level would avoid the alleged infringement of plaintiffs' beliefs and practices. In these circumstances we believe the government has shown an interest of a magnitude sufficient to justify the alleged infringements. <sup>4</sup>

[\*\*12] B

<sup>4</sup> Because we agree with the trial court that the government's interest in maintaining the level of Lake Powell is compelling, we do not reach the question whether the government action involved infringes plaintiffs' free exercise of religion.

The second basis for plaintiffs' free exercise claims concerns management of the Monument by the National Park Service. Specifically, plaintiffs assert that tourists visiting the Monument desecrate the area by noisy conduct, littering and defacement of the Bridge and that the presence of tourists prevents plaintiffs from holding ceremonies near the Bridge.

[\*178] The gravamen of plaintiffs' claim is that by permitting public access and the operation of commercial tour boats the government has burdened the practice of plaintiffs' religion. In their complaint plaintiffs seek an order requiring the government officials "to take appropriate steps to operate Glen Canyon Dam and Reservoir in such a manner that the important religious and cultural interests of Plaintiffs will not be harmed or degraded," and "to issue rules and regulations to take adequate measures preventing further desecration and destruction of the Rainbow Bridge area by tourists, and otherwise to take adequate measures to preclude impairment of the Rainbow Bridge National Monument." (R. 543) In their brief-in-chief, plaintiffs state they "seek only some measured accommodation to their religious interest, not [\*\*13] a wholesale bar to use of Rainbow Bridge by all others." (Appellants' Br. 8.) They suggest some specific types of relief, such as prohibiting consumption of beer at the Monument and closing the Monument on reasonable notice when religious ceremonies are to be held there. (Appellants' Br. 25.) In their reply brief, plaintiffs summarize their claim as follows: "The main thrust of appellants' claim seeks to eliminate government actions which encourage destructive visitor use of the Bridge, and to permit, on infrequent occasions, appellants or other Navajos to conduct religious ceremonies there in private." (Appellants' Reply Br. 3.)

Free exercise claims generally challenge government dictates which compel citizens to violate tenets of their religion; see [Wisconsin v. Yoder, 406 U.S. 205, 92 S. Ct. 1526, 32 L. Ed. 2d 15 \(1972\)](#) (Wisconsin's compulsory education law violated Amish free exercise of religion); [Wooley v. Maynard, 430 U.S. 705, 97 S. Ct. 1428, 51 L. Ed. 2d 752 \(1977\)](#) (statute requiring all motor vehicles of New Hampshire to bear the motto "Live Free or Die" violated Jehovah's Witness followers' *First Amendment* rights), or government action which conditions a benefit or right [\*\*14] on renunciation of a religious practice. See [McDaniel v. Paty, 435 U.S. 618, 633-34, 98 S. Ct. 1322, 1331, 55 L. Ed. 2d 593 \(1978\)](#) (Tennessee provisions barring ministers from serving as delegates or legislators violated the *First Amendment*); [Sherbert v.](#)

[Verner, 374 U.S. 398, 83 S. Ct. 1790, 10 L. Ed. 2d 965 \(1963\)](#) (disqualification of appellant from unemployment compensation because of refusal to work on Saturday contrary to religious beliefs violated *Free Exercise Clause*).

The government here has not prohibited plaintiffs' religious exercises in the area of Rainbow Bridge; plaintiffs may enter the Monument on the same basis as other people. It is the presence of tourists at the Monument and their actions while there that give rise to plaintiffs' complaint of interference with the exercise of their religion. We are mindful of the difficulties facing plaintiffs in performing solemn religious ceremonies in an area frequented by tourists. But what plaintiffs seek in the name of the *Free Exercise Clause* is affirmative action by the government which implicates the *Establishment Clause of the First Amendment*. They seek government action to exclude others from the Monument, at least for [\*\*15] short periods, and to control tourist behavior.

Unquestionably the government has a strong interest in assuring public access to this natural wonder. Congress has charged the Park Service with the duty to provide "for the enjoyment of (parks and monuments) ... by such means as will leave them unimpaired for the enjoyment of future of the generations." [16 U.S.C. § 1](#). Toward this end, the Secretary of the Interior is empowered to

grant privileges, leases, and permits for the use of land for the accommodation of visitors in the various parks, monuments, or other reservations provided for under [section 2](#) of this title, but for periods not exceeding thirty years; and no natural curiosities, wonders, or objects of interest shall be leased, rented, or granted to anyone on such terms as to interfere with free access to them by the public....

[16 U.S.C. § 3](#). The Park Service's action of allowing public access to the Monument in accordance with this legislative grant provides [\*\*179] the legal basis for plaintiffs' presence as well as the presence of the tourists.

Issuance of regulations to exclude tourists completely from the Monument for the avowed purpose of aiding plaintiffs' [\*\*16] conduct of religious ceremonies would seem a clear violation of the *Establishment Clause*.

The test may be stated as follows: what are the purpose and the primary effect of the

enactment? If either is the advancement or inhibition of religion then the enactment exceeds the scope of legislative power as circumscribed by the Constitution. That is to say that to withstand the strictures of the Establishment Clause there must be a secular legislative purpose and a primary effect that neither advances nor inhibits religion.

School Dist. of Abington v. Schempp, 374 U.S. at 222, 83 S. Ct. at 1571. Exercise of First Amendment freedoms may not be asserted to deprive the public of its normal use of an area. Shuttlesworth v. Birmingham, 394 U.S. 147, 152, 89 S. Ct. 935, 939, 22 L. Ed. 2d 162 (1969); Amalgamated Food Employees Union v. Logan Valley Plaza, Inc., 391 U.S. 308, 320, 88 S. Ct. 1601, 1609, 20 L. Ed. 2d 603 (1968); Cox v. Louisiana, 379 U.S. 536, 554-55, 85 S. Ct. 453, 464, 13 L. Ed. 2d 471 (1965); Niemotko v. Maryland, 340 U.S. 268, 271, 71 S. Ct. 325, 327, 95 L. Ed. 267 (1951). Government action has frequently been invalidated when it has denied the exercise of First Amendment [\*17] rights compatible with public use.

Wherever the title of streets and parks may rest, they have immemorially been held in trust for the use of the public and, time out of mind, have been used for purposes of assembly, communicating thoughts between citizens, and discussing public questions. Such use of the streets and public places has, from ancient times, been a part of the privileges, immunities, rights, and liberties of citizens. The privilege of a citizen of the United States to use the streets and parks for communication of views on national questions may be regulated in the interest of all; it is not absolute, but relative, and must be exercised in subordination to the general comfort and convenience, and in consonance with peace and good order; but it must not, in the guise of regulation, be abridged or denied.

Hague v. CIO, 307 U.S. 496, 515-16, 59 S. Ct. 954, 963-64, 83 L. Ed. 1423 (1939). We find no basis in the law for ordering the government to exclude the public from public areas to insure privacy during the exercise of First Amendment rights.

We must also deny relief insofar as plaintiffs seek to have the government police the actions of tourists

lawfully [\*18] visiting the Monument. Although Congress has authorized the Park Service to regulate the conduct of tourists in order to promote and preserve the Monument, see 16 U.S.C. §§ 1, 3, we do not believe plaintiffs have a constitutional right to have tourists visiting the Bridge act "in a respectful and appreciative manner." (Appellants' Reply Br. 4.)

The First Amendment protects one against action by the government, though even then, not in all circumstances; but it gives no one the right to insist that in the pursuit of their own interests others must conform their conduct to his own religious necessities.... We must accommodate our idiosyncracies, religious as well as secular, to the compromises necessary in communal life.

Otten v. Baltimore & O. R. Co., 205 F.2d 58, 61 (2d Cir. 1953) (Learned Hand, J.) (footnote omitted). Were it otherwise, the Monument would become a government-managed religious shrine.

The Park Service already has issued regulations applicable to the Monument prohibiting disorderly conduct, 36 C.F.R. § 2.7 (1979), intoxication and possession of alcoholic beverages by minors, id. § 2.16, defacement, id. § 2.20, littering, id. § 2.24, and tampering with [\*19] personal property, id. § 2.29. These regulations no doubt would be justified as authorized under its charge to conserve and protect the scenery, natural and historic objects for the enjoyment of the public. See 16 U.S.C. § 1. These regulations also provide the relief plaintiffs request as to control of tourist behavior, except [\*180] perhaps for a total ban on beer drinking.

What of the request stated in the appellant's reply brief for access "on infrequent occasions" to conduct religious ceremonies in private? The government asserts that plaintiffs, in common with other members of the public, may apply for a public assembly permit to hold religious ceremonies at the Bridge.<sup>5</sup> No one suggests such a permit could not be used to permit access after normal visiting hours when privacy might be assured. The courts have held permit requirements unconstitutional when they have been used to restrain First Amendment rights without narrow, objective standards. E. g., Shuttlesworth v. Birmingham, 394 U.S. 147, 89 S. Ct. 935, 22 L. Ed. 2d 162 (1969). Cf. Chess v. Widmar, 635 F.2d 1310 (8th Cir. No. 80-1048, Aug. 5, 1980) (use of

<sup>5</sup> 36 C.F.R. § 2.21 provides in pertinent part:

university facilities). Our problem is that there is no [\[\\*\\*20\]](#) allegation that any such permit was requested and denied. The pleadings, affidavits and interrogatories suggest no specific time or schedule for religious ceremonies. Indeed, plaintiffs' answers to interrogatories and the proffered affidavit of their expert Karl Luckert indicate the ceremonies are infrequent and scheduled at the request of individual Navajos when a need seems to exist.

Plaintiffs cite the Park Service's proposed guidelines for use of Grand Canyon National Park, which prohibit entry on certain sacred Indian religious sites. They also cite the American [\[\\*\\*21\]](#) Indian Religious Freedom Act, [42 U.S.C. § 1996](#), which states a public policy to permit Indians access to sacred sites for worship, and perhaps to protect them from intrusion. See H.R.Rep.No.1308, 95th Cong., 2d Sess. (1978), reprinted in (1978) U.S.Code Cong. & Ad.News, pp. 1262, 1264. But we do not have before us the constitutionality of those laws or regulations or of any action taken by defendants in alleged violation of them. The pleadings, even as supplemented by the expanded requests in the brief and supported by the proffered evidence, afford no basis for relief.

## II

Plaintiffs also seek an order under the National Environmental Policy Act of 1969 (NEPA), [42 U.S.C. § 4331 et seq.](#), requiring the Department of Interior to draft an environmental impact statement (EIS) on the continuing operation of the Glen Canyon Dam and Reservoir. Alternatively, plaintiffs seek a remand to the district court for trial on this issue. The district court held that the issue was not ripe for judicial review because the agency had not taken a position of sufficient clarity and finality to allow meaningful judicial review. [455 F. Supp. at 648](#). It also stated that if the issue were ripe for decision [\[\\*\\*22\]](#) an EIS would not be required because operation of the dam involves merely ministerial rather

than major federal actions and because no reasonable alternatives would afford relief to plaintiffs. [Id. at 648-49](#). The government now appears to concede the issue is ripe for judicial review, because the Bureau has decided to draft a comprehensive EIS for the entire Colorado River Basin Project. It has also determined that a site-specific EIS on the Glen Canyon unit is not necessary. (Appellees' Brief 24-26.) Thus, we must determine whether the agency's decision not to draft a site-specific EIS for the dam and reservoir is reasonable. <sup>6</sup> See [Wyoming Outdoor Coordinating \[\\*\\*181\] Council v. Butz](#), 484 F.2d 1244, 1248-49 (10th Cir. 1973).

[\[\\*\\*23\]](#) The Colorado River Storage Project Act of 1956, [43 U.S.C. § 620 et seq.](#), authorized the Glen Canyon Dam and Reservoir along with other storage facilities and power plants. Construction began on October 15, 1956, and was completed on September 13, 1963. Six months later, water was first impounded in the project. In September 1968, Congress instructed the Secretary of Interior to promulgate criteria for the storage and release of the water from the Colorado River Project. [43 U.S.C. § 1552\(a\)](#). The operational criteria were published on June 10, 1970, shortly after NEPA's effective date of January 1, 1970.

NEPA requires that federal agencies include an environmental impact statement "in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment." [42 U.S.C. § 4332\(2\)\(C\)](#). The Bureau apparently agrees with plaintiffs that the continuing operation of the Colorado River Basin Project is a major federal action since it has decided to draft a comprehensive EIS on the entire project. Disagreement between plaintiffs and the Bureau arises because plaintiffs believe an additional site-specific EIS on [\[\\*\\*24\]](#) the Glen Canyon unit is necessary.

The criteria in question apply not only to the Glen Canyon unit, but also to all the storage units of the

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(a) Public meetings, assemblies, gatherings, demonstrations, parades and other public expressions of views are permitted within park areas on lands which are open to the general public provided a permit therefor has been issued by the Superintendent.

"Park area" is defined in the regulations as "all federally owned or controlled areas administered by the National Park Service." [36 C.F.R. § 1.2\(f\)](#).

<sup>6</sup> The choice of standard of review here depends upon how the agency action is characterized. [Kleppe v. Sierra Club](#), [427 U.S. 390, 412, 96 S. Ct. 2718, 2731, 49 L. Ed. 2d 576 \(1976\)](#), requires a showing the agency acted "arbitrarily" in choosing the site specific approach rather than requiring a region-wide EIS. Arguably, that standard should apply to the instant case, which would make plaintiffs' task more difficult. For purposes of this appeal we give plaintiffs the benefit of the doubt and apply the "reasonableness" standard.

Colorado River Project constructed and operated under three related acts.<sup>7</sup> The title, "Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs," reflects the comprehensive scope of the criteria set by direction of Congress. See [43 U.S.C. § 1552\(a\)](#). This Court has recognized the interrelated and comprehensive development of the water resource project. [Friends of the Earth v. Armstrong, 485 F.2d 1 \(10th Cir. 1973\)](#), cert. denied, [414 U.S. 1171, 94 S. Ct. 933, 39 L. Ed. 2d 120 \(1974\)](#).

Lake Powell is an important element or link in the Colorado River water and power development. It cannot be considered alone as all the existing projects **[\*\*25]** in the Upper Basin, and the planned ones, are interrelated and interdependent. The projects have different purposes and functions, but are dependent on Lake Powell to provide basic storage necessary to fulfill the delivery requirements to the downstream states and Mexico, especially in dry years.... This interrelation created by the comprehensive plan for development is rather delicate and can be disturbed if the capacity of by far the largest storage or regulating unit is

reduced significantly.

[Id. at 6](#). We also note that Congress expressly declared that the purpose of the Act which required criteria was the "further comprehensive development of the water resources of the Colorado River Basin." [43 U.S.C. § 1501\(a\)](#).

Although a comprehensive EIS is frequently undertaken after project or site-specific EIS's have been drafted, need for a comprehensive EIS does not automatically establish need for environmental statements of narrower scope. See [Kleppe v. Sierra Club, 427 U.S. 390, 410-12, 96 S. Ct. 2718, 2730-31, 49 L. Ed. 2d 576 \(1976\)](#). We find no proposal for criteria or any other major action under NEPA which involves the Glen Canyon project singly; rather it is for the entire **[\*\*26]** Colorado River Basin Project. We therefore find the agency's decision to draft a comprehensive EIS considering the environmental effects of the entire project and its related decision not to draft a site-specific EIS on the Glen Canyon unit were reasonable. The district court correctly granted judgment against plaintiffs on this issue.

AFFIRMED.

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<sup>7</sup> These acts are: the Colorado River Storage Project Act, [43 U.S.C. § 620 et seq.](#); the Boulder Canyon Project Act, [43 U.S.C. § 617 et seq.](#); and the Boulder Canyon Project Adjustment Act, [43 U.S.C. § 618 et seq.](#)

# Appendix X

41-1493.01. [Free exercise of religion protected](#)

- A. Free exercise of religion is a fundamental right that applies in this state even if laws, rules or other government actions are facially neutral.
- B. Except as provided in subsection C, government shall not substantially burden a person's exercise of religion even if the burden results from a rule of general applicability.
- C. Government may substantially burden a person's exercise of religion only if it demonstrates that application of the burden to the person is both:
  - 1. In furtherance of a compelling governmental interest.
  - 2. The least restrictive means of furthering that compelling governmental interest.
- D. A person whose religious exercise is burdened in violation of this section may assert that violation as a claim or defense in a judicial proceeding and obtain appropriate relief against a government. A party who prevails in any action to enforce this article against a government shall recover attorney fees and costs.
- E. In this section, the term substantially burden is intended solely to ensure that this article is not triggered by trivial, technical or de minimis infractions.

41-1493.02. [Applicability](#)

- A. This article applies to all state and local laws and ordinances and the implementation of those laws and ordinances, whether statutory or otherwise, and whether adopted before or after the effective date of this article.
- B. State laws that are adopted after the effective date of this article are subject to this article unless the law explicitly excludes application by reference to this article.
- C. This article shall not be construed to authorize any government to burden any religious belief.

