



FR 545 Road Shoulder Repairs Sunset Crater Volcano National Monument Coconino County, Arizona

Environmental Assessment / Assessment of Effect

August 2008

Note to Reviewers and Respondents

If you wish to comment on the Environmental Assessment, you may enter them online at the National Park Service website Planning, Environment, and Public Comment (<http://parkplanning.nps.gov/>) or you may mail comments to: Christopher Donnermeyer, Compliance; (Flagstaff Area National Monuments, 6400 N. Hwy 89, Flagstaff, Arizona 86004). This Environmental Assessment will be on public review until September 15, 2008. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment including your personal identifying information may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Summary

The National Park Service (NPS) proposes to repair shoulders along the south entrance road to Sunset Crater Volcano National Monument. The road is designated as FR 545 and NPS Rt. 10, Bonito Park. The work area includes approximately 1.9 miles of FR 545 from the junction of U.S. Highway 89 to the Sunset Crater entrance station/kiosk. As part of the project, two informal turn-outs would be closed and obliterated, and one turn-out would be formalized for future use. The Old Haul Road (FR 9129E), just west of Bonito Park, would also be closed at the FR 545 junction.

The current shoulder material for FR 545 consists of volcanic cinders that offer no compaction when vehicles are driven over it. As a result, when motor vehicles drive off of the pavement they damage both the edge of the asphalt surface and portions of the road shoulder; more damage will occur if the problem is not corrected. Further damage occurs when visitors use the informal turn-outs, which were not designed or intended for off-pavement use. To accommodate visitors, a formalized turn-out would be constructed that matches the existing shoulder elevation.

This Environmental Assessment/Assessment of Effect (EA/AEF) analyzes the impacts of two alternatives: 1) no action and 2) repair of Sunset Crater south entrance road shoulders. Impacts to geologic resources, vegetation, wildlife, special status species, archeological resources, historic structures, park operations, and visual quality are described in this document.

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Introduction

This EA/AEF provides disclosure of the planning and decision-making process and potential environmental consequences of repairing shoulders of the south entrance road to Sunset Crater Volcano National Monument. The road is designated as FR 545 and NPS Rt. 10, Bonito Park. The document contains the information needed for consultation with the Arizona State Historic Preservation Office under Section 106 of the National Historic Preservation Act. The analysis of environmental consequences was based on a need to involve the public and other agencies in the decision-making process and to adequately analyze the consequences of the impacts related to the proposed action. In implementing this proposal, the NPS would comply with all applicable laws and executive orders.

Purpose And Need

Visitors to Sunset Crater Volcano National Monument occasionally drive off of the south entrance road (FR 545) and on to the road shoulders. The current shoulder material for FR 545 consists of volcanic cinders that offer no compaction when driven over by motor vehicles. When this occurs, both the shoulder and edge of the asphalt surface are damaged. Visitors also use two informal turn-outs to park or turn around, causing further damage to off-pavement surfaces. Finally, off-road vehicles continue to access the so-called Old Haul Road (FR 9129E) where it intersects with FR 545. The road was closed in the 1990s, but individuals have ignored barriers and road-closure signage, further impacting areas accessed by FR 9129E, such as Bonito Park. As proposed, the NPS would repair shoulders along the south entrance road, close the two unofficial turn-outs, construct a formalized turn-out for visitor use, and re-close FR 9129E at its junction with FR 545. The purpose of the proposal will be to provide for a safe road that minimizes impacts to resources, provides for safe and efficient turn-outs, and reinforces FR9129E as a closed road.

Project Objectives

Four objectives have been identified:

1. Remove the shoulder material of FR 545 and replace it with base materials that can be compacted and sloped to meet safety and resource issues.
2. Obliterate the two informal turn-outs.
3. Construct a formalized turn-out.
4. Close the Old Haul Road (FR 9129E) where it intersects with FR 545.

Project Location

Sunset Crater Volcano National Monument encompasses over 3,000 acres northeast of Flagstaff, Arizona (Figures 1 and 2) and represents the Colorado Plateau's most recent volcanic eruption. It is the youngest, least-eroded cinder cone in the San Francisco Volcanic Field. The south entrance road accesses the west end of the monument and provides an

approach to Wupatki National Monument to the north. Local residents also use FR 545 to access private land between the two monuments.

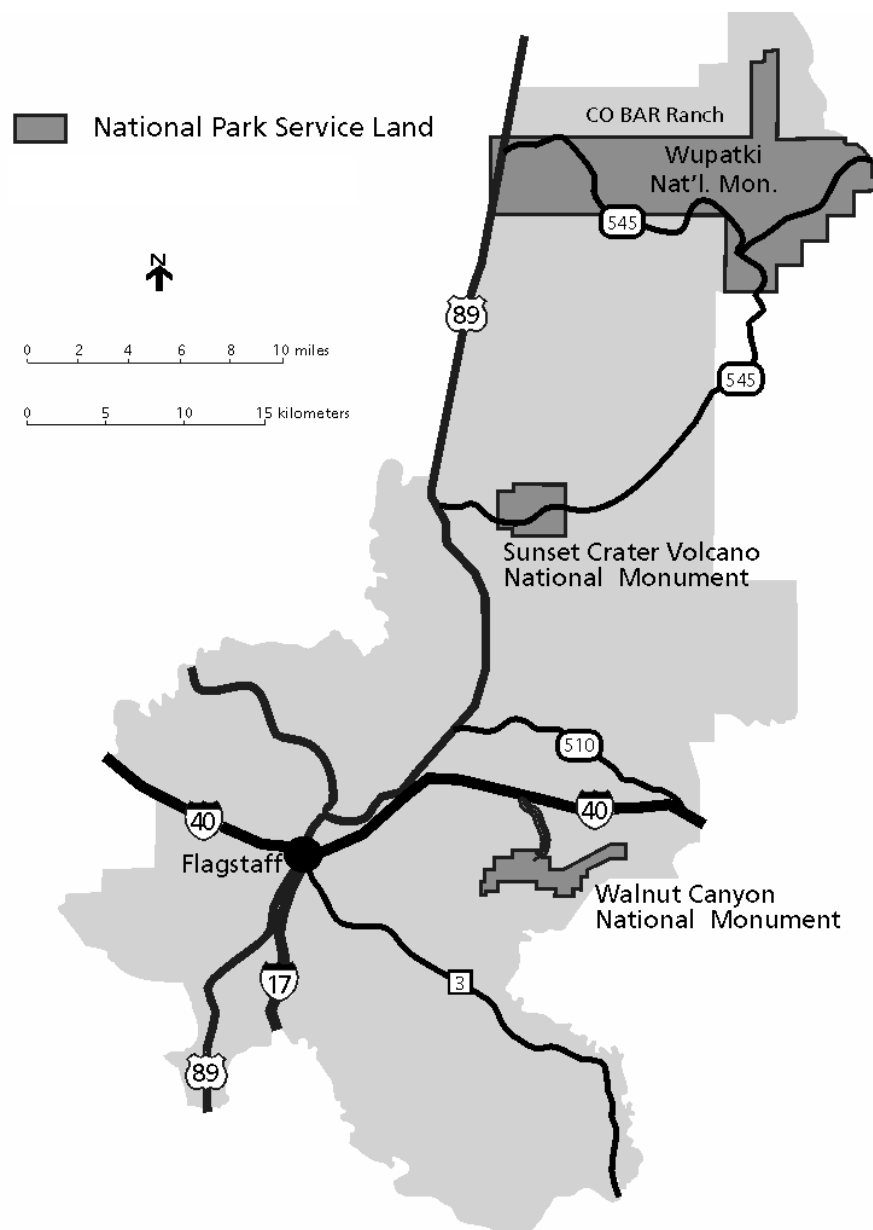


Figure 1. Vicinity map (Source: Sunset Crater Volcano National Monument Final GMP 2002).