# Appendix Y

# City of Boerne v. Flores

Supreme Court of the United States

February 19, 1997, Argued ; June 25, 1997, Decided

No. 95-2074

## Reporter

521 U.S. 507; 117 S. Ct. 2157; 138 L. Ed. 2d 624; 1997 U.S. LEXIS 4035; 65 U.S.L.W. 4612; 74 Fair Empl. Prac. Cas. (BNA) 62; 70 Empl. Prac. Dec. (CCH) P44,785; 97 Cal. Daily Op. Service 4904; 97 Daily Journal DAR 7973; 1997 Colo. J. C.A.R. 1329; 11 Fla. L. Weekly Fed. S 140

CITY OF BOERNE, PETITIONER v. P. F. FLORES, ARCHBISHOP OF SAN ANTONIO, AND UNITED STATES

**Prior History:** ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FIFTH CIRCUIT, Reported at: [1996 U.S. App. LEXIS 762](#).

**Disposition:** [73 F.3d 1352](#), reversed.

## Syllabus

Respondent, the Catholic Archbishop of San Antonio, applied for a building permit to enlarge a church in Boerne, Texas. When local zoning authorities denied the permit, relying on an ordinance governing historic preservation in a district which, they argued, included the church, the Archbishop brought this suit challenging the permit denial under, *inter alia*, the Religious Freedom Restoration Act of 1993 (RFRA). The District Court concluded that by enacting RFRA Congress exceeded the scope of its enforcement power under [§ 5 of the Fourteenth Amendment](#). The court certified its order for interlocutory appeal, and the Fifth Circuit reversed, finding RFRA to be constitutional.

*Held:* RFRA exceeds Congress' power. Pp. 2-27.

(a) Congress enacted RFRA in direct response to [Employment Div., Dept. of Human Resources of Ore. v. Smith, 494 U.S. 872, 108 L. Ed. 2d 876, 110 S. Ct. 1595](#), in which the Court upheld against a free exercise challenge a state law of general applicability criminalizing peyote use, as applied to deny unemployment benefits to Native American Church members who lost their jobs because of such use. In so ruling, the Court declined to apply the balancing test of [Sherbert v. Verner, 374 U.S. 398, 10 L. Ed. 2d 965, 83 S. Ct. 1790](#), which asks whether the law at issue substantially burdens a religious practice and, if so,

whether the burden is justified by a compelling government interest. RFRA prohibits "government" from "substantially burdening" a person's exercise of religion even if the burden results from a rule of general applicability unless the government can demonstrate the burden "(1) is in furtherance of a compelling governmental interest; and (2) is the least restrictive means of furthering that . . . interest." [42 U.S.C. § 2000bb-1](#). RFRA's mandate applies to any branch of Federal or State Government, to all officials, and to other persons acting under color of law. [§ 2000bb-2\(1\)](#). Its universal coverage includes "all Federal and State law, and the implementation of that law, whether statutory or otherwise, and whether adopted before or after [RFRA's enactment]." [§ 2000bb-3\(a\)](#). Pp. 2-6.

(b) In imposing RFRA's requirements on the States, Congress relied on the *Fourteenth Amendment*, which, *inter alia*, guarantees that no State shall make or enforce any law depriving any person of "life, liberty, or property, without due process of law," or denying any person the "equal protection of the laws," [§ 1](#), and empowers Congress "to enforce" those guarantees by "appropriate legislation," [§ 5](#). Respondent and the United States as *amicus* contend that RFRA is permissible enforcement legislation under [§ 5](#). Although Congress certainly can enact legislation enforcing the constitutional right to the free exercise of religion, see, e.g., [Cantwell v. Connecticut, 310 U.S. 296, 303, 84 L. Ed. 1213, 60 S. Ct. 900](#), its [§ 5](#) power "to enforce" is only preventive or "remedial," [South Carolina v. Katzenbach, 383 U.S. 301, 326, 15 L. Ed. 2d 769, 86 S. Ct. 803](#). The Amendment's design and [§ 5's](#) text are inconsistent with any suggestion that Congress has the power to decree the substance of the Amendment's restrictions on the States. Legislation which alters the *Free Exercise Clause's* meaning cannot be said to be enforcing the Clause. Congress does not enforce a constitutional right by changing what the right is. While the line between measures that remedy or prevent unconstitutional actions and measures that make a

substantive change in the governing law is not easy to discern, and Congress must have wide latitude in determining where it lies, the distinction exists and must be observed. There must be a congruence and proportionality between the injury to be prevented or remedied and the means adopted to that end. Lacking such a connection, legislation may become substantive in operation and effect. The need to distinguish between remedy and substance is supported by the *Fourteenth Amendment's* history and this Court's case law, see, e.g., *Civil Rights Cases*, 109 U.S. 3, 13-14, 15, 27 L. Ed. 835, 3 S. Ct. 18; *Oregon v. Mitchell*, 400 U.S. 112, 209, 296, 27 L. Ed. 2d 272, 91 S. Ct. 260. The Amendment's design has proved significant also in maintaining the traditional separation of powers between Congress and the Judiciary, depriving Congress of any power to interpret and elaborate on its meaning by conferring self-executing substantive rights against the States, cf. *id.*, at 325, and thereby leaving the interpretive power with the Judiciary. Pp. 6-19.

(c) RFRA is not a proper exercise of Congress' § 5 enforcement power because it contradicts vital principles necessary to maintain separation of powers and the federal-state balance. An instructive comparison may be drawn between RFRA and the Voting Rights Act of 1965, provisions of which were upheld in *Katzenbach, supra*, and subsequent voting rights cases. In contrast to the record of widespread and persisting racial discrimination which confronted Congress and the Judiciary in those cases, RFRA's legislative record lacks examples of any instances of generally applicable laws passed because of religious bigotry in the past 40 years. Rather, the emphasis of the RFRA hearings was on laws like the one at issue that place incidental burdens on religion. It is difficult to maintain that such laws are based on animus or hostility to the burdened religious practices or that they indicate some widespread pattern of religious discrimination in this country. RFRA's most serious shortcoming, however, lies in the fact that it is so out of proportion to a supposed remedial or preventive object that it cannot be understood as responsive to, or designed to prevent, unconstitutional behavior. It appears, instead, to attempt a substantive change in constitutional protections, proscribing state conduct that the *Fourteenth Amendment* itself does not prohibit. Its sweeping coverage ensures its intrusion at every level of government, displacing laws and prohibiting official actions of almost every description and regardless of subject matter. Its restrictions apply to every government agency and official, § 2000bb-2(1), and to all statutory

or other law, whether adopted before or after its enactment, § 2000bb-3(a). It has no termination date or termination mechanism. Any law is subject to challenge at any time by any individual who claims a substantial burden on his or her free exercise of religion. Such a claim will often be difficult to contest. See *Smith, supra, at 887*. Requiring a State to demonstrate a compelling interest and show that it has adopted the least restrictive means of achieving that interest is the most demanding test known to constitutional law. *494 U.S. at 888*. Furthermore, the least restrictive means requirement was not used in the pre-*Smith* jurisprudence RFRA purported to codify. All told, RFRA is a considerable congressional intrusion into the States' traditional prerogatives and general authority to regulate for the health and welfare of their citizens, and is not designed to identify and counteract state laws likely to be unconstitutional because of their treatment of religion. Pp. 19-27.

*73 F.3d 1352*, reversed.

**Counsel:** Marci A. Hamilton argued the cause for petitioner.

Jeffrey S. Sutton argued the cause for Ohio, et al., as amicus curiae, by special leave of court.

Douglas Laycock argued the cause for respondent P.F. Flores.

Walter Dellinger argued the cause for respondent United States.

**Judges:** KENNEDY, J., delivered the opinion of the Court, in which REHNQUIST, C. J., and STEVENS, THOMAS, and GINSBURG, JJ., joined, and in all but Part III-A-1 of which SCALIA, J., joined. STEVENS, J., filed a concurring opinion. SCALIA, J., filed an opinion concurring in part, in which STEVENS, J., joined. O'CONNOR, J., filed a dissenting opinion, in which BREYER, J., joined except as to a portion of Part I. SOUTER, J., and BREYER, J., filed dissenting opinions.

**Opinion by:** KENNEDY

## Opinion

[\*\*\*633] [\*511] [\*\*2160] JUSTICE KENNEDY delivered the opinion of the Court. \*

[1A] [2A] A decision by local zoning authorities to deny a church a building permit was challenged under the Religious Freedom Restoration Act of 1993 (RFRA), 107 Stat. 1488, [42 U.S.C. § 2000bb et seq.](#) The case calls into question the authority of Congress to enact RFRA. We conclude the statute exceeds Congress' power.

I

Situated on a hill in the city of Boerne, Texas, some 28 miles northwest of San Antonio, is St. Peter Catholic Church. Built in 1923, the church's structure replicates the mission [\*512] style of the region's earlier history. The church seats about 230 worshippers, a number too small for its growing parish. Some 40 to 60 parishioners cannot be accommodated at some Sunday masses. In order to meet the needs of the congregation the Archbishop of San Antonio gave permission to the parish to plan alterations to enlarge the building.

A few months later, the Boerne City Council passed an ordinance authorizing the city's Historic Landmark Commission to prepare a preservation plan with proposed historic landmarks and districts. Under the ordinance, the Commission must preapprove construction affecting historic landmarks or buildings in a historic district.

Soon afterwards, the Archbishop applied for a building permit so construction to enlarge the church could proceed. City authorities, relying on the ordinance and the designation of a historic district (which, they argued, [\*\*\*634] included the church), denied the application. The Archbishop brought this suit challenging the permit denial in the [United States District Court for the Western District of Texas](#). [877 F. Supp. 355 \(1995\)](#).

The complaint contained various claims, but to this point the litigation has centered on RFRA and the question of its constitutionality. The Archbishop relied upon RFRA as one basis for relief from the refusal to issue the permit. The District Court concluded that by enacting RFRA Congress exceeded the scope of its enforcement power under [§ 5 of the Fourteenth](#)

*Amendment*. The court certified its order for interlocutory appeal and the Fifth Circuit reversed, finding RFRA to be constitutional. [73 F.3d 1352 \(1996\)](#). We granted certiorari, 519 U.S. \_\_ (1996), and now reverse.

II

Congress enacted RFRA in direct response to the Court's decision in [Employment Div., Dept. of Human Resources of Ore. v. Smith](#), [494 U.S. 872, 108 L. Ed. 2d 876, 110 S. Ct. 1595 \(1990\)](#). There we considered a *Free Exercise Clause* claim brought by members of the [\*513] Native American Church who were denied unemployment benefits when they lost their jobs because they had used peyote. Their practice was to ingest peyote for sacramental purposes, and they challenged an Oregon statute of general applicability which made use of the drug criminal. In evaluating the claim, we declined to apply the balancing test set forth in [Sherbert v. Verner](#), [374 U.S. 398, 10 L. Ed. 2d 965, 83 S. Ct. 1790 \(1963\)](#), under which we [\*\*2161] would have asked whether Oregon's prohibition substantially burdened a religious practice and, if it did, whether the burden was justified by a compelling government interest. We stated:

"Government's ability to enforce generally applicable prohibitions of socially harmful conduct . . . cannot depend on measuring the effects of a governmental action on a religious objector's spiritual development. To make an individual's obligation to obey such a law contingent upon the law's coincidence with his religious beliefs, except where the State's interest is 'compelling' . . . contradicts both constitutional tradition and common sense." [494 U.S. at 885](#) (internal quotation marks and citation omitted).

The application of the *Sherbert* test, the *Smith* decision explained, would have produced an anomaly in the law, a constitutional right to ignore neutral laws of general applicability. The anomaly would have been accentuated, the Court reasoned, by the difficulty of determining whether a particular practice was central to an individual's religion. We explained, moreover, that it "is not within the judicial ken to question the centrality of particular beliefs or practices to a faith, or the validity of particular litigants' interpretations of those creeds." [494 U.S. at 887](#) (internal quotation marks and citation

\* JUSTICE SCALIA joins all but Part III-A-1 of this opinion.

omitted).

The only instances where a neutral, generally applicable law had failed to pass constitutional muster, the *Smith* Court [\*514] noted, were cases in which other constitutional protections were at stake. *Id.*, at 881-882. [\*\*\*635] In *Wisconsin v. Yoder*, 406 U.S. 205, 32 L. Ed. 2d 15, 92 S. Ct. 1526 (1972), for example, we invalidated Wisconsin's mandatory school-attendance law as applied to Amish parents who refused on religious grounds to send their children to school. That case implicated not only the right to the free exercise of religion but also the right of parents to control their children's education.

The *Smith* decision acknowledged the Court had employed the *Sherbert* test in considering free exercise challenges to state unemployment compensation rules on three occasions where the balance had tipped in favor of the individual. See *Sherbert*, *supra*; *Thomas v. Review Bd. of Indiana Employment Security Div.*, 450 U.S. 707, 67 L. Ed. 2d 624, 101 S. Ct. 1425 (1981); *Hobbie v. Unemployment Appeals Comm'n of Fla.*, 480 U.S. 136, 94 L. Ed. 2d 190, 107 S. Ct. 1046 (1987). Those cases, the Court explained, stand for "the proposition that where the State has in place a system of individual exemptions, it may not refuse to extend that system to cases of religious hardship without compelling reason." 494 U.S. at 884 (internal quotation marks omitted). By contrast, where a general prohibition, such as Oregon's, is at issue, "the sounder approach, and the approach in accord with the vast majority of our precedents, is to hold the test inapplicable to [free exercise] challenges." *Id.*, at 885. *Smith* held that neutral, generally applicable laws may be applied to religious practices even when not supported by a compelling governmental interest.

Four Members of the Court disagreed. They argued the law placed a substantial burden on the Native American Church members so that it could be upheld only if the law served a compelling state interest and was narrowly tailored to achieve that end. *Id.*, at 894. JUSTICE O'CONNOR concluded Oregon had satisfied the test, while Justice Blackmun, joined by Justice Brennan and Justice Marshall, could see no compelling interest justifying the law's application to the members.

[\*515] These points of constitutional interpretation were debated by Members of Congress in hearings and floor debates. Many criticized the Court's reasoning, and this disagreement resulted in the passage of RFRA.

Congress announced:

"(1) The framers of the Constitution, recognizing free exercise of religion as an unalienable right, secured its protection in the *First Amendment to the Constitution*;

"(2) laws 'neutral' toward religion may burden religious exercise as surely as laws intended to interfere with religious exercise; [\*\*2162]

"(3) governments should not substantially burden religious exercise without compelling justification;

"(4) in *Employment Division v. Smith*, 494 U.S. 872, 108 L. Ed. 2d 876, 110 S. Ct. 1595 (1990), the Supreme Court virtually eliminated the requirement that the government justify burdens on religious exercise imposed by laws neutral toward religion; and

"(5) the compelling interest test as set forth in prior Federal court rulings is a workable test for striking sensible balances between religious liberty and competing prior governmental [\*\*\*636] interests." 42 U.S.C. § 2000bb(a).

The Act's stated purposes are:

"(1) to restore the compelling interest test as set forth in *Sherbert v. Verner*, 374 U.S. 398, 10 L. Ed. 2d 965, 83 S. Ct. 1790 (1963) and *Wisconsin v. Yoder*, 406 U.S. 205, 32 L. Ed. 2d 15, 92 S. Ct. 1526 (1972) and to guarantee its application in all cases where free exercise of religion is substantially burdened; and

"(2) to provide a claim or defense to persons whose religious exercise is substantially burdened by government." § 2000bb(b).

RFRA prohibits "government" from "substantially burdening" a person's exercise of religion even if the burden results from a rule of general applicability unless the government can demonstrate the burden "(1) is in furtherance of [\*516] a compelling governmental interest; and (2) is the least restrictive means of furthering that compelling governmental interest." § 2000bb-1. The Act's mandate applies to any "branch, department,

agency, instrumentality, and official (or other person acting under color of law) of the United States," as well as to any "State, or . . . subdivision of a State." § 2000bb-2(1). The Act's universal coverage is confirmed in § 2000bb-3(a), under which RFRA "applies to all Federal and State law, and the implementation of that law, whether statutory or otherwise, and whether adopted before or after [RFRA's enactment]." In accordance with RFRA's usage of the term, we shall use "state law" to include local and municipal ordinances.

III

A

[3][4]Under our Constitution, the Federal Government is one of enumerated powers. [McCulloch v. Maryland](#), 17 U.S. 316, 4 Wheat. 316, 405, 4 L. Ed. 579 (1819); see also The Federalist No. 45, p. 292 (C. Rossiter ed. 1961) (J. Madison). The judicial authority to determine the constitutionality of laws, in cases and controversies, is based on the premise that the "powers of the legislature are defined and limited; and that those limits may not be mistaken, or forgotten, the constitution is written." [Marbury v. Madison](#), 5 U.S. 137, 1 Cranch 137, 176, 2 L. Ed. 60 (1803). [1B]Congress relied on its *Fourteenth Amendment* enforcement power in enacting the most far reaching and substantial of RFRA's provisions, those which impose its requirements on the States. See Religious Freedom Restoration Act of 1993, S. Rep. No. 103-111, pp. 13-14 (1993) (Senate Report); H. R. Rep. No. 103-88, p. 9 (1993) (House Report). The *Fourteenth Amendment* provides, in relevant part:

"Section 1. . . . No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process [\*517] of law; nor deny to any person within its jurisdiction the equal protection of the laws.

. . . .

"Section 5. The Congress shall have power to enforce, by appropriate

legislation, the provisions of this article."

[\*\*\*637] The parties disagree over whether RFRA is a proper exercise of Congress' § 5 power "to enforce" by "appropriate legislation" the constitutional guarantee that no State shall deprive any person of "life, liberty, or property, without due process of law" nor deny any person "equal protection of the laws."