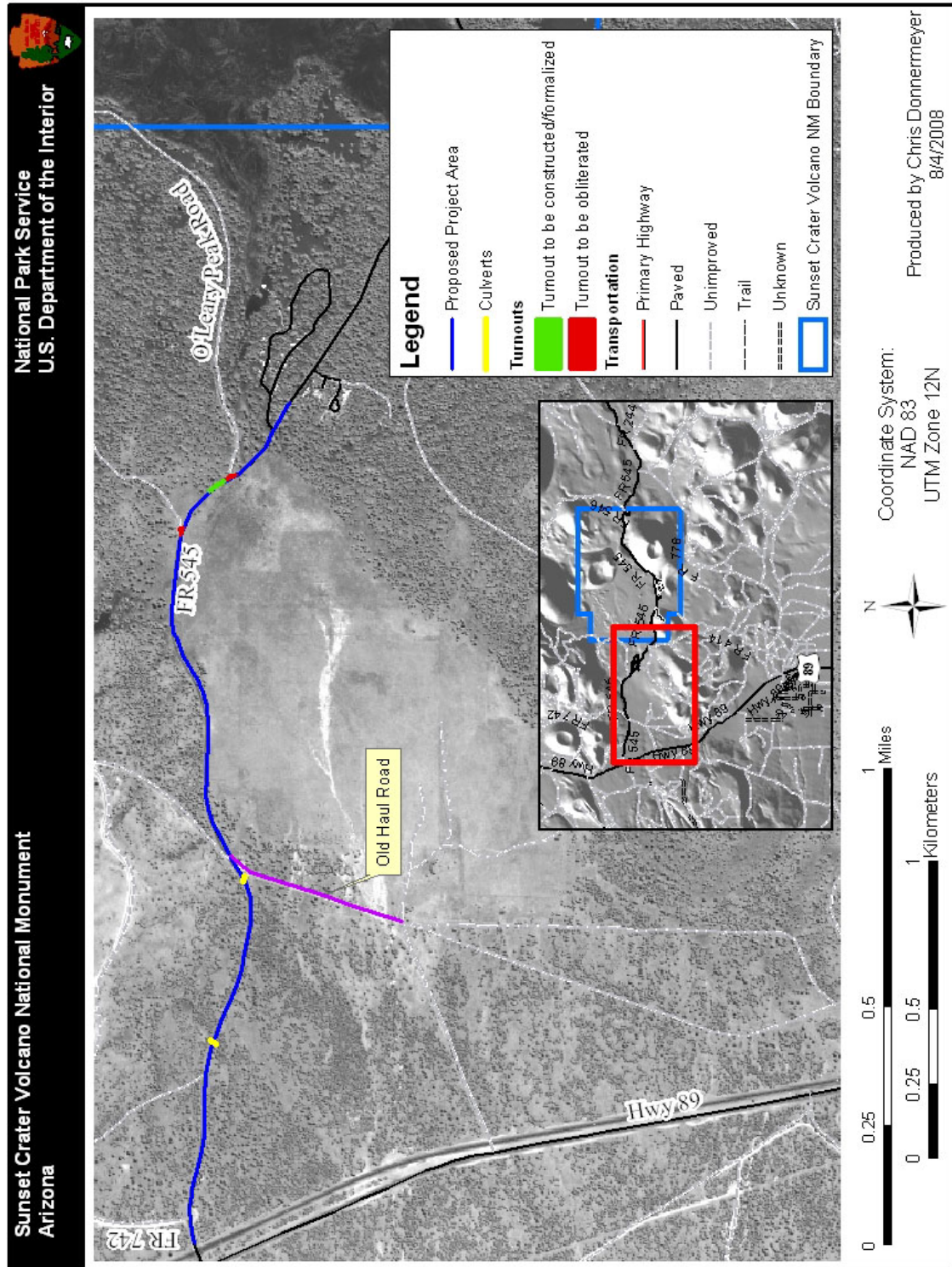


Figure 2. Project area map.

Relationship to Sunset Crater Volcano General Management Plan

The Final General Management Plan for Sunset Crater Volcano National Monument calls for facilities, services, and recreational opportunities to be offered but in keeping with site-specific requirements of resource protection and visitor enjoyment. The project area lies within the administrative zone identified in the General Management Plan. Within this zone the natural environment may be modified for park operation needs, but changes should be made in a way that harmonizes with the natural environment.

Appropriate Use

Sections 1.4 and 1.5 of *Management Policies* (2006) direct that the National Park Service must ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use may be allowed within a park only after a determination has been made in the professional judgment of the park manager that it will not result in unacceptable impacts.

Section 8.1.2 Of *Management Policies* (2006), *Process for Determining Appropriate Uses*, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for

- ☐ Consistency with applicable laws, executive orders, regulations, and policies;
- ☐ Consistency with existing plans for public use and resource management;
- ☐ Actual and potential effects on park resources and values;
- ☐ Total costs to the service; and
- ☐ Whether the public interest will be served.

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or discontinue it. More information on the definition of unacceptable impacts as cited in §1.4.7.1 of *Management Policies* (2006) can be found in the *Environmental Consequences* chapter.

Properly maintaining park roads is vital to ensuring visitor and employee safety. Addressing this issue along FR 545 west of the Sunset Crater Volcano National Monument visitor center is necessary. The construction of the formal turnout would allow visitors a location to view Bonito Park and the surrounding landscape. The proposed work is consistent with the park's general management plan and other related park plans. The NPS finds that this project is an acceptable use at Sunset Crater Volcano National Monument.

Issues and Impact Topics Included in this Document

This environmental analysis was prepared in accordance with the regulations of the Council on Environmental Quality (CEQ), the National Environmental Policy Act (40 CFR § 1500 *et seq.*) and in §516 of the U.S. Department of the Interior's Departmental Manual.

In March 2008, a public scoping letter about this project was sent to 87 individuals including federal and state agencies, special interest groups, American Indian tribes, and interested citizens. The letter described the proposed project and requested comments. A written letter was received from the Hopi Tribe, Arizona, regarding the closure of the Old Haul Road (FR 9129E). A response by the NPS is provided in the section "Ethnographic Resources" below. A written letter was also received from the Arizona State Historic Preservation Office (SHPO), acknowledging receipt of the scoping letter.

Issues to be carried forward in the analysis were developed by NPS staff and its contractor during the scoping process. The public identified one additional issue during public scoping.

Impact topics were then selected for detailed analysis based on substantive issues, environmental statutes, regulations and executive orders; and NPS Management Policies (2001a). Once issues were identified, they were used to help formulate the mitigation measures. Impact topics analyzed in this document include geologic resources, vegetation, wildlife, special status species, archeological resources, historic structures, park operations, and visual quality. A summary of the impact topics and rationale for selection are described below.

Natural Resources

Geologic Resources

The proposed road shoulder repair and related tasks would involve ground-disturbing activities within the area of effect. The area of effect includes a 10 foot right-of-way from the edge of the existing pavement on each side of the FR 545 road. It also includes an area 185 feet long and 15 feet wide for the new turn-out. Sunset Crater Volcano National Monument was established under the Antiquities Act to preserve and protect the unique geologic features associated with the Sunset Crater volcanic eruption. The effects of this project upon these resources should be considered, and this topic will be analyzed in this document.

Biotic Communities

Vegetation

The proposed project would involve disturbance and long-term removal of a small area of native vegetation within the area of effect. This project involves primarily the reconstruction of the existing road shoulder, and it is expected that forbs and shrubs would be removed; no trees, however would be impacted or removed. The potential also exists for introduction and/or spread of exotic vegetation and noxious weeds from ground disturbing activities. Therefore, this topic will be analyzed in this document.

Wildlife

The proposed road repair and related activities could potentially disturb wildlife and result in long-term loss of a small area of wildlife habitat. Therefore, this topic will be analyzed in this document.

Special Status Species

Section 7 of the Endangered Species Act of 1973, as amended, requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. Annual winter surveys have documented that bald eagles (*Haliaeetus leucocephalus*), a federally "Threatened" species, winter in the area and have been routinely observed above the loop road corridor. There are, however, no records of bald eagle nests in the project area.

Monument staff and the Arizona Heritage Database were consulted for a listing of species of concern not listed as threatened or endangered by the U.S. Fish and Wildlife Service, but nonetheless of concern to agencies. Pronghorn antelope (*Antilocapra americana*), the Gunnison prairie dog (*Cynomys gunnisoni*), and the golden eagle (*Aquila chrysaetos*) are wildlife species of concern. Three plant species of concern potentially occur within or nearby the project area: the Sunset Crater penstemon (*Penstemon clutei*), the saw phacelia (*Phacelia serrata*), and Welsh's scorpionweed (*Phacelia welshii*). Therefore, this topic will be analyzed in this document.

Cultural Resources

Archeological Resources

Cultural resources surveys have identified 14 archaeological sites along FR 545 in the vicinity of the project area (see Downum and Gumerman 1998). At least ten sites either span FR 545 or are within 10-20 feet of the edge of the pavement. The NPS is mandated to preserve and protect its cultural resources through the Organic Act of August 25, 1916, and through

specific legislation such as the Antiquities Act of 1906, NEPA of 1969 (as amended), National Historic Preservation Act of 1966, NPS Management Policies, Cultural Resource Management Guidelines (Director's Order-28), and the Advisory Council on Historic Preservation's implementing regulations regarding "Protection of Historic Properties" (36 CFR §800). Other relevant policy directives and legislation are detailed in Director's Order-28. The NPS has notified the SHPO that an EA/AEF would be prepared for this project to comply with Section 106 NHPA consultation requirements.

Ethnographic Resources

The lands of Sunset Crater Volcano National Monument are traditionally affiliated with a number of southwest tribes—the Havasupai, Hopi, Hualapai, White Mountain Apache, Yavapai Prescott, Yavapai Apache, Tonto Apache, Navajo Nation, Kaibab Paiute, San Juan Southern Paiute, and Zuni Tribes. Letters were sent to the tribes during the public scoping process. The Hopi Tribe responded with concerns for ethnographic resources that could be affected by the proposed undertaking. Specifically, the Hopi are concerned that re-closure of the Old Haul Road (FR 9129E) would restrict or deny access to plant gathering areas near Bonito Park. Because ethnographic resources (e.g., plant gathering areas) are known to occur in the general vicinity of the project area, this topic will be analyzed in this document.

Visitor Experience

Visual Quality

Vulnerability to visual impacts is a function of a site's visibility, the size of the development, and the site's capacity to absorb change. The proposed repairs and related activities may alter the visual condition of the area surrounding the south entrance road (FR545). Therefore, this topic will be analyzed in this document.

Public Health and Safety

There may be long-term benefits to visitor health and safety by repairing FR 545, creating a new turn-out, and related activities. Likewise, visitor health and safety may be diminished in the long-term by maintaining the current condition of the south entrance road. Therefore, this topic will be analyzed in this document.

Park Operations

The superintendent of Flagstaff Area National Monuments is responsible for managing Sunset Crater Volcano National Monument, its staff and residents, all of its programs, and its relations with persons, agencies, and organizations interested in the park. To fulfill these responsibilities, safe access to the monument and adequate visitor services are required. Repairs to the road shoulder of FR 545, and related actions, would ensure that the Park staff provides the full scope of functions and activities to meet resource, safety, and management objectives. Therefore, this topic will be analyzed in this document.

Impact Topics Eliminated from Further Consideration

Cultural Resources

Historic Structures

The headquarters area for the monument has historic significance and is known as the Sunset Crater National Monument Visitor Center Complex Historic District (Sunset Complex). The Sunset Complex is outside of the project area. No other historic structures have been identified within the area of effect. Therefore, this topic will not be analyzed in this document.

Air Quality

Project construction would result in an increase in fugitive dust from soil and road base exposure and disturbance. However, this effect would only occur during the construction phase and would be localized and negligible. Water or dust control agents would be applied

during construction, if necessary, to control dust. The proposed activities would also increase vehicle emissions from operating construction vehicles and hauling materials. The increased emissions would be localized and short-term, however, and would have an immeasurable effect on regional or local pollutant levels. Best Management Practices (BMPs) would be implemented (e.g., not allowing construction equipment to idle for more than five minutes, watering dusty areas, etc.). Therefore, this topic will not be analyzed in this document.

Soils

The project site lies in an area of unconsolidated, recent volcanic cinder and scoria deposits. Within these deposits, a thin, poorly-developed soil horizon has accumulated because of the vegetation that has developed over the years and its contribution to soil development. The project crosses the edge of Bonito Park, which is a low-lying area containing primarily a native grassland community. The proposed action would result in limited surface disturbance of up to a maximum of 10 feet from the edge of both sides of the pavement of FR 545, and up to 15 feet in the area of the new turn-out. Most of the disturbed area would be the old FR 545 road bed and grade materials. Inspectors would be on-site during construction and would allow very limited disturbance of original soils. Thus, impacts to the poorly-develop soil horizon would be considered negligible. Therefore this topic will not be analyzed in this document.

Environmental Justice

Environmental justice refers to fair treatment of all races, cultures, and income levels with respect to laws, policies, and government actions. In February 1994, Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations) was released. This order requires each federal agency to incorporate environmental justice as part of its mission. Specifically they are ordered to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations. In a related memorandum to heads of all federal departments and agencies, the President underscores provisions of existing laws that are intended to help ensure the environmental quality of communities throughout the nation. This memorandum states that mitigation identified in environmental documents should address significant and adverse environmental effects on minority and low-income communities.