In defense of the Act respondent contends, with support from the United States as *amicus*, that RFRA is permissible enforcement [\*\*2163] legislation. Congress, it is said, is only protecting by legislation one of the liberties guaranteed by the *Fourteenth Amendment's Due Process Clause*, the free exercise of religion, beyond what is necessary under *Smith*. It is said the congressional decision to dispense with proof of deliberate or overt discrimination and instead concentrate on a law's effects accords with the settled understanding that § 5 includes the power to enact legislation designed to prevent as well as remedy constitutional violations. It is further contended that Congress' § 5 power is not limited to remedial or preventive legislation. [5][6]All must acknowledge that § 5 is "a positive grant of legislative power" to Congress, [Katzenbach v. Morgan](#), 384 U.S. 641, 651, 16 L. Ed. 2d 828, 86 S. Ct. 1717 (1966). In [Ex parte Virginia](#), 100 U.S. 339, 345-346, 25 L. Ed. 676 (1880), we explained the scope of Congress' § 5 power in the following broad terms:

"Whatever legislation is appropriate, that is, adapted to carry out the objects the amendments have in view, whatever tends to enforce submission to the prohibitions they contain, and to secure to all persons the enjoyment of perfect equality of civil rights and the equal protection of the laws against State denial or invasion, if not [\*518] prohibited, is brought within the domain of congressional power."

Legislation which deters or remedies constitutional violations can fall within the sweep of Congress' enforcement power even if in the process it prohibits conduct which is not itself unconstitutional and intrudes into

"legislative spheres of autonomy previously reserved to the States." *Fitzpatrick v. Bitzer*, 427 U.S. 445, 455, 49 L. Ed. 2d 614, 96 S. Ct. 2666 (1976). For example, the Court upheld a suspension of literacy tests and similar voting requirements under Congress' parallel power to enforce the provisions of the *Fifteenth Amendment*, see *U.S. Const., Amdt. 15, § 2*, as a measure to combat racial discrimination in voting, *South Carolina v. Katzenbach*, 383 U.S. 301, 308, 15 L. Ed. 2d 769, 86 S. Ct. 803 (1966), despite the facial constitutionality of the tests under *Lassiter v. Northampton County Bd. of Elections*, 360 U.S. 45, 3 L. Ed. 2d 1072, 79 S. Ct. 985 (1959). We have also concluded that other measures protecting voting rights are within Congress' power to enforce the *Fourteenth* and *Fifteenth Amendments*, despite the burdens those measures placed on the States. *South Carolina v. Katzenbach*, *supra* (upholding several provisions of the Voting Rights Act of 1965); *Katzenbach v. Morgan*, *supra* (upholding ban on literacy tests that prohibited certain people schooled in Puerto Rico from voting); *Oregon v. Mitchell*, 400 U.S. 112, 27 L. Ed. 2d 272, 91 S. Ct. 260 (1970) (upholding 5-year nationwide ban on literacy tests and similar voting requirements for registering to vote); *City of Rome v. United States*, 446 U.S. 156, 161, 64 L. Ed. 2d 119, 100 S. Ct. 1548 [\*\*\*638] (1980) (upholding 7-year extension of the Voting Rights Act's requirement that certain jurisdictions preclear any change to a "standard, practice, or procedure with respect to voting"); see also *James Everard's Breweries v. Day*, 265 U.S. 545, 68 L. Ed. 1174, 44 S. Ct. 628 (1924) (upholding ban on medical prescription of intoxicating malt liquors as appropriate to enforce *Eighteenth Amendment* ban on manufacture, sale, or transportation of intoxicating liquors for beverage purposes). [7][8]It is also true, however, that "as broad as the congressional enforcement power is, it is not unlimited." *Oregon v. Mitchell*, *supra*, at 128 (opinion of Black, J.). In assessing the breadth of § 5's enforcement power, we begin with its text. Congress has been given the power "to enforce" the "provisions of this article." We agree with respondent, of course, that Congress can enact legislation under § 5 enforcing the constitutional right to the free

exercise of religion. The "provisions of this article," to which § 5 refers, include the *Due Process Clause of the Fourteenth Amendment*. Congress' power to enforce the *Free Exercise Clause* follows from our holding in *Cantwell v. Connecticut*, 310 U.S. 296, 303, 84 L. Ed. 1213, 60 S. Ct. 900 (1940), that the "fundamental concept of liberty embodied in [the *Fourteenth Amendment's Due Process Clause*] embraces the liberties guaranteed by the *First Amendment*." See also *United States v. Price*, 383 U.S. 787, 789, 16 L. Ed. 2d 267, 86 S. Ct. 1152 (1966) (there is "no doubt of the power of Congress to enforce by appropriate criminal sanction every right guaranteed by the *Due Process Clause of the Fourteenth Amendment*") (internal quotation marks and citation omitted). [9A][10]Congress' power under § 5, however, extends only to "enforcing" the provisions of the *Fourteenth Amendment*. The Court has described this power as "remedial," *South Carolina v. Katzenbach*, *supra*, at 326. The design of the Amendment and the text of § 5 are inconsistent with the suggestion that Congress has the power to decree the substance of the *Fourteenth Amendment's* restrictions on the States. Legislation which alters the meaning of the *Free Exercise Clause* cannot be said to be enforcing the Clause. Congress does not enforce a constitutional right by changing what the right is. It has been given the power "to enforce," not the power to determine what constitutes a constitutional violation. Were it not so, what Congress would be enforcing would no longer be, in any meaningful sense, the "provisions of [the *Fourteenth Amendment*]."

[9B] [11A]While the line between measures that remedy or prevent unconstitutional actions and measures that make a substantive change in the governing law is not easy to discern, and [\*520] Congress must have wide latitude in determining where it lies, the distinction exists and must be observed. There must be a congruence and proportionality between the injury to be prevented or remedied and the means adopted to that end. Lacking such a connection, legislation may become substantive in operation and effect. History and our case law support drawing the distinction,

one apparent from the text of the Amendment.

1

[9C] [\*\*\*639] The *Fourteenth Amendment's* history confirms the remedial, rather than substantive, nature of the Enforcement Clause. The Joint Committee on Reconstruction of the 39th Congress began drafting what would become the *Fourteenth Amendment* in January 1866. The objections to the Committee's first draft of the Amendment, and the rejection of the draft, have a direct bearing on the central issue of defining Congress' enforcement power. In February, Republican Representative John Bingham of Ohio reported the following draft amendment to the House of Representatives on behalf of the Joint Committee:

"The Congress shall have power to make all laws which shall be necessary and proper to secure to the citizens of each State all privileges and immunities of citizens in the several States, and to all persons in the several States equal protection in the rights of life, liberty, and property." Cong. Globe, 39th Cong., 1st Sess., 1034 (1866).

The proposal encountered immediate opposition, which continued through three days of debate. Members of Congress from across the political spectrum criticized the Amendment, and the criticisms had a common theme: The proposed Amendment gave Congress too much legislative power at the expense of the existing constitutional structure. *E.g.*, *id.*, at 1063-1065 (statement of Rep. Hale); *id.*, at 1082 [\*521] (statement of Sen. Stewart); *id.*, at 1095 (statement of Rep. Hotchkiss); *id.*, at App. 133-135 (statement of Rep. Rogers). Democrats and conservative Republicans argued that the proposed Amendment would give Congress a power to intrude into traditional areas of state responsibility, a power inconsistent with the federal design central to the Constitution. Typifying these views, Republican Representative Robert Hale of New York labeled the Amendment "an utter departure from every principle ever dreamed of by the men who framed our Constitution," *id.*, at 1063, and warned that under it "all State legislation, in its codes of civil and criminal jurisprudence and procedures . . . may be

overridden, may be repealed or abolished, and the law of Congress established instead." *Ibid.* Senator William Stewart of Nevada likewise stated the Amendment would permit "Congress to legislate fully upon all subjects affecting life, liberty, and property," such that "there would not be much left for the State Legislatures," and would thereby "work an entire change in our form of government." *Id.*, at 1082; accord, *id.*, at 1087 (statement of Rep. [\*\*2165] Davis); *id.*, at App. 133 (statement of Rep. Rogers). Some radicals, like their brethren "unwilling that Congress shall have any such power . . . to establish uniform laws throughout the United States upon . . . the protection of life, liberty, and property," *id.*, at 1095 (statement of Rep. Hotchkiss), also objected that giving Congress primary responsibility for enforcing legal equality would place power in the hands of changing congressional majorities. *Ibid.* See generally Bickel, *The Original Understanding and the Segregation Decision*, 69 Harv. L. Rev. 1, 57 (1955); Graham, *Our "Declaratory" Fourteenth Amendment*, 7 Stan. L. Rev. 3, 21 (1954).

As a result of these objections having been expressed from so many different quarters, the House voted to [\*\*\*640] table the proposal until April. See *e.g.*, B. Kendrick, *Journal of the Joint Committee of Fifteen on Reconstruction* 215, 217 (1914); Cong. Globe, 42d Cong., 1st Sess., App. 115 (1871) (statement [\*522] of Rep. Farnsworth). The congressional action was seen as marking the defeat of the proposal. See *The Nation*, Mar. 8, 1866, p. 291 ("The postponement of the amendment . . . is conclusive against the passage of [it]"); *New York Times*, Mar. 1, 1866, p. 4 ("It is doubtful if this ever comes before the House again . . ."); see also Cong. Globe, 42d Cong., 1st Sess., App., at 115 (statement of Rep. Farnsworth) (The Amendment was "given its quietus by a postponement for two months, where it slept the sleep that knows no waking"). The measure was defeated "chiefly because many members of the legal profession saw in [it] . . . a dangerous centralization of power," *The Nation*, *supra*, at 291, and "many leading Republicans of the House [of Representatives] would not consent to so radical a change in the Constitution," Cong. Globe, 42d Cong., 1st Sess., App., at

151 (statement of Rep. Garfield). The Amendment in its early form was not again considered. Instead, the Joint Committee began drafting a new article of Amendment, which it reported to Congress on April 30, 1866.

Section 1 of the new draft Amendment imposed self-executing limits on the States. Section 5 prescribed that "the Congress shall have power to enforce, by appropriate legislation, the provisions of this article." See Cong. Globe, 39th Cong., 1st Sess., at 2286. Under the revised Amendment, Congress' power was no longer plenary but remedial. Congress was granted the power to make the substantive constitutional prohibitions against the States effective. Representative Bingham said the new draft would give Congress "the power . . . to protect by national law the privileges and immunities of all the citizens of the Republic . . . whenever the same shall be abridged or denied by the unconstitutional acts of any State." *Id.*, at 2542. Representative Stevens described the new draft Amendment as "allowing Congress to correct the unjust legislation of the States." *Id.*, at 2459. See also *id.*, at 2768 (statement of Sen. Howard) ( § 5 "enables Congress, in case the States shall enact [\*523] laws in conflict with the principles of the amendment, to correct that legislation by a formal congressional enactment"). See generally H. Brannon, *The Rights and Privileges Guaranteed by the Fourteenth Amendment to the Constitution of the United States* 387 (1901) (Congress' "powers are only prohibitive, corrective, vetoing, aimed only at undue process of law"); *id.*, at 420, 452-455 (same); T. Cooley, *Constitutional Limitations* 294, n.1 (2d ed. 1871) ("This amendment of the Constitution does not concentrate power in the general government for any purpose of police government within the States; its object is to preclude legislation by any State which shall 'abridge the privileges or immunities of citizens of the United States'"). The revised Amendment proposal did not raise the concerns expressed earlier regarding broad congressional power to prescribe uniform national laws with respect to life, liberty, and property. See, e.g., Cong. Globe, 42d Cong., 1st Sess., at App. 151 (statement of Rep. Garfield) ("The [*Fourteenth Amendment*] limited but did not oust the

jurisdiction of the [\*\*\*641] States"). After revisions not relevant here, the new measure passed both Houses and was ratified in July 1868 as the *Fourteenth Amendment*.

The significance of the defeat of the Bingham proposal was apparent even then. During the debates over the Ku Klux Klan Act only a few years after the Amendment's ratification, [\*\*2166] Representative James Garfield argued there were limits on Congress' enforcement power, saying "unless we ignore both the history and the language of these clauses we cannot, by any reasonable interpretation, give to [ § 5] . . . the force and effect of the rejected [Bingham] clause." Cong. Globe, 42d Cong., 1st Sess., at App. 151; see also *id.*, at App. 115-116 (statement of Rep. Farnsworth). Scholars of successive generations have agreed with this assessment. See H. Flack, *The Adoption of the Fourteenth Amendment* 64 (1908); Bickel, *The Voting Rights Cases*, 1966 Sup. Ct. Rev. 79, 97.

[9D][12]The design of the *Fourteenth Amendment* has proved significant also in maintaining the traditional separation of powers [\*524] between Congress and the Judiciary. The first eight Amendments to the Constitution set forth self-executing prohibitions on governmental action, and this Court has had primary authority to interpret those prohibitions. The Bingham draft, some thought, departed from that tradition by vesting in Congress primary power to interpret and elaborate on the meaning of the new Amendment through legislation. Under it, "Congress, and not the courts, was to judge whether or not any of the privileges or immunities were not secured to citizens in the several States." Flack, *supra*, at 64. While this separation of powers aspect did not occasion the widespread resistance which was caused by the proposal's threat to the federal balance, it nonetheless attracted the attention of various Members. See Cong. Globe, 39th Cong., 1st Sess., at 1064 (statement of Rep. Hale) (noting that *Bill of Rights*, unlike the Bingham proposal, "provide safeguards to be enforced by the courts, and not to be exercised by the Legislature"); *id.*, at App. 133 (statement of Rep. Rogers) (prior to Bingham proposal it "was left entirely for the courts . . . to enforce the privileges and

immunities of the citizens"). As enacted, the *Fourteenth Amendment* confers substantive rights against the States which, like the provisions of the *Bill of Rights*, are self-executing. Cf. *South Carolina v. Katzenbach*, 383 U.S. at 325 (discussing *Fifteenth Amendment*). The power to interpret the Constitution in a case or controversy remains in the Judiciary.

2 [9E]The remedial and preventive nature of Congress' enforcement power, and the limitation inherent in the power, were confirmed in our earliest cases on the *Fourteenth Amendment*. In the *Civil Rights Cases*, 109 U.S. 3, 27 L. Ed. 835, 3 S. Ct. 18 (1883), the Court invalidated sections of the Civil Rights Act of 1875 which prescribed criminal penalties for denying to any person "the full enjoyment of" public accommodations and conveyances, on the grounds that it exceeded Congress' power [\*525] by seeking to regulate private conduct. The Enforcement Clause, the Court said, did not authorize Congress to pass "general legislation upon the rights of the citizen, but corrective legislation; that is, such as may be necessary and proper for [\*\*\*642] counteracting such laws as the States may adopt or enforce, and which, by the amendment, they are prohibited from making or enforcing . . . ." *Id.*, at 13-14. The power to "legislate generally upon" life, liberty, and property, as opposed to the "power to provide modes of redress" against offensive state action, was "repugnant" to the Constitution. *Id.*, at 15. See also *United States v. Reese*, 92 U.S. 214, 218, 23 L. Ed. 563 (1876); *United States v. Harris*, 106 U.S. 629, 639, 27 L. Ed. 290, 1 S. Ct. 601 (1883); *James v. Bowman*, 190 U.S. 127, 139, 47 L. Ed. 979, 23 S. Ct. 678 (1903). Although the specific holdings of these early cases might have been superseded or modified, see, e.g., *Heart of Atlanta Motel, Inc. v. United States*, 379 U.S. 241, 13 L. Ed. 2d 258, 85 S. Ct. 348 (1964); *United States v. Guest*, 383 U.S. 745, 16 L. Ed. 2d 239, 86 S. Ct. 1170 (1966), their treatment of Congress' § 5 power as corrective or preventive, not definitional, has not been questioned.

Recent cases have continued to revolve around the question of whether § 5 legislation can be

considered remedial. In *South Carolina v. Katzenbach*, *supra*, we emphasized that "the constitutional propriety of [legislation adopted under the Enforcement Clause] must be judged with reference to the historical experience . . . it reflects." 383 U.S. [\*\*2167] at 308. There we upheld various provisions of the Voting Rights Act of 1965, finding them to be "remedies aimed at areas where voting discrimination has been most flagrant," *id.*, at 315, and necessary to "banish the blight of racial discrimination in voting, which has infected the electoral process in parts of our country for nearly a century," *id.*, at 308. We noted evidence in the record reflecting the subsisting and pervasive discriminatory--and therefore unconstitutional--use of literacy tests. *Id.*, at 333-334. The Act's new remedies, which used the administrative resources of the Federal Government, included the suspension of both literacy tests and, [\*526] pending federal review, all new voting regulations in covered jurisdictions, as well as the assignment of federal examiners to list qualified applicants enabling those listed to vote. The new, unprecedented remedies were deemed necessary given the ineffectiveness of the existing voting rights laws, see *id.*, at 313-315, and the slow costly character of case-by-case litigation, *id.*, at 328.