None of the alternatives would have disproportionate health or environmental effect on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Environmental Justice Guidance, drafted in July 1996, as well as Executive Order 12898. The proposed project would impact everyone similarly and would not disproportionately affect any certain economic, religious, or ethnic class. Therefore, this topic will not be analyzed in this document.

Museum Collections

Any surface visible artifacts in the project area would be collected prior to the beginning of construction. Therefore, this topic will be discussed in this document.

Water Quality

The NPS seeks to restore, maintain, and enhance the quality of all surface and ground waters in the park, consistent with the Federal Water Pollution Control Act, as amended, and other applicable federal, state, and local laws and regulations. Construction of the proposed project to repair FR 545 road shoulders and related activities would occur outside of the 100-year floodplain and there are no plans for new construction within a wash or major drainage. For these reasons, the proposed action and all alternatives are deemed to have a negligible impact on water quality. Therefore, this topic is excluded from further environmental analysis.

Floodplains

Executive Order 11988 ("Floodplain Management") requires an examination of impacts to floodplains. The 2001 NPS Management Guidelines, DO-12, and the 2002 Final GMP

provide guidelines on developments proposed in floodplains. Executive Order 11988 requires all federal agencies to avoid construction within the 100-year floodplain unless no other practical alternative exists. Certain construction within a 100-year floodplain requires that a "Statement of Findings" be prepared and accompany a "Finding of No Significant Impact." The proposed FR 545 road shoulder repair project is not within the 100-year floodplain; therefore, none of the alternatives would be constructed within the 100-year floodplain. Consequently, no "Statement of Findings" for floodplains will be prepared and this issue will not be analyzed in this document.

Wetlands

Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid, where possible, impacts on wetlands. Proposed actions that have the potential to adversely impact wetlands must be addressed in a "Statement of Findings." Soils, hydrology, and vegetation typical of a wetland environment classify jurisdictional wetlands. No jurisdictional wetlands exist at or near the project area. Therefore, this topic will not be analyzed in this document.

Prime and Unique Farmland

All federal agencies are required to analyze the effects of their actions on soils classified as prime or unique by the Natural Resource Conservation Service (NRCS), as required by the Council of Environmental Quality in a memorandum of August 1980. The Farmland Protection Policy Act of 1981, as amended, also requires federal agencies to consider adverse effects to prime and unique farmlands that would result in conversion of prime and unique farmland to non-agricultural uses. Prime farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. There are no prime or unique farmlands associated with the project area. Therefore, this topic will not be analyzed in this document.

Socioeconomic Values

The local economy and most businesses of the communities surrounding the park are based on construction, recreation, transportation, tourist sales, services, and educational research; the regional economy is strongly influenced by tourist activity. There may be short-term, negligible benefits to the local and regional economy resulting from construction-related expenditures and employment. Park businesses would not suffer any appreciable adverse short or long-term economic impacts from any of the alternatives, and no businesses would be closed for construction purposes. During repairs and construction the south entrance road (FR 545) would be open and accessible to local residents. Finally, none of the proposed alternatives would change local or regional land use. The short and long-term socioeconomic impacts of implementing any of the action alternatives would be consistent with the impacts described in the GMP EIS. Therefore, this topic will not be analyzed in this document.

Soundscape

The NPS is mandated by DO-47 (Sound Preservation and Noise Management) to articulate their operational policies that would require, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of "the scenery and the natural and historic objects and the wildlife" protected by the Organic Act. Natural sounds may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern because they sometimes impede the ability of the NPS to accomplish their mission.

Noise impacts from this project would only last during construction. After construction is completed, noise level impacts would essentially return to their natural condition. All construction would occur during daylight hours, when roads and the associated traffic already impact the area. Therefore, this topic will not be analyzed in this document.

Lightscape

The 2006 Management Policies guide the NPS in cooperating with park neighbors and local agencies to minimize the intrusion of artificial light into the night scene. Elements such as the stars, planets, and earth's moon that are visible during clear nights influence many species, including humans. Project repairs and related tasks would conform to all standards required by the NPS to maintain the existing dark sky. For example, project tasks would be limited to daylight hours and would not affect the ambient night sky. Upon completion, light levels along FR 545 would remain at the same level as before construction. Therefore, lightscape will not be analyzed in this document.

Chapter

2 Alternatives

Introduction

This section describes one action alternative for this project, in addition to the Council on Environmental Quality (CEQ) required no action alternative. Although the option of continuing current management/no action does not improve operational efficiency, current conditions are used as the baseline against which the action alternative can be analyzed. This is the context for determining the relative magnitude and intensity of impacts. The no action alternative is referred to as "Alternative A, Current Management/No Action" for the purposes of this environmental assessment.

Alternative A – Current Management/No Action

The No Action alternative would maintain the existing conditions of the south entrance road to Sunset Crater Volcano National Monument, also known as FR 545 or NPS Rt. 10, Bonito Park. The No Action alternative provides the baseline for comparison with the action alternative. This alternative would result in the NPS rejecting the proposal for repairs to the road shoulders of FR 545 and related activities.

The south entrance road associated with Sunset Crater Volcano National Monument was constructed and is operated by NPS under an agreement with the US Forest Service (USFS). A Memorandum of Understanding between USFS and NPS establishes the responsibilities and uses of FR 545 at Sunset Crater Volcano National Monument. Currently, the road is maintained by the NPS, but provides access not only to the monument but adjacent lands managed by the USFS. The existing road is based on planning initiated in the 1950s and put into place in the late 1960s.

Alternative B – Road Shoulder Repairs to FR 545/NPS Rt. 10, Bonito Park

In this alternative, shoulders would be repaired along the south entrance road (FR 545) to Sunset Crater Volcano National Monument. The work area includes approximately 1.9 miles of FR 545 from the junction of U.S. Highway 89 to the Sunset Crater entrance station/kiosk (Figure 2).

The proposed work calls for removing the shoulder material of FR 545 and replacing it with base materials that can be compacted and sloped to meet safety and resource issues. The current shoulder material consists of volcanic cinders, which offer no compaction when vehicles are driven over it. After removal of the shoulder material, a new aggregate base would be deposited with a 3-inch upper layer of topsoil. The construction limit would be 10

feet from the edge of the pavement on both sides of the road. A 4:1 grade (Federal Highway Administration standard) would be used except along areas where the shoulders are steep and the ground surface is significantly lower than the road surface. In these areas the grade would be steeper than a 4:1 to adhere to the 10 ft. construction limit; a 2:1 or 1:1 may be necessary at some locations. One lane of FR 545 would be closed where work is occurring with appropriate safety control, but access into and out of the monument would be allowed.

During the construction process the toe of the slope of the new shoulders would exceed the end of two culverts, (Refer to Figure 2), making it necessary to extend the culverts. The first culvert, located closest to highway 89 would have approximately six feet of culvert added to both ends. The second culvert would also have approximately five feet added but only on the south end of the culvert. Both culverts would also have diffusers on the downstream ends. The construction limit at the two culvert locations is 20 ft. as this work would extend beyond the 10 ft. construction limit.

Additional work consists of obliteration of two informal turn-outs along FR 545. Visitors have increasingly used the turn-outs, which were never designed or intended for use. Obliteration of the two sections would include ripping and scarifying of the current disturbed surfaces. To accommodate visitors who might wish to park along FR 545 in the Bonito Park area, a formalized turn-out would be constructed that matches the existing shoulder elevation. Installation of the turn-out would involve grading and laying base material and asphalt. The new turn-out would be 185 feet long and 15 feet wide with tapered ends. This turn-out is located in a relatively level area that has been previously disturbed by visitors, who use it to park or turn around their vehicles.

Finally, the NPS proposes to enhance the closure of the Old Haul Road (FR 9129E) where it intersects with FR 545. The road was closed in the 1990s and the closure was signed, but individuals continue to use it. Some of the barriers (e.g., boulders) have been moved and vehicles have circumvented the remaining barriers. In the process damage has occurred to existing portions of the road shoulder and right-of-way. The NPS proposes to augment the closure of FR 9129E by putting up new barriers, such as boulders and large tree branches, and installing a new sign indicating that the road is closed to motorized vehicles. The installation of new barriers and a "road closed" sign would reduce impacts to the road shoulder of FR 545 and areas accessed by FR 9129E.

Mitigation Measures for the Action Alternative

Best Management Practices (BMPs) and mitigation measures would be used to prevent or minimize potential adverse effects associated with construction activities. These practices and measures would be incorporated into the project construction documents and plans to ensure that major adverse impacts would not occur. Mitigation measures undertaken during construction activities would include, but are not limited to:

Natural Resources

Construction zones would be fenced with construction tape, snow fencing, or some similar material before any construction activity begins. The fencing would define the construction zone and confine activity to the minimum area required for construction. For this project, activity related to road shoulder repair is restricted to 10 feet from the edge of the existing road pavement. For construction of the new turn-out activity is restricted to 15 feet from the edge of the road pavement. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

Biotic Communities

Vegetation (Invasive Species)

To prevent and minimize the spread of exotic vegetation and noxious weeds, the following mitigation measures would be implemented:

1. Existing occurrences of exotic vegetation that are found at the project site would be treated and/or destroyed prior to construction activities. Surveys would be conducted in July-September 2008.
2. The source of all imported soil must be from a trusted source, and must be tested to ensure that it is weed-free.
3. All construction equipment that leaves the paved road would be pressure washed prior to entering the Monument.
4. Parking of vehicles would be limited to the maintenance facility, existing roads and pull-outs, or within the construction zone.
5. Post-project exotic plant monitoring and control would be conducted in the project area for 2 years following the completion of the project. Monitoring would consist of surveying the shoulders of both sides of FR 545 throughout the project area in the early summer and early fall of each of the two years. Control would consist of manually pulling all exotic plants encountered, or, if the infestation is too extensive, using only fully approved chemicals for control.

Vegetation (Native Species)

Construction activities would be conducted such a way that the least amount of vegetation would be removed to safely construct the new road shoulder and turn-out. No native trees would be removed during the entire project. All native shrubs and trees that are within possible strike distance of construction equipment and vehicles would be marked with flagging or fenced with construction tape. Destruction of native shrubs would be kept to an absolute minimum.

Wildlife

General wildlife surveys have been performed and it has been determined that the only sensitive wildlife species that may be negatively impacted by this project is the Gunnison prairie dog (Figure 3). Active and inactive burrows have been located directly on the existing road shoulder within the 10-foot construction zone.

Construction workers and supervisors would be advised to keep their work site clean of debris, especially food wrappers and waste that may attract wildlife. Workers and supervisors would also be instructed to not feed or harass the wildlife.

Gunnison Prairie Dog (*Cynomys gunnisonii*)

- Within the project area, all Gunnison prairie dog active and inactive burrows within a 10-foot buffer zone outside of the 10-foot construction zone would be marked with red flagging and surrounded with construction tape; this applies to both sides of FR 545. These precautions are necessary so that construction equipment and vehicles maintain an adequate distance to prevent caving-in or destruction of the burrows. It is estimated that no more than 20 burrows would have to be treated in this manner.
- All Gunnison prairie dog burrows within the 10-foot construction zone would be destroyed during construction. Thus, all live prairie dogs inhabiting active burrows would be captured and re-located away from the construction zone.

Special Status Species

No "Special Status" species have been located within the construction zone; however, not all surveys have been completed.

Sunset Crater beardtongue (*Penstemon clutei*)

- To date, no Sunset Crater beardtongue plants have been located within the project area. Final surveys would be conducted in May-July, 2008. In the event that some plants are located, the plant and the top layer of cinders and underlying soil associated with it would be removed and stored separately during construction, and replaced in the general area after the project is complete; this is a habitat conservation measure. The soil storage and replacement should be done in an area at least five feet outside of the boundary of the plant(s), i.e., a 5-foot radius for one plant or a tight clump of plants.