After *South Carolina v. Katzenbach*, the Court continued to acknowledge the necessity of using strong remedial and preventive measures to respond to the widespread and persisting deprivation of constitutional rights resulting from this country's history of racial discrimination. See *Oregon v. Mitchell*, 400 U.S. at 132 ("In enacting the literacy test ban . . . Congress had before it a long history of the discriminatory use of literacy tests to disfranchise voters on account of their race") (opinion of Black, J.); *id.*, at 147 (Literacy tests "have been used at times as a discriminatory weapon against some minorities, not only Negroes but Americans of Mexican ancestry, and American Indians") (opinion of Douglas, J.); *id.*, at 216 ("Congress could have [\*\*\*643] determined that racial prejudice is prevalent throughout the Nation, and that literacy tests unduly lend themselves to discriminatory application, either conscious or unconscious") (opinion of Harlan, J.); *id.*, at

235 ("There is no question but that Congress could legitimately have concluded that the use of literacy tests anywhere within the United States has the inevitable effect of denying the vote to members of racial minorities whose inability to pass such tests is the direct consequence of previous governmental discrimination in education") (opinion of Brennan, J.); *id.*, at 284 ("Nationwide [suspension of literacy tests] may be reasonably thought appropriate when Congress acts against an evil such as racial discrimination which in varying degrees manifests itself in every part of the country") (opinion of Stewart, J.); *City of Rome*, 446 U.S. at 182 ("Congress' considered determination that at least another 7 years of statutory remedies were necessary to counter the [\*527] perpetuation of 95 years of pervasive voting discrimination is both unsurprising and unassailable"); *Morgan*, 384 U.S. at 656 (Congress had a factual basis to conclude that New York's literacy requirement "constituted an invidious discrimination in violation of the Equal Protection Clause").

3 Any suggestion that Congress has a substantive, non-remedial power under the Fourteenth Amendment is not supported by our case law. In *Oregon v. Mitchell*, *supra*, at 112, a majority of the Court concluded Congress had exceeded its enforcement powers by enacting legislation lowering the minimum age of voters from 21 to 18 in state and local elections. The five Members of the Court who reached this conclusion explained that the legislation intruded into an area reserved by the Constitution to the States. See 400 U.S. at 125 (concluding that the legislation was unconstitutional because the Constitution "reserves to the States the power to set voter qualifications in state and local elections") (opinion of Black, J.); *id.*, at 154 (explaining that the "Fourteenth Amendment was never intended to restrict the authority of the States to allocate their political power as they see fit") (opinion of Harlan, J.); *id.*, at 294 (concluding that States, not Congress, have the power "to establish a qualification for voting based on age") (opinion of Stewart, J., joined by Burger, C. J., and Blackmun, J.). Four of these [\*\*2168] five were explicit in rejecting the position that § 5 endowed Congress with the power to

establish the meaning of constitutional provisions. See *id.*, at 209 (opinion of Harlan, J.); *id.*, at 296 (opinion of Stewart, J.). Justice Black's rejection of this position might be inferred from his disagreement with Congress' interpretation of the Equal Protection Clause. See *id.*, at 125.

There is language in our opinion in *Katzenbach v. Morgan*, 384 U.S. 641, 16 L. Ed. 2d 828, 86 S. Ct. 1717 (1966), which could be interpreted as acknowledging a power in Congress to enact legislation that expands [\*528] the rights contained in § 1 of the Fourteenth [\*\*\*644] Amendment. This is not a necessary interpretation, however, or even the best one. In *Morgan*, the Court considered the constitutionality of § 4(e) of the Voting Rights Act of 1965, which provided that no person who had successfully completed the sixth primary grade in a public school in, or a private school accredited by, the Commonwealth of Puerto Rico in which the language of instruction was other than English could be denied the right to vote because of an inability to read or write English. New York's Constitution, on the other hand, required voters to be able to read and write English. The Court provided two related rationales for its conclusion that § 4(e) could "be viewed as a measure to secure for the Puerto Rican community residing in New York nondiscriminatory treatment by government." *Id.*, at 652. Under the first rationale, Congress could prohibit New York from denying the right to vote to large segments of its Puerto Rican community, in order to give Puerto Ricans "enhanced political power" that would be "helpful in gaining nondiscriminatory treatment in public services for the entire Puerto Rican community." *Ibid.* Section 4(e) thus could be justified as a remedial measure to deal with "discrimination in governmental services." *Id.*, at 653. The second rationale, an alternative holding, did not address discrimination in the provision of public services but "discrimination in establishing voter qualifications." *Id.*, at 654. The Court perceived a factual basis on which Congress could have concluded that New York's literacy requirement "constituted an invidious discrimination in violation of the Equal Protection Clause." *Id.*, at 656. Both rationales for upholding § 4(e) rested on unconstitutional

discrimination by New York and Congress' reasonable attempt to combat it. As Justice Stewart explained in [Oregon v. Mitchell, supra, at 296](#), interpreting *Morgan* to give Congress the power to interpret the Constitution "would require an enormous extension of that decision's rationale." [\*529] [9F]If Congress could define its own powers by altering the *Fourteenth Amendment's* meaning, no longer would the Constitution be "superior paramount law, unchangeable by ordinary means." It would be "on a level with ordinary legislative acts, and, like other acts, . . . alterable when the legislature shall please to alter it." [Marbury v. Madison, 1 Cranch at 177](#). Under this approach, it is difficult to conceive of a principle that would limit congressional power. See Van Alstyne, *The Failure of the Religious Freedom Restoration Act under Section 5 of the Fourteenth Amendment*, [46 Duke L. J. 291, 292-303 \(1996\)](#). Shifting legislative majorities could change the Constitution and effectively circumvent the difficult and detailed amendment process contained in Article V.

We now turn to consider whether RFRA can be considered enforcement legislation under [§ 5 of the Fourteenth Amendment](#).

## B

Respondent contends that RFRA is a proper exercise of Congress' remedial or preventive power. The Act, it is said, is a reasonable means of protecting the free exercise of religion [\*\*\*645] as defined by *Smith*. It prevents and remedies laws which are enacted with the unconstitutional object of targeting religious beliefs and practices. See [Church of the Lukumi Babalu Aye, Inc. v. Hialeah, 508 U.S. 520, 533, 124 L. Ed. 2d 472, 113 S. Ct. 2217 \(1993\)](#) ("[A] law targeting religious beliefs as such is never permissible"). To avoid the difficulty of proving such violations, it is said, Congress can simply invalidate any law which imposes a substantial [\*\*2169] burden on a religious practice unless it is justified by a compelling interest and is the least restrictive means of accomplishing that interest. If Congress can prohibit laws with discriminatory effects in order to prevent racial discrimination in violation of the *Equal Protection Clause*, see [Fullilove v. Klutznick, 448 U.S. 448, 477, 65 L. Ed. 2d 902, 100 S. Ct.](#)

[2758 \(1980\)](#) (plurality opinion); [City of Rome, 446 U.S. at 177](#), then it can do the same, respondent argues, to promote religious liberty.

[\*530] [11B]While preventive rules are sometimes appropriate remedial measures, there must be a congruence between the means used and the ends to be achieved. The appropriateness of remedial measures must be considered in light of the evil presented. See [South Carolina v. Katzenbach, 383 U.S. at 308](#). Strong measures appropriate to address one harm may be an unwarranted response to another, lesser one. [Id., at 334](#). [1C][13]A comparison between RFRA and the Voting Rights Act is instructive. In contrast to the record which confronted Congress and the judiciary in the voting rights cases, RFRA's legislative record lacks examples of modern instances of generally applicable laws passed because of religious bigotry. The history of persecution in this country detailed in the hearings mentions no episodes occurring in the past 40 years. See, e.g., Religious Freedom Restoration Act of 1991, Hearings on H. R. 2797 before the Subcommittee on Civil and Constitutional Rights of the House Committee on the Judiciary, 102d Cong., 2d Sess., 331-334 (1993) (statement of Douglas Laycock) (House Hearings); The Religious Freedom Restoration Act, Hearing on S. 2969 before the Senate Committee on the Judiciary, 102d Cong., 2d Sess., 30-31 (1993) (statement of Dallin H. Oaks) (Senate Hearing); Senate Hearing 68-76 (statement of Douglas Laycock); Religious Freedom Restoration Act of 1990, Hearing on H. R. 5377 before the Subcommittee on Civil and Constitutional Rights of the House Committee on the Judiciary, 101st Cong., 2d Sess., 49 (1991) (statement of John H. Buchanan, Jr.) (1990 House Hearing). The absence of more recent episodes stems from the fact that, as one witness testified, "deliberate persecution is not the usual problem in this country." House Hearings 334 (statement of Douglas Laycock). See also House Report 2 ("Laws directly targeting religious practices have become increasingly rare"). Rather, the emphasis of the hearings was on laws of general applicability which place incidental burdens on religion. Much of the discussion centered [\*531] upon anecdotal evidence of autopsies performed on Jewish individuals and

Hmong immigrants in violation of their religious beliefs, see, e.g., House Hearings 81 (statement of Nadine Strossen); *id.*, at 107-110 (statement of William Yang); *id.*, at 118 (statement [\*\*\*646] of Rep. Stephen J. Solarz); *id.*, at 336 (statement of Douglas Laycock); Senate Hearing 5-6, 14-26 (statement of William Yang); *id.*, at 27-28 (statement of Hmong-Lao Unity Assn., Inc.); *id.*, at 50 (statement of Baptist Joint Committee); see also Senate Report 8; House Report 5-6, and n.14, and on zoning regulations and historic preservation laws (like the one at issue here), which as an incident of their normal operation, have adverse effects on churches and synagogues. See, e.g. House Hearings 17, 57 (statement of Robert P. Dugan, Jr.); *id.*, at 81 (statement of Nadine Strossen); *id.*, at 122-123 (statement of Rep. Stephen J. Solarz); *id.*, at 157 (statement of Edward M. Gaffney, Jr.); *id.*, at 327 (statement of Douglas Laycock); Senate Hearing 143-144 (statement of Forest D. Montgomery); 1990 House Hearing 39 (statement of Robert P. Dugan, Jr.); see also Senate Report 8; House Report 5-6, and n.14. It is difficult to maintain that they are examples of legislation enacted or enforced due to animus or hostility to the burdened religious practices or that they indicate some widespread pattern of religious discrimination in this country. Congress' concern was with the incidental burdens imposed, not the object or purpose of the legislation. See House Report 2; Senate Report 4-5; House Hearings 64 (statement of Nadine Strossen); *id.*, at 117-118 (statement of Rep. Stephen J. Solarz); 1990 House Hearing at 14 (statement of Rep. Stephen J. Solarz). This lack of support in the legislative record, however, is not RFRA's most serious shortcoming. [\*\*2170] Judicial deference, in most cases, is based not on the state of the legislative record Congress compiles but "on due regard for the decision of the body constitutionally appointed to decide." *Oregon v. Mitchell*, 400 U.S. at 207 (opinion of Harlan, J.). As a general [\*532] matter, it is for Congress to determine the method by which it will reach a decision.

[1D] [11C] Regardless of the state of the legislative record, RFRA cannot be considered remedial, preventive legislation, if those terms

are to have any meaning. RFRA is so out of proportion to a supposed remedial or preventive object that it cannot be understood as responsive to, or designed to prevent, unconstitutional behavior. It appears, instead, to attempt a substantive change in constitutional protections. Preventive measures prohibiting certain types of laws may be appropriate when there is reason to believe that many of the laws affected by the congressional enactment have a significant likelihood of being unconstitutional. See *City of Rome*, 446 U.S. at 177 (since "jurisdictions with a demonstrable history of intentional racial discrimination . . . create the risk of purposeful discrimination" Congress could "prohibit changes that have a discriminatory impact" in those jurisdictions). Remedial legislation under § 5 "should be adapted to the mischief and wrong which the [Fourteenth] Amendment was intended to provide against." *Civil Rights Cases*, 109 U.S. at 13. [1E] RFRA is not so confined. Sweeping coverage ensures its intrusion at every level of government, displacing laws and prohibiting official actions of almost every description and regardless of subject matter. RFRA's restrictions apply to every agency and official of the Federal, State, and local Governments. [\*\*\*647] 42 U.S.C. § 2000bb-2(1). RFRA applies to all federal and state law, statutory or otherwise, whether adopted before or after its enactment. § 2000bb-3(a). RFRA has no termination date or termination mechanism. Any law is subject to challenge at any time by any individual who alleges a substantial burden on his or her free exercise of religion. [14] The reach and scope of RFRA distinguish it from other measures passed under Congress' enforcement power, even in the area of voting rights. In *South Carolina v. Katzenbach*, the challenged provisions were confined to those regions [\*533] of the country where voting discrimination had been most flagrant, see 383 U.S. at 315, and affected a discrete class of state laws, *i.e.*, state voting laws. Furthermore, to ensure that the reach of the Voting Rights Act was limited to those cases in which constitutional violations were most likely (in order to reduce the possibility of overbreadth), the coverage under the Act would terminate "at the behest of States and political subdivisions

in which the danger of substantial voting discrimination has not materialized during the preceding five years." *Id.*, at 331. The provisions restricting and banning literacy tests, upheld in *Katzenbach v. Morgan*, 384 U.S. 641, 16 L. Ed. 2d 828, 86 S. Ct. 1717 (1966), and *Oregon v. Mitchell*, 400 U.S. 112, 27 L. Ed. 2d 272, 91 S. Ct. 260 (1970), attacked a particular type of voting qualification, one with a long history as a "notorious means to deny and abridge voting rights on racial grounds." *South Carolina v. Katzenbach*, 383 U.S. at 355 (Black, J., concurring and dissenting). In *City of Rome*, 446 U.S. 156, 64 L. Ed. 2d 119, 100 S. Ct. 1548, the Court rejected a challenge to the constitutionality of a Voting Rights Act provision which required certain jurisdictions to submit changes in electoral practices to the Department of Justice for preimplementation review. The requirement was placed only on jurisdictions with a history of intentional racial discrimination in voting. *Id.*, at 177. Like the provisions at issue in *South Carolina v. Katzenbach*, this provision permitted a covered jurisdiction to avoid preclearance requirements under certain conditions and, moreover, lapsed in seven years. This is not to say, of course, that § 5 legislation requires termination dates, geographic restrictions or egregious predicates. Where, however, a congressional enactment pervasively prohibits constitutional state action in an effort to remedy or to prevent unconstitutional state action, limitations of this kind tend to ensure Congress' [\*\*2171] means are proportionate to ends legitimate under § 5.

[1F] [15]The stringent test RFRA demands of state laws reflects a lack of proportionality or congruence between the means adopted and the legitimate end to be achieved. If an objector can show a substantial burden on his free exercise, the [\*534] State must demonstrate a compelling governmental interest and show that the law is the least restrictive means of furthering its interest. Claims that a law substantially burdens someone's exercise of religion will often be difficult to contest. See *Smith*, 494 U.S. at 887 ("What principle of law or logic can be brought to bear to contradict a believer's assertion that a [\*\*\*648] particular act is 'central' to his personal faith?"); *id.*, at 907 ("The distinction between questions of centrality

and questions of sincerity and burden is admittedly fine . . .") (O'CONNOR, J., concurring in judgment). Requiring a State to demonstrate a compelling interest and show that it has adopted the least restrictive means of achieving that interest is the most demanding test known to constitutional law. If "compelling interest" really means what it says . . . many laws will not meet the test. . . . [The test] would open the prospect of constitutionally required religious exemptions from civic obligations of almost every conceivable kind." *Id.*, at 888. Laws valid under *Smith* would fall under RFRA without regard to whether they had the object of stifling or punishing free exercise. We make these observations not to reargue the position of the majority in *Smith* but to illustrate the substantive alteration of its holding attempted by RFRA. Even assuming RFRA would be interpreted in effect to mandate some lesser test, say one equivalent to intermediate scrutiny, the statute nevertheless would require searching judicial scrutiny of state law with the attendant likelihood of invalidation. This is a considerable congressional intrusion into the States' traditional prerogatives and general authority to regulate for the health and welfare of their citizens.

[1G]The substantial costs RFRA exacts, both in practical terms of imposing a heavy litigation burden on the States and in terms of curtailing their traditional general regulatory power, far exceed any pattern or practice of unconstitutional conduct under the *Free Exercise Clause* as interpreted in *Smith*. Simply put, RFRA is not designed to identify and counteract state laws likely to be unconstitutional because of [\*535] their treatment of religion. In most cases, the state laws to which RFRA applies are not ones which will have been motivated by religious bigotry. If a state law disproportionately burdened a particular class of religious observers, this circumstance might be evidence of an impermissible legislative motive. Cf. *Washington v. Davis*, 426 U.S. 229, 241, 48 L. Ed. 2d 597, 96 S. Ct. 2040 (1976). RFRA's substantial burden test, however, is not even a discriminatory effects or disparate impact test. It is a reality of the modern regulatory state that numerous state laws, such as the zoning

regulations at issue here, impose a substantial burden on a large class of individuals. When the exercise of religion has been burdened in an incidental way by a law of general application, it does not follow that the persons affected have been burdened any more than other citizens, let alone burdened because of their religious beliefs. In addition, the Act imposes in every case a least restrictive means requirement--a requirement that was not used in the pre-*Smith* jurisprudence RFRA purported to codify--which also indicates that the legislation is broader than is appropriate if the goal is to prevent and remedy constitutional violations.