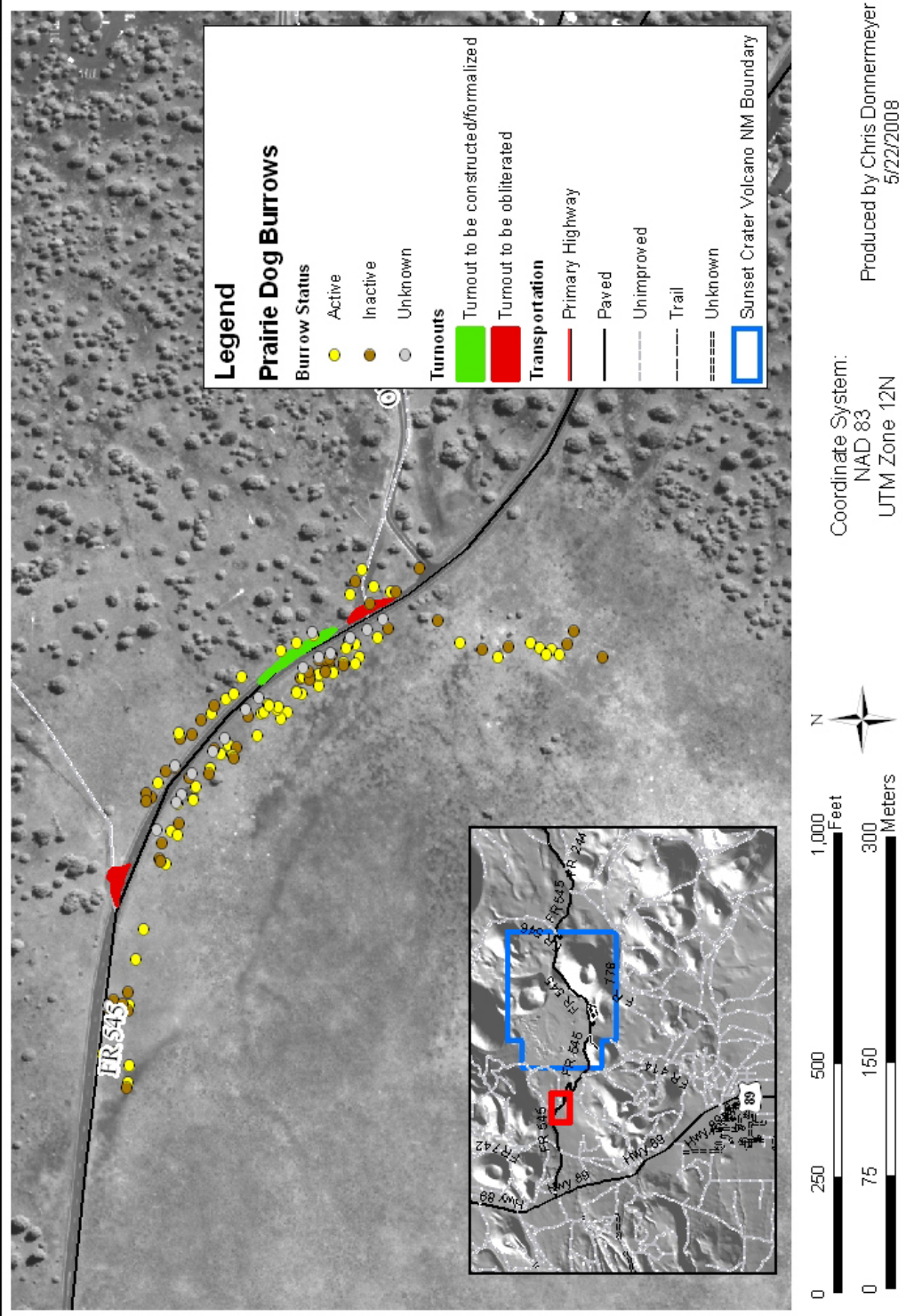


Figure 3. Prairie dog burrows map.

- The Sunset Crater beardtongue is a perennial found in: "Volcanic ash-cinders 5-10 cm thick with a layer of silty soil of similar thickness below. This soil structure has an important function in water retention after rains, and is critical for this species. The underlying soil retains water for a longer period of time than the cinder layers above after summer moisture is received. This allows the plant to retain moisture in the area of the root system during periods when no moisture is received. Areas of deep cinders without the soil layer, areas on the slopes of cinder cones where soil is unstable, and areas of dense vegetation cover by other vegetation such as Blue grama (*Bouteloua gracilis*) do not provide the required microhabitat for this plant" (Arizona Game and Fish 1997). Considering the strict habitat requirements of this species, and the type and amount of vegetation in the project area, this species has a low probability of occurring throughout the project area.
- If construction occurs after the existing plants have set seed, then seed would be collected from those plants, stored, and dispersed over the area where the plants were originally located after construction is completed, and the plants would be re-located as close to their original location as possible.

Saw Phacelia (*Phacelia serrata*)

- To date, the saw phacelia has been located within the project area. A survey in early July, 2008, located approximately 37 plants within 10-feet of the edge of the road near the east end of the project area. Thus, seeds will be collected and broadcast over the area once the project is completed. Since this species is an annual, it is not a good candidate for live transplanting.
- "*Phacelia serrata* grows in volcanic cinders. Population sizes depend upon winter and spring precipitation (Huisinga et al. 2000). In wet years, plants are very abundant and dense due to germination of dormant seeds within the soil. In drought years, the plants are sparse to rare (Arizona Game and Fish Department 1997). This species appears to be tolerant of man-made and natural disturbance. It has been reported to thrive in recently disturbed areas and has been observed in recently burned sites (Bateman 1980; Huisinga et al. 2000). Even after quarrying and totally removing all vegetation from a slope, as long as a suitable cinder substrate is available, this species will re-establish and reproduce. Its annual life cycle contributes to its tolerance of disturbance" (NatureServe 2002).

Welsh's phacelia (*Phacelia welshii*)

- To date, no Welsh's phacelia plants have been located within the project area. Final surveys would be conducted in May-July 2008. In the event that some plants are located, seeds would be collected and broadcast over the area once the project is completed. Since this species is an annual, it is not a good candidate for live transplanting.
- The range of this species is northeast of Flagstaff from Wupatki National Monument and Sunset Crater Volcano National Monument, north to Cameron and The Gap in northeastern Coconino County (Arizona Fish and Game 2004). It is primarily found between 1300-1550 m in the Great Basin cold desert shrub community, and occasionally in Pinyon-juniper or Plains and Great Basin grassland communities. Typically in the red shale outcrops of the Moenkopi Formation, along roadside edges and gravelly washes, but it has also been collected on black, sandy, volcanic ash; typical slopes are around 5% (Phillips et al. 1982).

Cultural Resources

Although the south entrance road to Sunset Crater bisects or is near ten known archaeological sites, most of the area of effect consists of previously disturbed road shoulders and adjacent turn-outs (Appendix A; Confidential Figure 4).

- An archeologist would monitor all ground-disturbing activities. If any isolated artifacts are found during construction, they would be documented and collected.
- If previously unknown archeological resources are discovered during construction, all work within a 100-foot radius of the discovery would be halted until the resources are identified and documented by a qualified archeologist from the NPS, and an appropriate mitigation strategy developed. The mitigation effort may include testing or data recovery excavations. If such work is required, the effort would be guided by a research design approved by the NPS.
- All workers would be informed of the penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers would also be informed of the correct procedures if previously unknown resources are uncovered during construction activities.
- Additionally, the NPS would begin consultations under the Native American Graves Protection and Repatriation Act in the event that buried human remains are discovered during archeological excavations or project development. If previously unknown burials are discovered, all work within a 100-foot radius of the discovery would be halted pending consultations and development of a mitigation strategy.

Comparison of Alternatives

The project objectives were identified in Chapter 1. Table 1 compares the ability of the alternatives to meet the project objectives.

Table 1. Comparison of Alternatives

Project Objective	Alternative A	Alternative B
1. <i>Remove the shoulder material of FR 545 and replace it with base materials that can be compacted and sloped to meet safety and resource issues.</i>	No. By maintaining the current FR 545 road shoulder material, the shoulder will continue to erode and destabilize due to off-pavement vehicular traffic. This will contribute to erosion of the asphalt road edge.	Yes. Replacing the current FR 545 road shoulder material with a new aggregate base and topsoil would reduce or minimize erosion of the shoulders and impacts to the asphalt road edge.
2. <i>Obliterate the two informal turn-outs.</i>	No. If the two informal turn-outs are not obliterated they will continue to be used by vehicles. The turn-outs were not designed for this type of use and the road shoulders, road edge and adjacent areas will continue to be impacted.	Yes. Obliteration of the two informal turn-outs would eliminate or greatly reduce motor vehicle impacts to resources in this area.
3. <i>Construct a formalized turn-out.</i>	No. If a formal turn-out is not constructed visitors will continue to rely on the two informal turn-outs as well as the road shoulder for parking, U-turns, etc. This will contribute to overall impacts to the FR 545 roadway and adjacent areas.	Yes. Designing and constructing a formalized turn-out would improve public safety and enhance the visitor experience in the Bonito Park portion of the Monument entrance road.
4. <i>Close the Old Haul Road (FR 9129E) where it intersects with FR 545.</i>	No. Current barriers to prevent access of FR 9129E from the entrance road are insufficient. If 9129E is not re-closed it will continue to be used, contributing to impacts to the FR 545 road shoulder and areas accessed by FR 9129E.	Yes. Constructing new barriers and installing a road-closed sign would greatly reduce or eliminate access to the Old Haul Road (FR 9129E) from FR 545, reducing impacts to resources in this area.

Summary Of Environmental Impacts

Table 2 is a matrix of environmental consequences to the impact topics identified in Chapter 1 as a result of implementing the alternatives.

Table 2. Summary of Environmental Consequences

Impact Topic	Alternative A <i>No Action</i>	Alternative B <i>Preferred Alternative</i>
Natural Resources		
Geologic Resources	No direct or indirect impacts. Cumulative impacts would be minor over the long-term, primarily as a result of continued use of informal turn-outs, which might affect cinder deposits.	No previously undisturbed recent volcanic scoria and cinder deposits would be disturbed to repair FR 545 road shoulders. The area of the new turn-out has also been previously disturbed, but grading and re-surfacing may impact a shallow, upper layer of nondisturbed soil, including cinders. No unique geologic features associated with the Sunset Crater Volcano eruption would be impacted. Long-term direct impacts to geologic resources would be minor. Cumulative impacts would be minor over the long-term.
Vegetation	Possible cumulative, minor impacts if continued use of informal turn-outs removes habitat for native vegetation.	No trees would be impacted. Small amounts of herbaceous and shrub vegetation would be destroyed. Long-term direct impacts to vegetation would be negligible. Cumulative impacts would be negligible and short-term.
Wildlife	No impact.	Direct and indirect impacts to wildlife would be negligible. Long-term habitat loss would be negligible since very little new ground would be disturbed. Cumulatively, impacts to wildlife would be negligible for the short- and long-term.
Species of Concern	No impacts to bald eagle, golden eagles, pronghorn antelope, Gunnison prairie dogs, Sunset Crater penstemon, saw phacelia, or Welsh's scorpionweed.	<p>The proposed project would have no adverse effect on bald eagles, golden eagles, and pronghorn antelope. Cumulative impacts to bald eagles, golden eagles, and pronghorn antelope as a result of implementing this alternative would also be negligible. The proposed project would have little adverse effect on the Gunnison prairie dog. Some individuals may be affected through relocation. Cumulative impacts to Gunnison prairie dogs as a result of implementing this alternative would be negligible.</p> <p>The proposed project would have no adverse effect on <i>Penstemon clutei</i>, <i>Phacelia serrata</i>, or <i>Phacelia Welshii</i>. Cumulative impacts as a result of implementing this alternative would be negligible.</p>
Cultural Resources		
Prehistoric	Possible cumulative, minor impacts to isolated artifacts in areas of informal turn-outs.	No adverse effect. Construction of the new formalized turn-out may have a long-term minor impact on one National Register eligible site, but the effect would not be harmful to those characteristics that qualify the resource for inclusion on the National Register.
Ethnographic Resources	No impact.	No impact. Access to plant gathering areas would not be restricted. The Old Haul Road (FR 9129E) has been closed since the 1990s. A parking area is available near the intersection of FR 545 and FR 9129E for individuals wishing to access this portion of Bonito Park.
Other		
Park Operations	Direct, indirect, and cumulative impacts to park operations would be long-term and moderate to major adverse under this scenario because of the continued degradation of the FR 545 road shoulders and pavement and two informal turn-outs.	Repairs to the FR 545 road shoulders and construction of a formalized turn-out would have long-term, major beneficial impacts on operational efficiency as many of the existing deficiencies regarding the south entrance road and visitor parking in the area of Bonito Park would be addressed and mitigated.
Visual Quality	Cumulative impacts would be long-term and minor due to use of informal turn-outs in scenic Bonito Park area.	An area 185 feet by 15 feet would be required for the new, formalized turn-out. Because of previous disturbance within this area, impacts would be considered a short-term major to long-term moderate. Cumulative impacts would also be long-term moderate.

Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the CEQ. The CEQ provides direction that "the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's § 101:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- Assure for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- Preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative B is the environmentally preferred alternative. Alternative B was designed to use existing administrative use area and previously disturbed areas where possible, and to avoid or mitigate major or adverse impacts to resources. Alternative B provides a high level of protection of natural and cultural resources and integrates resource protection. Although Alternative A does not propose any construction activities, the pavement of FR 545 is deteriorating along the edge, as are the road shoulders, and must eventually be repaired. The project would harden the shoulder and prevent or reduce further decline of the pavement. It would also minimize impacts from vehicles that pull off onto the shoulders and informal turn-outs, thus decreasing the risk of adverse impacts to natural and cultural resources in Bonito Park and other areas alongside the road.

Introduction

This chapter briefly describes the existing environment of the project area. This chapter is organized by the impact topics identified in Chapter 1.

Natural Resources

Geologic Resources

Sunset Crater Volcano erupted around 1040 - 1100 AD, and is the youngest dated volcano in the San Francisco Volcanic Field (Holm and Moore 1987). The local terrain is rugged and dominated by mostly barren basaltic cinder cones and lava flows. Sunset Crater Volcano lies at the southeastern corner of the monument. The volcano is a classic example of a cinder cone volcano, approximately 1,000 feet high and more than a mile wide at the base. At the crest of the cinder cone are fumerole deposits of distinct white, yellow, and pink minerals. While the cinder cone was erupting, two basalt lava flows extruded from the base of the cone. The Kana-A Flow flowed more than six miles to the northeast down a narrow valley. The Bonito Flow locally pooled over about two square-miles around the northwest base of the cinder cone. Sunset Crater Volcano erupted at the northwest end of a six-mile long volcanic fissure, trending northwest to southeast. A huge volume of volcanic scoria, lapilli, cinders, and ash were ejected into the air and deposited as a "tephra blanket" over an 800 square mile area around the volcano (Amos 1986, Hooten et al. 2001). During the peak of volcanic activity, at least nine other cinder cones, numerous smaller spatter cones and fumaroles, and three lava flows were simultaneously active along the fissure, forming a "ring-of-fire" style eruption much like those observed today in Hawaii. Most of this volcanic fissure and other geologic features associated with the Sunset eruption lie outside of the monument on the Coconino National Forest.

Biotic Communities

Sunset Crater Volcano National Monument is a very small natural area within a regional framework of lands that are primarily managed by the U.S. Forest Service for ecologically sustainable, multiple uses. The natural systems and processes surrounding the monument have been influenced by historical logging and timber management practices. Off-Road Vehicle (ORV) use has increased substantially in the past 15 years and this has compromised many facets of the biological integrity of the area. Preserving the integrity of the monument's natural systems requires close coordination with the Coconino National Forest to ensure that the full complement of plants and wildlife within the monument are conserved.

An inventory of natural resources within Sunset Crater Volcano was completed during the late 1970s (Bateman 1976, 1979). Recently, vegetation mapping (Thomas and Hansen 2005) and mammal inventories (Drost 2008) have also been completed. These studies are the best available documentation of the monument's flora and fauna. Research has also examined plant succession in the area following the volcano's eruption (Eggler 1966).