[16] [17]When Congress acts within its sphere of power and responsibilities, it has not just the right but the duty to make its own informed judgment on the meaning and force of the Constitution. This has been clear from the early days of the Republic. In 1789, when a Member of the [\*\*\*649] House of Representatives objected to a debate on the constitutionality of legislation based on the theory that "it would be officious" to consider the constitutionality of a measure that did not affect the House, James Madison explained that "it is incontrovertibly of as much importance to this branch of the Government as to any other, that the constitution should be preserved entire. It is our duty." 1 Annals of Congress 500 (1789). Were it otherwise, we [\*\*2172] would not afford Congress the presumption of validity its enactments now enjoy. [2B][18][19]Our national experience teaches that the Constitution is preserved best when each part of the government respects [\*536] both the Constitution and the proper actions and determinations of the other branches. When the Court has interpreted the Constitution, it has acted within the province of the Judicial Branch, which embraces the duty to say what the law is. *Marbury v. Madison*, 1 Cranch at 177. When the political branches of the Government act against the background of a judicial interpretation of the Constitution already issued, it must be understood that in later cases and controversies the Court will treat its precedents with the respect due them under settled principles, including *stare decisis*, and contrary expectations must be disappointed.

RFRA was designed to control cases and controversies, such as the one before us; but as the provisions of the federal statute here invoked are beyond congressional authority, it is this Court's precedent, not RFRA, which must control.

\*\*\* [1H][20]It is for Congress in the first instance to "determine whether and what legislation is needed to secure the guarantees of the *Fourteenth Amendment*," and its conclusions are entitled to much deference. *Katzenbach v. Morgan*, 384 U.S. at 651. Congress' discretion is not unlimited, however, and the courts retain the power, as they have since *Marbury v. Madison*, to determine if Congress has exceeded its authority under the Constitution. Broad as the power of Congress is under the Enforcement Clause of the *Fourteenth Amendment*, RFRA contradicts vital principles necessary to maintain separation of powers and the federal balance. The judgment of the Court of Appeals sustaining the Act's constitutionality is reversed.

*It is so ordered.*

**Concur by:** STEVENS; SCALIA (In Part)

## Concur

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JUSTICE STEVENS, concurring.

In my opinion, the Religious Freedom Restoration Act of 1993 (RFRA) is a "law respecting an establishment of religion" that violates the *First Amendment to the Constitution*.

[\*537] If the historic landmark on the hill in Boerne happened to be a museum or an art gallery owned by an atheist, it would not be eligible for an exemption from the city ordinances that forbid an enlargement of the structure. Because the landmark is owned by the Catholic Church, it is claimed that RFRA gives its owner a federal statutory entitlement to an exemption from a generally applicable, neutral civil law. Whether the Church would actually prevail under the statute or not, the statute has [\*\*\*650] provided the Church with a legal weapon that no atheist or agnostic can obtain. This governmental preference for religion, as opposed to irreligion, is forbidden by the *First Amendment*. *Wallace v. Jaffree*, 472 U.S. 38, 52-55, 86 L. Ed. 2d 29,

[105 S. Ct. 2479 \(1985\)](#).

JUSTICE SCALIA, with whom JUSTICE STEVENS joins, concurring in part.

I write to respond briefly to the claim of JUSTICE O'CONNOR's dissent (hereinafter "the dissent") that historical materials support a result contrary to the one reached in [Employment Div., Dept. of Human Resources of Ore. v. Smith, 494 U.S. 872, 108 L. Ed. 2d 876, 110 S. Ct. 1595 \(1990\)](#). See *post*, p. \_\_ (dissenting opinion). We held in *Smith* that the Constitution's Free Exercise Clause "does not relieve an individual of the obligation to comply with a 'valid and neutral law of general applicability on the ground that the law proscribes (or prescribes) conduct that his religion proscribes (or proscribes).'" [494 U.S. at 879](#) (quoting [United States v. Lee, 455 U.S. 252, 263, n.3, 71 L. Ed. 2d 127, 102 S. Ct. 1051 \(1982\)](#) (STEVENS, J., concurring in judgment)). The material that the dissent claims is at odds with *Smith* either has little to say about the issue or is in fact more consistent with *Smith* than with the dissent's interpretation of the Free Exercise Clause. The dissent's extravagant claim that the historical record shows *Smith* to have been wrong should be compared with the assessment of the most prominent scholarly critic of *Smith*, who, after an extensive review of the historical record, was willing to venture **[\*\*2173]** no more than that "constitutionally **[\*538]** compelled exemptions [from generally applicable laws regulating conduct] were *within the contemplation* of the framers and ratifiers as a *possible interpretation* of the *free exercise clause*." McConnell, The Origins and Historical Understanding of Free Exercise of Religion, [103 Harv. L. Rev. 1409, 1415 \(1990\)](#) (emphasis added); see also Hamburger, A Constitutional Right of Religious Exemption: An Historical Perspective, 60 Geo. Wash. Law Rev. 915 (1992) (arguing that historical evidence supports *Smith's* interpretation of free exercise).

The dissent first claims that *Smith's* interpretation of the Free Exercise Clause departs from the understanding reflected in various statutory and constitutional protections of religion enacted by Colonies, States, and Territories in the period leading up to the ratification of the Bill of Rights. *Post*, at 8-14. But the protections afforded by those enactments are in fact more consistent with *Smith's* interpretation of free exercise than with the dissent's understanding of it. The Free Exercise Clause, the dissent claims, "is best understood as an affirmative guarantee of the right to participate in religious practices

and conduct without impermissible governmental interference, even when such conduct conflicts with a neutral, generally applicable law"; thus, even neutral laws of general application may be invalid if they burden religiously motivated conduct. *Post*, at 3. However, the early "free exercise" enactments cited by the dissent protect only against action that is taken "for" or "in respect of" religion, *post*, at 8-11 (Maryland **[\*\*\*651]** Act **[\*539]** Concerning Religion of 1649, Rhode Island Charter of 1663, and New Hampshire Constitution); or action taken "on account of" religion, *post*, at 11-12 (Maryland Declaration of Rights of 1776 and Northwest Ordinance of 1787); or "discriminatory" action, *post*, at 10 (New York Constitution); or, finally (and unhelpfully for purposes of interpreting "free exercise" in the Federal Constitution), action that interferes with the "free exercise" of religion, *post*, at 8, 11 (Maryland Act Concerning Religion of 1649 and Georgia Constitution). It is eminently arguable that application of neutral, generally applicable laws of the sort the dissent refers to--such as zoning laws, *post*, at 4--would not constitute action taken "for," "in respect of," or "on account of" one's religion, or "discriminatory" action.

Assuming, however, that the affirmative protection of religion accorded by the early "free exercise" enactments sweeps as broadly as the dissent's theory would require, those enactments do not support the dissent's view, since they contain "provisos" that significantly qualify the affirmative protection they grant. According to the dissent, the "provisos" support *its* view because they would have been "superfluous" if "the Court was correct in *Smith* that generally applicable laws are enforceable regardless of religious conscience." *Post*, at 12. I disagree. In fact, the most plausible reading of the "free exercise" enactments (if their affirmative provisions are read broadly, as the dissent's view requires) is a virtual restatement of *Smith*: Religious exercise shall be permitted *so long as it does not violate general laws governing conduct*. The "provisos" in the enactments negate a license to act in a manner "unfaithful to the Lord Proprietary" (Maryland Act Concerning Religion of 1649), or "behave" in other than a "peaceable and quiet" manner (Rhode Island Charter of 1663), or "disturb the public peace" (New Hampshire Constitution), or interfere with the "peace [and] safety of the State" (New York, Maryland, and Georgia Constitutions), or "demean" oneself in other than a "peaceable and orderly manner" (Northwest Ordinance of 1787). See *post*, at 8-12. At the time these provisos were enacted, keeping "peace" and "order" seems to have meant, precisely, obeying the laws.

"Every breach of law is against the peace." *Queen v. Lane*, 6 Mod. 128, 87 Eng. Rep. 884, 885 (Q. B. 1704). Even as late as 1828, when Noah Webster published his American Dictionary of the English Language, he gave as one of the meanings of "peace": "8. Public [\*540] tranquility; that quiet, order and security which is guaranteed by the laws; as, to keep the *peace*; to break the *peace*." 2 An American Dictionary of the English Language 31 [\*\*2174] (1828).<sup>1</sup> This limitation upon the scope of religious exercise would have been in accord with the background political philosophy of the age (associated most prominently with John Locke), which regarded freedom as the right "to do only what was not lawfully prohibited," West, *The Case Against a Right to Religion-Based Exemptions*, 4 Notre [\*\*\*652] Dame J. of Law, Ethics & Public Policy 591, 624 (1990). "Thus, the disturb-the-peace caveats apparently permitted government to deny religious freedom, not merely in the event of violence or force, but, more generally, upon the occurrence of illegal actions." Hamburger, *supra*, at 918-919.<sup>2</sup> And while, under this interpretation, these early "free exercise" enactments support the Court's judgment in *Smith*, I see no sensible interpretation that could cause them to support what I understand to be the position of JUSTICE O'CONNOR, or any of *Smith*'s other critics. No one in that camp, to my knowledge, contends that their favored "compelling state interest" test conforms to any possible interpretation of "breach of peace and order"--*i.e.*, that *only* violence or force, or any other category of action (more limited than "violation of law") which can possibly be conveyed by the phrase "peace and order," justifies state prohibition of religiously motivated conduct.

[\*541] Apart from the early "free exercise" enactments of Colonies, States, and Territories, the dissent calls attention to those bodies', and the Continental Congress's, legislative accommodation of religious practices prior to ratification of the *Bill of Rights*. *Post*, at 14-17. This accommodation--which took place both before and after enactment of the state constitutional

protections of religious liberty--suggests (according to the dissent) that "the drafters and ratifiers of the *First Amendment* . . . assumed courts would apply the *Free Exercise Clause* similarly." *Post*, at 17. But that legislatures sometimes (though not always)<sup>3</sup> found it "appropriate," *ibid.*, to accommodate religious practices does not establish that accommodation was understood to be constitutionally *mandated* by the *Free Exercise Clause*. As we explained in *Smith*, "To say that a nondiscriminatory religious-practice exemption is permitted, or even that it is desirable, is not to say that it is constitutionally required." *494 U.S. at 890*. "Values that are protected against government interference through enshrinement in the *Bill of Rights* are not thereby banished from the political process." *Ibid.*

The dissent's final source of claimed historical support consists of statements of certain of the Framers in the context of debates about proposed legislative enactments or debates over general principles (not in connection with the drafting of State or Federal Constitutions). Those statements are subject to the same objection as was the evidence about [\*\*\*653] legislative accommodation: There is no reason to think they were meant to describe what was constitutionally required (and judicially enforceable), as opposed to what was thought to be legislatively or even morally desirable. Thus, for example, the pamphlet written by James Madison opposing Virginia's proposed general assessment for support of religion, [\*542] *post*, at 17-19, does not argue that the assessment would violate the "free exercise" provision in the Virginia Declaration of Rights, although that provision had been enacted into law only eight years earlier, *post*, at 14; rather the pamphlet argues that the assessment wrongly placed civil society ahead of personal religious belief and, thus, should not be approved [\*\*2175] by the legislators, *post*, at 18. Likewise, the letter from George Washington to the Quakers, *post*, at 20, by its own terms refers to Washington's "wish and desire" that religion be accommodated, not his belief that existing constitutional

<sup>1</sup> The word "licentious," used in several of the early enactments, likewise meant "exceeding the limits of law." 2 An American Dictionary of the English Language 6 (1828).

<sup>2</sup> The same explanation applies, of course, to George Mason's initial draft of Virginia's religious liberty clause, see *post*, at 12-13. When it said "unless, under colour of religion, any man disturb the peace . . . of society," it probably meant "unless under color of religion any man break the law." Thus, it is not the case that "both Mason's and [James] Madison's formulations envisioned that, where there was a conflict [between religious exercise and generally applicable laws], a person's interest in freely practicing his religion was to be balanced against state interests," *post*, at 14--at least insofar as regulation of *conduct* was concerned.

<sup>3</sup> The dissent mentions, for example, that only seven of the thirteen Colonies had exempted Quakers from military service by the mid-1700's; and that "virtually all" of the States had enacted oath exemptions by 1789. *Post*, at 15-16 (emphasis added).

provisions required accommodation. These and other examples offered by the dissent reflect the speakers' views of the "proper" relationship between government and religion, *post*, at 21, but not their views (at least insofar as the content or context of the material suggests) of the constitutionally required relationship. The one exception is the statement by Thomas Jefferson that he considered "the government of the United States as interdicted by the Constitution from intermeddling with religious institutions, their doctrines, discipline, or exercises," *post*, at 19-20 (internal quotation marks omitted); but it is quite clear that Jefferson did not in fact espouse the broad principle of affirmative accommodation advocated by the dissent, see McConnell, 103 Harv. L. Rev., at 1449-1452.

It seems to me that the most telling point made by the dissent is to be found, not in what it says, but in what it fails to say. Had the understanding in the period surrounding the ratification of the *Bill of Rights* been that the various forms of accommodation discussed by the dissent were constitutionally required (either by State Constitutions or by the Federal Constitution), it would be surprising not to find a single state or federal case refusing to enforce a generally applicable statute because of its failure to make accommodation. Yet the dissent cites none--and to my knowledge, and to the knowledge of the academic defenders of the dissent's position, see, e.g., *id.*, at 1504, 1506-1511 (discussing early [\*543] cases), none exists. The closest one can come in the period prior to 1850 is the decision of a New York City municipal court in 1813, holding that the New York Constitution of 1777, quoted *post*, at 10, required acknowledgement of a priest-penitent privilege, to protect a Catholic priest from being compelled to testify as to the contents of a confession. *People v. Phillips*, Court of General Sessions, City of New York (June 14, 1813), *excerpted in* Privileged Communications to Clergymen, 1 Cath. Lawyer 199 (1955). Even this lone case is weak authority, not only because it comes from a minor court,<sup>4</sup> but also because it did not involve a statute, and the same result might possibly have been achieved (without invoking constitutional entitlement) by [\*\*\*654] the court's simply modifying the common-law

rules of evidence to recognize such a privilege. On the other side of the ledger, moreover, there are two cases, from the Supreme Court of Pennsylvania, flatly rejecting the dissent's view. In *Simon's Executors v. Gratz*, 2 Pen. & W. 412 (Pa. 1831), the court held that a litigant was not entitled to a continuance of trial on the ground that appearing on his Sabbath would violate his religious principles. And in *Stansbury v. Marks*, 2 U.S. 213, 2 Dall. 213, 1 L. Ed. 353 (Pa. 1793), decided just two years after the ratification of the *Bill of Rights*, the court imposed a fine on a witness who "refused to be sworn, because it was his Sabbath."<sup>5</sup>

I have limited this response to the new items of "historical evidence" brought forward by today's dissent. (The dissent's [\*544] claim that "before *Smith*, our free exercise cases were generally in keeping" with the dissent's view, *post*, at 3, is adequately answered in *Smith* itself.) The historical evidence marshalled by the dissent cannot fairly be said to demonstrate the correctness of *Smith*; but it is more supportive of that conclusion than destructive of it. And, to return to a point I made earlier, that evidence is not compatible with any theory I am familiar with that has been proposed as an [\*\*2176] alternative to *Smith*. The dissent's approach has, of course, great popular attraction. Who can possibly be against the abstract proposition that government should not, even in its general, nondiscriminatory laws, place unreasonable burdens upon religious practice? Unfortunately, however, that abstract proposition must ultimately be reduced to concrete cases. The issue presented by *Smith* is, quite simply, whether the people, through their elected representatives, or rather this Court, shall control the outcome of those concrete cases. For example, shall it be the determination of this Court, or rather of the people, whether (as the dissent apparently believes, *post*, at 4) church construction will be exempt from zoning laws? The historical evidence put forward by the dissent does nothing to undermine the conclusion we reached in *Smith*: It shall be the people.

**Dissent by: O'CONNOR; SOUTER; BREYER**

<sup>4</sup> The Court of General Sessions was a mayor's court, and the ruling in *Phillips* was made by DeWitt Clinton, the last mayor to preside over that court, which was subsequently reconstituted as the Court of Common Pleas. Clinton had never been a jurist, and indeed had never practiced law. Some years before *Phillips*, he was instrumental in removing the political disabilities of Catholics in New York. See 4 Dictionary of American Biography 221-222, 224 (1943).

<sup>5</sup> Indeed, the author of *Simon's Executors* could well have written *Smith*: "Considerations of policy address themselves with propriety to the legislature, and not to a magistrate whose course is prescribed not by discretion, but rules already established." 2 Pen. & W. at 417.

## Dissent

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JUSTICE O'CONNOR, with whom JUSTICE BREYER joins except as to a portion of Part I, dissenting.

I dissent from the Court's disposition of this case. I agree with the Court that the issue before us is whether the Religious Freedom Restoration Act (RFRA) is a proper exercise of Congress' power to enforce § 5 of the Fourteenth Amendment. But as a yardstick for measuring the constitutionality of RFRA, the Court uses its holding in Employment Div., Dept. of Human Resources of Ore. v. Smith, 494 U.S. 872, 108 L. Ed. 2d 876, 110 S. Ct. 1595 (1990), the decision that prompted Congress to enact RFRA as a means of more rigorously enforcing the Free Exercise Clause. I remain of the view that *Smith* was [\*545] wrongly decided, and I would use this case to reexamine the Court's holding there. Therefore, I would direct the parties to brief the question whether *Smith* represents the correct understanding of the Free [\*\*\*655] Exercise Clause and set the case for reargument. If the Court were to correct the misinterpretation of the Free Exercise Clause set forth in *Smith*, it would simultaneously put our First Amendment jurisprudence back on course and allay the legitimate concerns of a majority in Congress who believed that *Smith* improperly restricted religious liberty. We would then be in a position to review RFRA in light of a proper interpretation of the Free Exercise Clause.

I

I agree with much of the reasoning set forth in Part III-A of the Court's opinion. Indeed, if I agreed with the Court's standard in *Smith*, I would join the opinion. As the Court's careful and thorough historical analysis shows, Congress lacks the "power to decree the substance of the Fourteenth Amendment's restrictions on the States." *Ante*, at 9 (emphasis added). Rather, its power under § 5 of the Fourteenth Amendment extends only to enforcing the Amendment's provisions. In short, Congress lacks the ability independently to define or expand the scope of constitutional rights by statute. Accordingly, whether Congress has exceeded its § 5 powers turns on whether there is a "congruence and proportionality between the injury to be prevented or remedied and the means adopted to that end." *Ante*, at 10. This recognition does not, of course, in any way diminish Congress' obligation to draw its own conclusions regarding the Constitution's meaning. Congress, no less than this Court, is called upon to

consider the requirements of the Constitution and to act in accordance with its dictates. But when it enacts legislation in furtherance of its delegated powers, Congress must make its judgments consistent with this Court's exposition of the Constitution and with the limits [\*546] placed on its legislative authority by provisions such as the Fourteenth Amendment.

The Court's analysis of whether RFRA is a constitutional exercise of Congress' § 5 power, set forth in Part III-B of its opinion, is premised on the assumption that *Smith* correctly interprets the Free Exercise Clause. This is an assumption that I do not accept. I continue to believe that *Smith* adopted an improper standard for deciding free exercise claims. In *Smith*, five Members of this Court--without briefing or argument on the issue--interpreted the Free Exercise Clause to permit the government to prohibit, without justification, conduct mandated by an individual's religious beliefs, so long as the prohibition is generally applicable. Contrary [\*\*2177] to the Court's holding in that case, however, the Free Exercise Clause is not simply an antidiscrimination principle that protects only against those laws that single out religious practice for unfavorable treatment. See Smith, supra, at 892-903 (O'CONNOR, J., concurring in judgment). Rather, the Clause is best understood as an affirmative guarantee of the right to participate in religious practices and conduct without impermissible governmental interference, even when such conduct conflicts with a neutral, generally applicable law. Before *Smith*, our free exercise cases were generally in keeping with this idea: where a law substantially burdened religiously motivated conduct--regardless whether it was specifically targeted [\*\*\*656] at religion or applied generally--we required government to justify that law with a compelling state interest and to use means narrowly tailored to achieve that interest. See 494 U.S. at 894 (citing Hernandez v. Commissioner, 490 U.S. 680, 699, 104 L. Ed. 2d 766, 109 S. Ct. 2136 (1989); Hobbie v. Unemployment Appeals Comm'n of Fla., 480 U.S. 136, 141, 94 L. Ed. 2d 190, 107 S. Ct. 1046 (1987); United States v. Lee, 455 U.S. 252, 257-258, 71 L. Ed. 2d 127, 102 S. Ct. 1051 (1982); McDaniel v. Paty, 435 U.S. 618, 626-629, 55 L. Ed. 2d 593, 98 S. Ct. 1322 (1978); Wisconsin v. Yoder, 406 U.S. 205, 215, 32 L. Ed. 2d 15, 92 S. Ct. 1526 (1972); Gillette v. United States, 401 U.S. 437, 462, 28 L. Ed. 2d 168, 91 S. Ct. 828 (1971); Sherbert v. Verner, 374 U.S. 398, 403, 10 L. Ed. 2d 965, 83 S. Ct. 1790 (1963)). [\*547]

The Court's rejection of this principle in *Smith* is supported neither by precedent nor, as discussed below,

521 U.S. 507, \*547; 117 S. Ct. 2157, \*\*2177; 138 L. Ed. 2d 624, \*\*\*656

by history. The decision has harmed religious liberty. For example, a Federal District Court, in reliance on *Smith*, ruled that the *Free Exercise Clause* was not implicated where Hmong natives objected on religious grounds to their son's autopsy, conducted pursuant to a generally applicable state law. *Yang v. Sturner*, 750 F. Supp. 558, 559 (RI 1990). The Court of Appeals for the Eighth Circuit held that application of a city's zoning laws to prevent a church from conducting services in an area zoned for commercial uses raised no free exercise concerns, even though the city permitted secular not-for-profit organizations in that area. *Cornerstone Bible Church v. Hastings*, 948 F.2d 464 (CA8 1991); see also *Rector of St. Bartholomew's Church v. New York*, 914 F.2d 348, 355 (CA2 1990) (no Free Exercise claim where city's application of facially neutral landmark designation law "drastically restricted the Church's ability to raise revenue to carry out its various charitable and ministerial programs"), cert. denied, 499 U.S. 905, 113 L. Ed. 2d 214, 111 S. Ct. 1103 (1991); *State v. Hershberger*, 462 N.W.2d 393 (Minn. 1990) (*Free Exercise Clause* provided no basis for exempting an Amish farmer from displaying a bright orange triangle on his buggy, to which the farmer objected on religious grounds, even though the evidence showed that some other material would have served the State's purpose equally well). These cases demonstrate that lower courts applying *Smith* no longer find necessary a searching judicial inquiry into the possibility of reasonably accommodating religious practice.

*Stare decisis* concerns should not prevent us from revisiting our holding in *Smith*. "*Stare decisis* is a principle of policy and not a mechanical formula of adherence to the latest decision, however recent and questionable, when such adherence involves collision with a prior doctrine more embracing in its scope, intrinsically sounder, and verified by experience." *Adarand Constructors, Inc. v. Pena*, 515 U.S. 200, [\*548] 231, 132 L. Ed. 2d 158, 115 S. Ct. 2097 (1995) (citing *Helvering v. Hallock*, 309 U.S. 106, 119, 84 L. Ed. 604, 60 S. Ct. 444 (1940)). This principle is particularly true in constitutional cases, where--as this case so plainly illustrates--"correction through legislative action is practically impossible." *Seminole Tribe of Fla. v. Florida*, 1996 U.S. LEXIS 2165, \*31, 517 U.S. \_\_, \_\_, 116 S. Ct. 1114, 134 L. Ed. 2d (1996) (internal quotation marks and citation omitted). I believe that, in [\*\*\*657] light of both our precedent and our Nation's tradition of religious liberty, *Smith* is demonstrably wrong. Moreover, it is a recent decision. As such, it has not engendered the kind of reliance on its continued application that

would militate against overruling it. Cf. *Planned Parenthood* [\*\*2178] of *Southeastern Pa. v. Casey*, 505 U.S. 833, 855-856, 120 L. Ed. 2d 674, 112 S. Ct. 2791 (1992).

Accordingly, I believe that we should reexamine our holding in *Smith*, and do so in this very case. In its place, I would return to a rule that requires government to justify any substantial burden on religiously motivated conduct by a compelling state interest and to impose that burden only by means narrowly tailored to achieve that interest.

II

I shall not restate what has been said in other opinions, which have demonstrated that *Smith* is gravely at odds with our earlier free exercise precedents. See *Church of Lukumi Babalu Aye, Inc. v. Hialeah*, 508 U.S. 520, 570-571, 124 L. Ed. 2d 472, 113 S. Ct. 2217 (1993) (SOUTER, J., concurring) (stating that it is "difficult to escape the conclusion that, whatever *Smith's* virtues, they do not include a comfortable fit with settled law"); *Smith, supra*, at 894-901 (O'CONNOR, J., concurring); see also McConnell, Free Exercise Revisionism and the *Smith* Decision, 57 U. Chi. L. Rev. 1109, 1120-1127 (1990). Rather, I examine here the early American tradition of religious free exercise to gain insight into the original understanding of the *Free Exercise Clause*--an inquiry the Court in *Smith* did not undertake. We have previously recognized the importance of interpreting the Religion Clauses in light of their history. *Lynch v. Donnelly*, 465 U.S. 668, 673, 79 L. Ed. 2d 604, 104 S. Ct. 1355 (1984) ("The Court's [\*549] interpretation of the *Establishment Clause* has comported with what history reveals was the contemporaneous understanding of its guarantees"); *School Dist. of Abington Township v. Schempp*, 374 U.S. 203, 212-214, 10 L. Ed. 2d 844, 83 S. Ct. 1560 (1963).

The historical evidence casts doubt on the Court's current interpretation of the *Free Exercise Clause*. The record instead reveals that its drafters and ratifiers more likely viewed the *Free Exercise Clause* as a guarantee that government may not unnecessarily hinder believers from freely practicing their religion, a position consistent with our pre-*Smith* jurisprudence.

A

The original Constitution, drafted in 1787 and ratified by the States in 1788, had no provisions safeguarding

individual liberties, such as freedom of speech or religion. Federalists, the chief supporters of the new Constitution, took the view that amending the Constitution to explicitly protect individual freedoms was superfluous, since the rights that the amendments would protect were already completely secure. See, e.g., 1 Annals of Congress 440, 443-444, 448-459 (Gales and Seaton ed. 1834) (remarks of James Madison, June 8, 1789). Moreover, they feared that guaranteeing certain civil liberties might backfire, since the express mention of some freedoms might imply that others were not protected. According to Alexander Hamilton, a *Bill of Rights* would even be dangerous, in that by specifying "various exceptions [\*\*\*658] to powers" not granted, it "would afford a colorable pretext to claim more than were granted." The Federalist No. 84, p. 513 (C. Rossiter ed. 1961). Anti-Federalists, however, insisted on more definite guarantees. Apprehensive that the newly established federal government would overwhelm the rights of States and individuals, they wanted explicit assurances that the federal government had no power in matters of personal liberty. T. Curry, *The First Freedoms: Church and State in America to the Passage of the First Amendment* 194 (1986). Additionally, Baptists and other Protestant dissenters feared for their religious liberty under [\*550] the new Federal Government and called for an amendment guaranteeing religious freedom. *Id.*, at 198.

In the end, legislators acceded to these demands. By December 1791, the *Bill of Rights* had been added to the Constitution. With respect to religious liberty, the *First Amendment* provided: "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof." *U.S. Const., Amdt. 1*. Neither the First Congress nor the ratifying state legislatures debated the question of religious freedom in much detail, nor did they directly consider [\*\*2179] the scope of the *First Amendment's* free exercise protection. It would be disingenuous to say that the Framers neglected to define precisely the scope of the *Free Exercise Clause* because the words "free exercise" had a precise meaning. L. Levy, *Essays on American Constitutional History* 173 (1972). As is the case for a number of the terms used in the *Bill of Rights*, it is not exactly clear what the Framers thought the phrase signified. *Ibid.* ("It is astonishing to discover that the debate on a *Bill of Rights* was conducted on a level of abstraction so vague as to convey the impression that Americans of 1787-1788 had only the most nebulous conception of the meanings of the particular rights they sought to insure"). But a variety of sources supplement

the legislative history and shed light on the original understanding of the *Free Exercise Clause*. These materials suggest that--contrary to *Smith*--the Framers did not intend simply to prevent the Government from adopting laws that discriminated against religion. Although the Framers may not have asked precisely the questions about religious liberty that we do today, the historical record indicates that they believed that the Constitution affirmatively protects religious free exercise and that it limits the government's ability to intrude on religious practice.

## B

The principle of religious "free exercise" and the notion that religious liberty deserved legal protection were by no [\*551] means new concepts in 1791, when the *Bill of Rights* was ratified. To the contrary, these principles were first articulated in this country in the colonies of Maryland, Rhode Island, Pennsylvania, Delaware, and Carolina, in the mid-1600's. These colonies, though established as sanctuaries for particular groups of religious dissenters, extended freedom of religion to groups--although often limited to Christian groups--beyond their own. Thus, they encountered early on the conflicts that may arise in a society made up of a plurality of faiths.

The term "free exercise" appeared in an American legal document as [\*\*\*659] early as 1648, when Lord Baltimore extracted from the new Protestant governor of Maryland and his councilors a promise not to disturb Christians, particularly Roman Catholics, in the "free exercise" of their religion. McConnell, *The Origins and Historical Understanding of Free Exercise of Religion*, 103 *Harv. L. Rev.* 1409, 1425 (1990) (hereinafter *Origins of Free Exercise*). Soon after, in 1649, the Maryland Assembly enacted the first *free exercise clause* by passing the Act Concerning Religion: "Noe person . . . professing to believe in Jesus Christ, shall from henceforth bee any waies troubled, Molested or discountenanced for or in respect of his or her religion nor in the free exercise thereof . . . nor any way [be] compelled to the believe or exercise of any other Religion against his or her consent, soe as they be not unfaithful to the Lord Proprietary, or molest or conspire against the civil Governemt." Act Concerning Religion of 1649, reprinted in 5 *The Founders' Constitution* 49, 50 (P. Kurland & R. Lerner eds. 1987) (hereinafter *Founders' Constitution*). Rhode Island's Charter of 1663 used the analogous term "liberty of conscience." It protected residents from being "in any ways molested,

punished, disquieted, or called into question, for any differences in opinion, in matters of religion, and do not actually disturb the civil peace of our said colony." The Charter further provided that residents may "freely, and fully have and enjoy his and their own judgments, and conscience in matters of religious [\*552] concerns . . .; they behaving themselves peaceably and quietly and not using this liberty to licentiousness and profaneness; nor to the civil injury, or outward disturbance of others." Charter of Rhode Island and Providence Plantations, 1663, in 8 W. Swindler, Sources and Documents of United States Constitutions 363 (1979). Various agreements between prospective settlers and the proprietors of Carolina, New York, and New Jersey similarly guaranteed religious freedom, using language that paralleled that of the Rhode Island Charter of 1663. See New York Act Declaring Rights & Privileges (1691); Concession and Agreement of the Lords Proprietors of the Province of New Caesarea, or New-Jersey (1664); Laws of West New-Jersey, Art. X (1681); Fundamental [\*\*2180] Constitutions for East New-Jersey, Art. XVI (1683); First Charter of Carolina, Art. XVIII (1663). N. Cogan, *The Complete Bill of Rights* 23-27 (Galley 1997).

These documents suggest that, early in our country's history, several colonies acknowledged that freedom to pursue one's chosen religious beliefs was an essential liberty. Moreover, these colonies appeared to recognize that government should interfere in religious matters only when necessary to protect the civil peace or to prevent "licentiousness." In other words, when religious beliefs conflicted with civil law, religion prevailed unless important state interests militated otherwise. Such notions parallel the ideas expressed in our pre-*Smith* cases--that government may not hinder believers from freely exercising their religion, unless necessary to further a significant state interest.

## C

The principles expounded in these early charters re-emerged over a century later in state constitutions that were adopted in the flurry of [\*\*\*660] constitution-drafting that followed the American Revolution. By 1789, every State but Connecticut had incorporated some version of a *free exercise* [\*553] *clause* into its constitution. Origins of Free Exercise 1455. These state provisions, which were typically longer and more detailed than the federal *Free Exercise Clause*, are perhaps the best evidence of the original understanding of the Constitution's protection of

religious liberty. After all, it is reasonable to think that the States that ratified the *First Amendment* assumed that the meaning of the federal free exercise provision corresponded to that of their existing state clauses. The precise language of these state precursors to the *Free Exercise Clause* varied, but most guaranteed free exercise of religion or liberty of conscience, limited by particular, defined state interests. For example, the New York Constitution of 1777 provided:

"The free exercise and enjoyment of religious profession and worship, without discrimination or preference, shall forever hereafter be allowed, within this State, to all mankind: *Provided*, That the liberty of conscience, hereby granted, *shall not be so construed as to excuse acts of licentiousness, or justify practices inconsistent with the peace or safety of this State.*" N. Y. Const., Art. XXXVIII (1777), in 7 Swindler, *supra*, at 178 (emphasis added).

Similarly, the New Hampshire Constitution of 1784 declared:

"Every individual has a natural and unalienable right to worship GOD according to the dictates of his own conscience, and reason; and no subject shall be hurt, molested, or restrained in his person, liberty or estate for worshipping GOD, in the manner and season most agreeable to the dictates of his own conscience, . . . *provided he doth not disturb the public peace, or disturb others*, in their religious worship." N. H. Const., Art. I, § 5 (1784), in 6 Swindler, *supra*, at 345 (emphasis added).

The Maryland Declaration of Rights of 1776 read:

"No person ought by any law to be molested in his person or estate on account of his religious persuasion [\*554] or profession, or for his religious practice; unless, under colour of religion, *any man shall disturb the good order, peace or safety of the State, or shall infringe the laws of morality, or injure others*, in their natural, civil, or religious rights." Md. Const., Declaration of Rights, Art. XXXIII in 4 Swindler, *supra*, at 374 (emphasis added).

The religious liberty clause of the Georgia Constitution of 1777 stated:

"All persons whatever shall have the free exercise of their religion; provided *it be not repugnant to the peace and safety of the State.*" Ga. Const., Art. LVI (1777), in 2 Swindler, *supra*, at 449 (emphasis added).

In addition to these state provisions, the Northwest Ordinance of 1787--which was enacted contemporaneously with the drafting of the Constitution and re-enacted by the First Congress--established a *bill of rights* for a territory that included what is now Ohio, Indiana, Michigan, Wisconsin, and part of Minnesota. Article I of the Ordinance declared: [\*\*2181]

"No person, *demeaning himself in a peaceable and orderly manner*, [\*\*\*66] shall ever be molested on account of his mode of worship or religious sentiments, in the said territory." Northwest Territory Ordinance of 1787, Art. I, 1 Stat. 52 (emphasis added).

The language used in these state constitutional provisions and the Northwest Ordinance strongly suggests that, around the time of the drafting of the *Bill of Rights*, it was generally accepted that the right to "free exercise" required, where possible, accommodation of religious practice. If not--and if the Court was correct in *Smith* that generally applicable laws are enforceable regardless of religious conscience--there would have been no need for these documents to specify, as the New York Constitution did, that rights of conscience should not be "construed as to excuse acts of licentiousness, or justify practices inconsistent with the peace or safety of [the] State." Such a proviso would have been superfluous. [\*555] Instead, these documents make sense only if the right to free exercise was viewed as generally superior to ordinary legislation, to be overridden only when necessary to secure important government purposes.

The Virginia Legislature may have debated the issue most fully. In May 1776, the Virginia Constitutional Convention wrote a constitution containing a Declaration of Rights with a clause on religious liberty. The initial drafter of the clause, George Mason, proposed the following:

"That religion, or the duty which we owe to our CREATOR, and the manner of discharging it, can be (directed) only by reason and conviction, not by force or violence; and therefore, *that all men should enjoy the fullest toleration in the exercise of religion*, according to the dictates of conscience, unpunished and unrestrained by the magistrate, *unless, under colour of religion, any man disturb the peace, the happiness, or safety of society.* And that it is the mutual duty of all to practice Christian forbearance, love, and charity towards each other." Committee Draft of the Virginia Declaration of Rights, 1 Papers of George Mason 284-285 (R. Rutland ed. 1970) (emphasis added).

Mason's proposal did not go far enough for a 26-year-old James Madison, who had recently completed his studies at the Presbyterian College of Princeton. He objected first to Mason's use of the term "toleration," contending that the word implied that the right to practice one's religion was a governmental favor, rather than an inalienable liberty. Second, Madison thought Mason's proposal countenanced too much state interference in religious matters, since the "exercise of religion" would have yielded whenever it was deemed inimical to "the peace, happiness, or safety of society." Madison suggested the provision read instead:

"That religion, or the duty we owe our Creator, and the manner of discharging it, being under the direction [\*556] of reason and conviction only, not of violence or compulsion, *all men are equally entitled to the full and free exercise of it, according to the dictates of conscience*; and therefore that no man or class of men ought on account of religion to be invested with peculiar emoluments or privileges, nor subjected to any penalties or disabilities, *unless under color of religion the preservation of equal [\*\*\*662] liberty, and the existence of the State be manifestly endangered.*" G. Hunt, James Madison and Religious Liberty, 1 Annual Report of the American Historical Association 163, 166-167 (1901) (emphasis added).

Thus, Madison wished to shift Mason's language of "toleration" to the language of

rights. See S. Cobb, *The Rise of Religious Liberty in America* 492 (1902) (reprint 1970) (noting that Madison objected to the word "toleration" as belonging to "a system where was an established Church, and where a certain liberty of worship was granted, not of right, but of grace"). Additionally, under Madison's proposal, the State could interfere in a believer's religious exercise only if the State would otherwise "be manifestly endangered." In the end, neither Mason's nor Madison's language regarding the extent to which state interests could limit religious exercise made it into the Virginia Constitution's religious liberty clause. Like the federal *Free Exercise Clause*, the Virginia religious [\*2182] liberty clause was simply silent on the subject, providing only that "all men are equally entitled to the free exercise of religion, according to the dictates of conscience." Virginia Declaration of Rights, Art. XVI (1776), in 10 Swindler, *Sources and Documents of United States Constitutions*, at 50. For our purposes, however, it is telling that *both* Mason's and Madison's formulations envisioned that, when there was a conflict, a person's interest in freely practicing his religion was to be balanced against state interests. Although Madison endorsed a more limited state interest exception than did Mason, the debate would have been irrelevant if either had thought the right to free exercise did not [\*557] include a right to be exempt from certain generally applicable laws. Presumably, the Virginia Legislature intended the scope of its free exercise provision to strike some middle ground between Mason's narrower and Madison's broader notions of the right to religious freedom.

#### D

The practice of the colonies and early States bears out the conclusion that, at the time the *Bill of Rights* was ratified, it was accepted that government should, when possible, accommodate religious practice. Unsurprisingly, of course, even in the American colonies inhabited by people of religious persuasions, religious conscience and civil law rarely conflicted. Most 17th and 18th century Americans belonged to denominations of Protestant Christianity whose religious

practices were generally harmonious with colonial law. Curry, *The First Freedoms*, at 219 ("The vast majority of Americans assumed that theirs was a Christian, i.e. Protestant, country, and they automatically expected that government would uphold the commonly agreed on Protestant ethos and morality"). Moreover, governments then were far smaller and less intrusive than they are today, which made conflict between civil law and religion unusual.

Nevertheless, tension between religious conscience and generally applicable laws, though rare, was not unknown in pre-Constitutional America. Most commonly, such conflicts arose from oath requirements, military conscription, and religious assessments. *Origins of Free Exercise* 1466. The ways in which these conflicts were resolved suggest that [\*\*\*663] Americans in the colonies and early States thought that, if an individual's religious scruples prevented him from complying with a generally applicable law, the government should, if possible, excuse the person from the law's coverage. For example, Quakers and certain other Protestant sects refused on Biblical grounds to subscribe to oaths or "swear" allegiance to civil authority. A. Adams & C. Emmerich, [\*558] *A Nation Dedicated to Religious Liberty: The Constitutional Heritage of the Religion Clauses* 14 (1990) (hereinafter Adams & Emmerich). Without accommodation, their beliefs would have prevented them from participating in civic activities involving oaths, including testifying in court. Colonial governments created alternatives to the oath requirement for these individuals. In early decisions, for example, the Carolina proprietors applied the religious liberty provision of the Carolina Charter of 1665 to permit Quakers to enter pledges in a book. Curry, *The First Freedoms*, at 56. Similarly, in 1691, New York enacted a law allowing Quakers to testify by affirmation, and in 1734, it permitted Quakers to qualify to vote by affirmation. *Id.*, at 64. By 1789, virtually all of the States had enacted oath exemptions. See Adams & Emmerich 62.

Early conflicts between religious beliefs and generally applicable laws also occurred

because of military conscription requirements. Quakers and Mennonites, as well as a few smaller denominations, refused on religious grounds to carry arms. Members of these denominations asserted that liberty of conscience should exempt them from military conscription. Obviously, excusing such objectors from military service had a high public cost, given the importance of the military to the defense of society. Nevertheless, Rhode Island, North Carolina, and Maryland exempted Quakers from military service in the late 1600's. New York, Massachusetts, Virginia, and New Hampshire followed suit in the mid-1700's. *Origins of Free Exercise* 1468. The Continental Congress likewise granted exemption from conscription:

[\*\*2183]

"As there are some people, who, from religious principles, cannot bear arms in any case, this Congress intend no violence to their consciences, but earnestly recommend it to them, to contribute liberally in this time of universal calamity, to the relief of their distressed brethren in the several colonies, and to do all other services to their oppressed Country, which they can consistently [\*559] with their religious principles." Resolution of July 18, 1775, reprinted in 2 *Journals of the Continental Congress, 1774-1789*, pp. 187, 189 (W. Ford ed. 1905).

Again, this practice of excusing religious pacifists from military service demonstrates that, long before the *First Amendment* was ratified, legislative accommodations were a common response to conflicts between religious practice and civil obligation. Notably, the Continental Congress exempted objectors from conscription to avoid "violence to their consciences," explicitly recognizing that civil laws must sometimes give way to freedom of conscience. *Origins of Free Exercise* 1468.

States and colonies with established churches encountered a further religious accommodation problem. Typically, these governments [\*\*\*664] required citizens to pay tithes to support either the government-established church or the

church to which the tithepayer belonged. But Baptists and Quakers, as well as others, opposed all government-compelled tithes on religious grounds. *Id.*, at 1469. Massachusetts, Connecticut, New Hampshire, and Virginia responded by exempting such objectors from religious assessments. *Ibid.* There are additional examples of early conflicts between civil laws and religious practice that were similarly settled through accommodation of religious exercise. Both North Carolina and Maryland excused Quakers from the requirement of removing their hats in court; Rhode Island exempted Jews from the requirements of the state marriage laws; and Georgia allowed groups of European immigrants to organize whole towns according to their own faith. *Id.*, at 1471.

To be sure, legislatures, not courts, granted these early accommodations. But these were the days before there was a Constitution to protect civil liberties--judicial review did not yet exist. These legislatures apparently believed that the appropriate response to conflicts between civil law and religious scruples was, where possible, accommodation of religious [\*560] conduct. It is reasonable to presume that the drafters and ratifiers of the *First Amendment*--many of whom served in state legislatures--assumed courts would apply the *Free Exercise Clause* similarly, so that religious liberty was safeguarded.

E

The writings of the early leaders who helped to shape our Nation provide a final source of insight into the original understanding of the *Free Exercise Clause*. The thoughts of James Madison--one of the principal architects of the *Bill of Rights*--as revealed by the controversy surrounding Virginia's General Assessment Bill of 1784, are particularly illuminating. Virginia's debate over religious issues did not end with its adoption of a constitutional free exercise provision. Although Virginia had disestablished the Church of England in 1776, it left open the question whether religion might be supported on a nonpreferential basis by a so-called "general assessment." Levy, *Essays on American Constitutional History*, at 200. In the years between 1776 and 1784, the issue how

to support religion in Virginia--either by general assessment or voluntarily--was widely debated. Curry, *The First Freedoms*, at 136.

By 1784, supporters of a general assessment, led by Patrick Henry, had gained a slight majority in the Virginia Assembly. M. Malbin, *Religion and Politics: The Intentions of the Authors of the First Amendment 23* (1978); Levy, *supra*, at 200. They introduced "A Bill Establishing a Provision for the Teachers of the Christian Religion," which proposed that citizens be taxed in order to support the Christian denomination of their choice, with those taxes not designated for any specific denomination to go to a public fund to aid seminaries. Levy, *supra*, at 200-201; Curry, *supra*, at 140-141; Malbin, *supra*, at 23. Madison viewed religious assessment as a dangerous infringement of religious liberty and led the opposition to the [**\*\*2184**] bill. He took the case against religious assessment to the people of Virginia in his now-famous "Memorial [**\*561**] and Remonstrance Against Religious Assessments." Levy, *supra*, at 201. This [**\*\*\*665**] pamphlet led thousands of Virginians to oppose the bill and to submit petitions expressing their views to the legislature. Malbin, *supra*, at 24. The bill eventually died in committee, and Virginia instead enacted a Bill for Establishing Religious Freedom, which Thomas Jefferson had drafted in 1779. Malbin, *supra*, at 24.

The "Memorial and Remonstrance" begins with the recognition that "the Religion . . . of every man must be left to the conviction and conscience of every man; and it is the right of every man to exercise it as these may dictate." 2 Writings of James Madison 184 (G. Hunt ed. 1901). By its very nature, Madison wrote, the right to free exercise is "unalienable," both because a person's opinion "cannot follow the dictates of others," and because it entails "a duty toward the Creator." *Ibid.* Madison continued:

"This duty [owed the Creator] is precedent both in order of time and degree of obligation, to the claims of Civil Society. . . . Every man who becomes a member of any Civil Society, [must] do it with a saving of his

allegiance to the Universal Sovereign. We maintain therefore that in matters of Religion, no man's right is abridged by the institution of Civil Society, and that Religion is wholly exempt from its cognizance." *Id.*, at 184-185.

To Madison, then, duties to God were superior to duties to civil authorities--the ultimate loyalty was owed to God above all. Madison did not say that duties to the Creator are precedent only to those laws specifically directed at religion, nor did he strive simply to prevent deliberate acts of persecution or discrimination. The idea that civil obligations are subordinate to religious duty is consonant with the notion that government must accommodate, where possible, those religious practices that conflict with civil law. [**\*562**]

Other early leaders expressed similar views regarding religious liberty. Thomas Jefferson, the drafter of Virginia's Bill for Establishing Religious Freedom, wrote in that document that civil government could interfere in religious exercise only "when principles break out into overt acts against peace and good order." In 1808, he indicated that he considered "the government of the United States as interdicted by the Constitution from intermeddling with religious institutions, their doctrines, discipline, or exercises." 11 The Writings of Thomas Jefferson 428-429 (A. Lipscomb ed. 1904) (quoted in Office of Legal Policy, U.S. Dept. of Justice, Report to the Attorney General, *Religious Liberty under the Free Exercise Clause 7* (1986)). Moreover, Jefferson believed that "every religious society has a right to determine for itself the time of these exercises, and the objects proper for them, according to their own particular tenets; and this right can never be safer than in their own hands, where the Constitution has deposited it." *Ibid.*

George Washington expressly stated that he believed that government should do its utmost to accommodate religious scruples, writing in a letter to a group of Quakers:

"In my opinion the conscientious scruples of all men should be treated with great delicacy and tenderness; and it is my wish and desire, that the laws may always be as extensively

accommodated to [\*\*\*666] them, as a due regard to the protection and essential interests of the nation may justify and permit." Letter from George Washington to the Religious Society Called Quakers (Oct. 1789), in George Washington on Religious Liberty and Mutual Understanding 11 (E. Humphrey ed. 1932).

Oliver Ellsworth, a Framer of the *First Amendment* and later Chief Justice of the United States, expressed the similar view that government could interfere in religious matters only when necessary "to prohibit and punish gross immoralities [\*563] and impieties; because the open practice of these is of evil example and detriment." Oliver Ellsworth, Landholder, No. 7 (Dec. 17, 1787), reprinted in 4 Founders' Constitution, 640. Isaac Backus, a Baptist minister who was a delegate to the Massachusetts ratifying convention of 1788, declared that "every person has an unalienable right to act in all religious affairs according to the full persuasion of his own [\*\*2185] mind, where others are not injured thereby." Backus, A Declaration of Rights, of the Inhabitants of the State of Massachusetts-Bay, in Isaac Backus on Church, State, and Calvinism 487 (W. McLoughlin ed. 1968).

These are but a few examples of various perspectives regarding the proper relationship between church and government that existed during the time the *First Amendment* was drafted and ratified. Obviously, since these thinkers approached the issue of religious freedom somewhat differently, see Adams & Emmerich 21-31, it is not possible to distill their thoughts into one tidy formula. Nevertheless, a few general principles may be discerned. Foremost, these early leaders accorded religious exercise a special constitutional status. The right to free exercise was a substantive guarantee of individual liberty, no less important than the right to free speech or the right to just compensation for the taking of property. See P. Kauper, Religion and the Constitution 17 (1964) ("Our whole constitutional history . . . supports the conclusion that religious liberty is an independent liberty, that its recognition may either require or permit preferential treatment

on religious grounds in some instances . . ."). As Madison put it in the concluding argument of his "Memorial and Remonstrance":

"The equal right of every citizen to the free exercise of his Religion according to the dictates of [his] conscience' is held by the same tenure with all our other rights. . . . It is equally the gift of nature; . . . it cannot be less dear to us; . . . it is enumerated with equal solemnity, [\*564] or rather studied emphasis." 2 Writings of James Madison, at 191.

Second, all agreed that government interference in religious practice was not to be lightly countenanced. Adams & Emmerich at 31. Finally, all shared the conviction that "true religion and good morals are the only solid foundation of public liberty and happiness." Curry, The First Freedoms, at 219 (quoting Continental Congress); see Adams & Emmerich at 72 ("The Founders . . . acknowledged that the republic rested largely on moral principles derived from religion"). To give meaning to these ideas--particularly in a society characterized by religious pluralism and pervasive regulation--there will be times when the Constitution requires government to accommodate the needs of those citizens [\*\*\*667] whose religious practices conflict with generally applicable law.

### III

The Religion Clauses of the Constitution represent a profound commitment to religious liberty. Our Nation's Founders conceived of a Republic receptive to voluntary religious expression, not of a secular society in which religious expression is tolerated only when it does not conflict with a generally applicable law. As the historical sources discussed above show, the *Free Exercise Clause* is properly understood as an affirmative guarantee of the right to participate in religious activities without impermissible governmental interference, even where a believer's conduct is in tension with a law of general application. Certainly, it is in no way anomalous to accord heightened protection to a right identified in the text of the *First Amendment*. For example, it has long

been the Court's position that freedom of speech--a right enumerated only a few words after the right to free exercise--has special constitutional status. Given the centrality of freedom of speech and religion to the American concept of personal liberty, it is altogether reasonable to conclude [\*565] that both should be treated with the highest degree of respect.

Although it may provide a bright line, the rule the Court declared in *Smith* does not faithfully serve the purpose of the Constitution. Accordingly, I believe that it is essential for the Court to reconsider its holding in *Smith*--and to do so in this very case. I would therefore direct the parties to brief this issue and set the case for reargument.

I respectfully dissent from the Court's disposition of this case.

JUSTICE SOUTER, dissenting.

To decide whether the *Fourteenth Amendment* gives Congress sufficient power to enact the Religious Freedom Restoration Act, the Court measures the legislation against [\*\*2186] the free-exercise standard of *Employment Div., Dept. of Human Resources of Ore. v. Smith*, 494 U.S. 872, 108 L. Ed. 2d 876, 110 S. Ct. 1595 (1990). For the reasons stated in my opinion in *Church of Lukumi Babalu Aye, Inc. v. Hialeah*, 508 U.S. 520, 564-577, 124 L. Ed. 2d 472, 113 S. Ct. 2217 (1993) (opinion concurring in part and concurring in judgment), I have serious doubts about the precedential value of the *Smith* rule and its entitlement to adherence. These doubts are intensified today by the historical arguments going to the original understanding of the *Free Exercise Clause* presented in JUSTICE O'CONNOR's opinion, *ante*, at 5-21, which raises very substantial issues about the soundness of the *Smith* rule. See also *ante*, at 1-9 (JUSTICE SCALIA, concurring) (addressing historical arguments). But without briefing and argument on the merits of that rule (which this Court has never had in any case, including *Smith* itself, see *Lukumi, supra*, at 571-572), I am not now prepared to join JUSTICE O'CONNOR in rejecting it or the majority in assuming it to be correct. In order to provide full adversarial consideration, this case should be set down for reargument permitting

plenary reexamination of the issue. Since the Court declines to follow that course, our free-exercise [\*566] law remains marked by an "intolerable tension," *Lukumi*, 508 U.S. at 574, [\*\*\*668] and the constitutionality of the Act of Congress to enforce the free-exercise right cannot now be soundly decided. I would therefore dismiss the writ of certiorari as improvidently granted, and I accordingly dissent from the Court's disposition of this case.

JUSTICE BREYER, dissenting.

I agree with JUSTICE O'CONNOR that the Court should direct the parties to brief the question whether *Employment Div., Dept. of Human Resources of Ore. v. Smith*, 494 U.S. 872, 108 L. Ed. 2d 876, 110 S. Ct. 1595 (1990) was correctly decided, and set this case for reargument. I do not, however, find it necessary to consider the question whether, assuming *Smith* is correct, § 5 of the *Fourteenth Amendment* would authorize Congress to enact the legislation before us. Thus, while I agree with some of the views expressed in the first paragraph of Part I of JUSTICE O'CONNOR's dissent, I do not necessarily agree with all of them. I therefore join JUSTICE O'CONNOR's dissent, with the exception of the first paragraph of Part I.

## References

*15 Am Jur 2d, Civil Rights 7; 16 Am Jur 2d, Constitutional Law 74, 287, 291, 326, 327, 331; 16A Am Jur 2d, Constitutional Law 452, 471-473, 491; 83 Am Jur 2d, Zoning and Planning 206, 44025B Am Jur PI & Pr Forms (Rev), Zoning and Planning 46, 6616 Am Jur Trials 99, Relief from Zoning Ordinance USCS, Constitution, Amendments 1, 14; 42 USCS 2000bb et seq.* L Ed Digest, Constitutional Law 7, 71; Zoning 1L Ed Index, *Fourteenth Amendment*, Historic District or Site; Religious Freedom; Separation of Powers; Zoning ALR Index, *Fourteenth Amendment*, Freedom of Religion; Historic Landmarks; Religion and Religious Societies; Separation of Powers; States ;Zoning Annotation References: Supreme Court's views as to concept of "liberty" under *due process clauses of Fifth and Fourteenth Amendments*. 47 L Ed 2d 975. Supreme Court cases involving establishment and freedom of religion clauses of Federal Constitution. 37 L Ed 2d 1147. Validity, construction, and application of Religious

521 U.S. 507, \*566; 117 S. Ct. 2157, \*\*2186; 138 L. Ed. 2d 624, \*\*\*668

Freedom Restoration Act ([42 USCS 2000bb et seq.](#)). [990](#). Zoning regulations as affecting churches. [74 ALR2d 135 ALR Fed 121](#). Validity and construction of statute or ordinance protecting historical landmarks. [18 ALR4th 377](#).

# Appendix Z

**TITLE 42 - THE PUBLIC HEALTH AND WELFARE**  
**CHAPTER 21 - CIVIL RIGHTS**  
**SUBCHAPTER I - GENERALLY**

**§ 1996. Protection and preservation of traditional religions of Native Americans**

On and after August 11, 1978, it shall be the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

(Pub. L. 95–341, § 1, Aug. 11, 1978, 92 Stat. 469.)

**Short Title of 1994 Amendment**

Pub. L. 103–344, § 1, Oct. 6, 1994, 108 Stat. 3125, provided that: “This Act [enacting section 1996a of this title] may be cited as the ‘American Indian Religious Freedom Act Amendments of 1994’.”

**Short Title**

Pub. L. 95–341, as amended, which enacted this section, section 1996a of this title, and a provision set out as a note under this section, is popularly known as the American Indian Religious Freedom Act.

**Federal Implementation of Protective and Preservation Functions Relating to Native American Religious Cultural Rights and Practices; Presidential Report to Congress**

Section 2 of Pub. L. 95–341 provided that the President direct the various Federal departments, agencies, and other instrumentalities responsible for administering relevant laws to evaluate their policies and procedures in consultation with native traditional religious leaders to determine changes necessary to preserve Native American religious cultural rights and practices and report to the Congress 12 months after Aug. 11, 1978.

**Ex. Ord. No. 13007. Indian Sacred Sites**

Ex. Ord. No. 13007, May 24, 1996, 61 F.R. 26771, provided:

By the authority vested in me as President by the Constitution and the laws of the United States, in furtherance of Federal treaties, and in order to protect and preserve Indian religious practices, it is hereby ordered:

Section 1. Accommodation of Sacred Sites. (a) In managing Federal lands, each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

(b) For purposes of this order:

(i) “Federal lands” means any land or interests in land owned by the United States, including leasehold interests held by the United States, except Indian trust lands;

(ii) “Indian tribe” means an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to Public Law No. 103–454, 108 Stat. 4791 [see 25 U.S.C. 479a, 479a–1], and “Indian” refers to a member of such an Indian tribe; and

(iii) “Sacred site” means any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.

Sec. 2. Procedures. (a) Each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall, as appropriate, promptly implement procedures for the purposes of carrying out the provisions of section 1 of this order, including, where practicable and appropriate, procedures to ensure reasonable

*NB: This unofficial compilation of the U.S. Code is current as of Jan. 4, 2012 (see <http://www.law.cornell.edu/uscode/uscpri.html>).*

notice is provided of proposed actions or land management policies that may restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites. In all actions pursuant to this section, agencies shall comply with the Executive memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" [25 U.S.C. 450 note ].

(b) Within 1 year of the effective date of this order, the head of each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall report to the President, through the Assistant to the President for Domestic Policy, on the implementation of this order. Such reports shall address, among other things, (i) any changes necessary to accommodate access to and ceremonial use of Indian sacred sites; (ii) any changes necessary to avoid adversely affecting the physical integrity of Indian sacred sites; and (iii) procedures implemented or proposed to facilitate consultation with appropriate Indian tribes and religious leaders and the expeditious resolution of disputes relating to agency action on Federal lands that may adversely affect access to, ceremonial use of, or the physical integrity of sacred sites.

Sec. 3. Nothing in this order shall be construed to require a taking of vested property interests. Nor shall this order be construed to impair enforceable rights to use of Federal lands that have been granted to third parties through final agency action. For purposes of this order, "agency action" has the same meaning as in the Administrative Procedure Act (5 U.S.C. 551 (13)).

Sec. 4. This order is intended only to improve the internal management of the executive branch and is not intended to, nor does it, create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by any party against the United States, its agencies, officers, or any person.

William J. Clinton.

# Appendix W

# Appendix Z1

# Executive Order 13007: Indian Sacred Sites

[Federal Register: May 29, 1996 (Volume 61, Number 104)]  
[Presidential Documents]  
[Page 26771-26772]  
From the Federal Register Online via GPO Access [wais.access.gpo.gov]  
[DOCID:fr29my96-149]

Presidential Documents

[[Page 26771]]

Executive Order 13007 of May 24, 1996

Indian Sacred Sites

By the authority vested in me as President by the Constitution and the laws of the United States, in furtherance of Federal treaties, and in order to protect and preserve Indian religious practices, it is hereby ordered:

Section 1. Accommodation of Sacred Sites. (a) In managing Federal lands, each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

(b) For purposes of this order:

- (i) "Federal lands" means any land or interests in land owned by the United States, including leasehold interests held by the United States, except Indian trust lands;
  - (ii) "Indian tribe" means an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to Public Law No. 103-454, 108 Stat. 4791, and "Indian" refers to a member of such an Indian tribe;
- and

(iii) "Sacred site" means any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.

Sec. 2. Procedures. (a) Each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall, as appropriate, promptly implement procedures for the purposes of carrying out the provisions of section 1 of this order, including, where practicable and appropriate, procedures to ensure reasonable notice is provided of proposed actions or land management policies that may restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites. In all actions pursuant to this section, agencies shall comply with the Executive memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments."

(b) Within 1 year of the effective date of this order, the head of each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall report to the President, through the Assistant to the President for Domestic Policy, on the implementation of this order. Such reports shall address, among other things,

- (i) any changes necessary to accommodate access to and ceremonial use of Indian sacred sites;
- (ii) any changes necessary to avoid adversely affecting the physical integrity of Indian sacred sites; and
- (iii) procedures implemented or proposed to facilitate consultation with appropriate Indian tribes and religious leaders and the expeditious resolution of disputes relating to agency action on Federal lands that may adversely affect access to, ceremonial use of, or the physical integrity of sacred sites.

[[Page 26772]]

Sec. 3. Nothing in this order shall be construed to require a taking of vested property interests. Nor shall this order be construed to impair enforceable rights to use of Federal lands that have been granted to third parties through final agency action. For purposes of this order, "agency action" has the same meaning as in the Administrative Procedure Act (5 U.S.C. 551(13)).

Sec. 4. This order is intended only to improve the internal management of the executive branch and is not intended to, nor does it, create any right, benefit, or trust responsibility, substantive or

procedural, enforceable at law or equity by any party against the United States, its agencies, officers, or any person.

(Presidential Sig.) William Clinton

THE WHITE HOUSE,

May 24, 1996.

# Appendix Z2

Title 3—

Executive Order 13175 of November 6, 2000

The President

Consultation and Coordination With Indian Tribal Governments

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes; it is hereby ordered as follows:

**Section 1. Definitions.** For purposes of this order:

(a) “Policies that have tribal implications” refers to regulations, legislative comments or proposed legislation, and other policy statements or actions that have substantial direct effects on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes.

(b) “Indian tribe” means an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. 479a.

(c) “Agency” means any authority of the United States that is an “agency” under 44 U.S.C. 3502(1), other than those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(5).

(d) “Tribal officials” means elected or duly appointed officials of Indian tribal governments or authorized intertribal organizations.

**Sec. 2. Fundamental Principles.** In formulating or implementing policies that have tribal implications, agencies shall be guided by the following fundamental principles:

(a) The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions. Since the formation of the Union, the United States has recognized Indian tribes as domestic dependent nations under its protection. The Federal Government has enacted numerous statutes and promulgated numerous regulations that establish and define a trust relationship with Indian tribes.

(b) Our Nation, under the law of the United States, in accordance with treaties, statutes, Executive Orders, and judicial decisions, has recognized the right of Indian tribes to self-government. As domestic dependent nations, Indian tribes exercise inherent sovereign powers over their members and territory. The United States continues to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, tribal trust resources, and Indian tribal treaty and other rights.

(c) The United States recognizes the right of Indian tribes to self-government and supports tribal sovereignty and self-determination.

**Sec. 3. Policymaking Criteria.** In addition to adhering to the fundamental principles set forth in section 2, agencies shall adhere, to the extent permitted by law, to the following criteria when formulating and implementing policies that have tribal implications:

(a) Agencies shall respect Indian tribal self-government and sovereignty, honor tribal treaty and other rights, and strive to meet the responsibilities that arise from the unique legal relationship between the Federal Government and Indian tribal governments.

(b) With respect to Federal statutes and regulations administered by Indian tribal governments, the Federal Government shall grant Indian tribal governments the maximum administrative discretion possible.

(c) When undertaking to formulate and implement policies that have tribal implications, agencies shall:

(1) encourage Indian tribes to develop their own policies to achieve program objectives;

(2) where possible, defer to Indian tribes to establish standards; and

(3) in determining whether to establish Federal standards, consult with tribal officials as to the need for Federal standards and any alternatives that would limit the scope of Federal standards or otherwise preserve the prerogatives and authority of Indian tribes.

**Sec. 4. *Special Requirements for Legislative Proposals.*** Agencies shall not submit to the Congress legislation that would be inconsistent with the policy-making criteria in Section 3.

**Sec. 5. *Consultation.*** (a) Each agency shall have an accountable process to ensure meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications. Within 30 days after the effective date of this order, the head of each agency shall designate an official with principal responsibility for the agency's implementation of this order. Within 60 days of the effective date of this order, the designated official shall submit to the Office of Management and Budget (OMB) a description of the agency's consultation process.

(b) To the extent practicable and permitted by law, no agency shall promulgate any regulation that has tribal implications, that imposes substantial direct compliance costs on Indian tribal governments, and that is not required by statute, unless:

(1) funds necessary to pay the direct costs incurred by the Indian tribal government or the tribe in complying with the regulation are provided by the Federal Government; or

(2) the agency, prior to the formal promulgation of the regulation,

(A) consulted with tribal officials early in the process of developing the proposed regulation;

(B) in a separately identified portion of the preamble to the regulation as it is to be issued in the **Federal Register**, provides to the Director of OMB a tribal summary impact statement, which consists of a description of the extent of the agency's prior consultation with tribal officials, a summary of the nature of their concerns and the agency's position supporting the need to issue the regulation, and a statement of the extent to which the concerns of tribal officials have been met; and

(C) makes available to the Director of OMB any written communications submitted to the agency by tribal officials.

(c) To the extent practicable and permitted by law, no agency shall promulgate any regulation that has tribal implications and that preempts tribal law unless the agency, prior to the formal promulgation of the regulation,

(1) consulted with tribal officials early in the process of developing the proposed regulation;

(2) in a separately identified portion of the preamble to the regulation as it is to be issued in the **Federal Register**, provides to the Director of OMB a tribal summary impact statement, which consists of a description of the extent of the agency's prior consultation with tribal officials, a summary of the nature of their concerns and the agency's position supporting the

need to issue the regulation, and a statement of the extent to which the concerns of tribal officials have been met; and

(3) makes available to the Director of OMB any written communications submitted to the agency by tribal officials.

(d) On issues relating to tribal self-government, tribal trust resources, or Indian tribal treaty and other rights, each agency should explore and, where appropriate, use consensual mechanisms for developing regulations, including negotiated rulemaking.

**Sec. 6. *Increasing Flexibility for Indian Tribal Waivers.***

(a) Agencies shall review the processes under which Indian tribes apply for waivers of statutory and regulatory requirements and take appropriate steps to streamline those processes.

(b) Each agency shall, to the extent practicable and permitted by law, consider any application by an Indian tribe for a waiver of statutory or regulatory requirements in connection with any program administered by the agency with a general view toward increasing opportunities for utilizing flexible policy approaches at the Indian tribal level in cases in which the proposed waiver is consistent with the applicable Federal policy objectives and is otherwise appropriate.

(c) Each agency shall, to the extent practicable and permitted by law, render a decision upon a complete application for a waiver within 120 days of receipt of such application by the agency, or as otherwise provided by law or regulation. If the application for waiver is not granted, the agency shall provide the applicant with timely written notice of the decision and the reasons therefor.

(d) This section applies only to statutory or regulatory requirements that are discretionary and subject to waiver by the agency.

**Sec. 7. *Accountability.***

(a) In transmitting any draft final regulation that has tribal implications to OMB pursuant to Executive Order 12866 of September 30, 1993, each agency shall include a certification from the official designated to ensure compliance with this order stating that the requirements of this order have been met in a meaningful and timely manner.

(b) In transmitting proposed legislation that has tribal implications to OMB, each agency shall include a certification from the official designated to ensure compliance with this order that all relevant requirements of this order have been met.

(c) Within 180 days after the effective date of this order the Director of OMB and the Assistant to the President for Intergovernmental Affairs shall confer with tribal officials to ensure that this order is being properly and effectively implemented.

**Sec. 8. *Independent Agencies.*** Independent regulatory agencies are encouraged to comply with the provisions of this order.

**Sec. 9. *General Provisions.*** (a) This order shall supplement but not supersede the requirements contained in Executive Order 12866 (Regulatory Planning and Review), Executive Order 12988 (Civil Justice Reform), OMB Circular A-19, and the Executive Memorandum of April 29, 1994, on Government-to-Government Relations with Native American Tribal Governments.

(b) This order shall complement the consultation and waiver provisions in sections 6 and 7 of Executive Order 13132 (Federalism).

(c) Executive Order 13084 (Consultation and Coordination with Indian Tribal Governments) is revoked at the time this order takes effect.

(d) This order shall be effective 60 days after the date of this order.

**Sec. 10. *Judicial Review.*** This order is intended only to improve the internal management of the executive branch, and is not intended to create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law by a party against the United States, its agencies, or any person.

A handwritten signature in black ink that reads "William Clinton". The signature is written in a cursive style with a large, prominent "W" and "C".

THE WHITE HOUSE,  
*November 6, 2000.*

[FR Doc. 00-29003  
Filed 11-8-00; 8:45 am]  
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