Rather than attempt to identify and describe all species of plants and wildlife within the study area, general vegetation communities (habitats) with associated characteristic species, and

species and habitats of particular concern are described in the following section. More detailed information can be attained from the studies referenced above.

Vegetation

Native vegetation

Vegetation is relatively sparse within the monument, but generally most of the monument is composed of various ponderosa pine (*Pinus ponderosa*) forest associations including scattered areas of Douglas fir (*Pseudotsuga menziesii*) forest, and pinyon pine (*Pinus edulis*) woodlands wherever there are soil pockets on cinder cone slopes, lava, and deep cinder deposits.

The project area, which is actually west of and just outside the monument, lies within an essentially pure stand of mature ponderosa pine, and straddles the edge of Bonito Park, a beautiful dry mountain meadow consisting primarily of blue grama (*Bouteloua gracilis*) and mountain muhly (*Muhlenbergia montana*) grassland.

Canopy cover in the project area is thick with sparse understory vegetation wherever the road is in the ponderosa pine forest. Where the road is in Bonito Park there are few trees and thick ground cover, which varies from approximately 40-70%, with many herbaceous plants due to the more developed soils and increased moisture availability in Bonito Park.

Non-native vegetation

Exotic vegetation has yet to become extensively established within Sunset Crater Volcano National Monument. There currently is little information on the distribution or impacts of non-native plants within the Monument. Non-native plant infestations, predominately mullen (*Verbascum thapsus*), are generally confined to road corridors, developed areas, or areas of heavy visitor use. These plants benefit from the additional runoff associated with paved surfaces and often out-compete native vegetation in these areas. Non-native plants may also rapidly colonize areas where the ground surface is disturbed by equipment or foot traffic. One patch of Camel-thorn (*Alhagi maurorum*), and diffuse knapweed (*Centaurea diffusa*), both tenacious noxious weeds, are known to occur along FR 545 outside of the Monument.

Wildlife

The vegetation cover of Bonito Park provides much forage and cover for wildlife. Bonito Park is an area where numerous wildlife interactions occur, facilitated by the presence of the Gunnison prairie dog, which is a keystone species for the grassland habitat of the area, and provides food and shelter for a myriad of smaller and larger species. There is ample literature on prairie dogs in general playing keystone roles in the ecosystems where they are found (Kotliar et al. 1999; Kotliar 2000; Miller et al. 2000; Lomolino and Smith 2003). Prairie dog colonies host a high diversity of vertebrate, invertebrate, and plant species (Miller et al. 1996; Reading et al. 1989; Clark et al. 1982; Campbell and Clark 1981), a level of diversity sometimes markedly higher than surrounding grassland (Hansen and Gold 1977). Thus, Bonito Park is biologically one of the highest producing areas in and adjacent to the monument because of the high vegetation cover relative to all other areas and the presence of the Gunnison prairie dogs. Mammals observed on the monument include coyote, pronghorn, cottontail, jackrabbit, bobcat, squirrel, raccoon, porcupine, pocket gopher, and skunk. Numerous species of raptors, including bald eagles, golden eagles, and northern goshawks, use Bonito Park as hunting grounds, and over 100 species of avifauna have been observed in the monument (NPS 2005).

Special Status Species

The Arizona Heritage Database (Arizona Game and Fish Department 2006) was queried to generate a list of "Threatened and Endangered" species and other "Species of Concern" for Coconino County, Arizona. Currently, no federally listed threatened or endangered plant or

animal species are known to breed or reproduce in Sunset Crater Volcano National Monument (NPS 2002) or in the project area.

Wildlife

Gunnison Prairie Dog (*Cynomys gunnisonii*)

There is an active Gunnison prairie dog town adjacent to the proposed project area (see Figure 5). Due to a number of factors the U.S. Fish and Wildlife Service has been petitioned to list the Gunnison prairie dog as either threatened or endangered. This species has experienced major mortality factors including disease, predation, and disturbance by man. Colonies suffer drastic population declines and are often extirpated during outbreaks of flea-borne sylvatic plague (Rayner 1985; see also papers by Barnes, Cully, and Fitzgerald in Oldemeyer et al. 1993). This species and the black-tailed prairie dog (*Cynomys ludovicianus*) occur at densities up to 10 times higher and are more social than the white-tailed prairie dog (*Cynomys leucurus*), and thus are much more susceptible to the fast spread of plague; in fact, the Gunnison prairie dog is perhaps the most susceptible to this exotic (non-native) disease (Cully and Williams 2001).

The Gunnison prairie dog is also an important prey species in fall for migrating raptors in northern New Mexico (Cully 1988). USFWS (2006) found that a petition to list this species as threatened or endangered did not present substantial scientific information indicating that listing may be warranted under any pertinent threat factors. USFWS acknowledged that sylvatic plague has been and continues to be the primary mortality factor for Gunnison's prairie dog, especially at specific sites, but concluded that the impact that this disease has had on the overall status of the species is unclear.



Figure 5. Active Gunnison Prairie Dog Burrows in Bonito Park near Shoulder Repairs Project, FR 545. Sunset Crater Volcano National Monument.

Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles, listed as “Threatened” under the ESA, are winter residents and breeding birds within the region surrounding Sunset Crater Volcano National Monument. There are at least nine winter roosting or “significant perching” areas south of the monument on Coconino National Forest and other lands. A small number of breeding pairs may also nest around larger lakes within the region. However, there are no suitable aquatic feeding habitats within the monument, and bald eagles would not be expected to nest here, nor have any nests ever been found. Over-wintering bald eagles are routinely observed above the loop road corridor during annual winter surveys. Bald eagles may feed on carrion along the road corridor. Critical habitat has not been formally designated within or nearby the monument.

Mexican Spotted Owl (*Strix occidentalis lucida*)

One Federally “Endangered” species, the Mexican spotted owl (*Strix occidentalis lucida*), is known to occur on nearby Coconino National Forest land. The species lives and nests in dense, old growth forest on steep mountain slopes or in deep canyons. Suitable habitat conditions are not found and no records of nests have ever been found within the monument, but the Mexican spotted owl may rarely cross into the monument in search of prey. The proposed project is not located within critical habitat for the Mexican spotted owl as designated by the US Fish and Wildlife Service (NPS 2002).

Northern Goshawk (*Accipiter gentilis*)

A species of concern, the northern goshawk, is known to occur on nearby Coconino National Forest land. This species is widespread but solitary across much of the United States and southern Canada (Association for Biodiversity Information 2000). It nests and breeds in a wide variety of habitats, including agricultural areas and formerly logged forests. In Arizona, goshawks prefer forest interior stands of large ponderosa pine trees. Suitable habitat conditions are found within the monument and project area, but no records of nests have been found. There is a documented goshawk territory a couple miles west of the project area on Forest Service land. The northern goshawk may cross into the monument and/or project area in search of prey (NPS 2002).

Golden Eagle (*Aquila chrysaetos*)

Although they are not formally listed as a species of concern, golden eagles may forage within the monument. There are no records of golden eagle nests within Sunset Crater Volcano Monument, but suitable nesting habitat is found on nearby Coconino National Forest, Bureau of Land Management land, and at Wupatki National Monument. They are known to be sensitive to human presence (NPS 2002).

Pronghorn Antelope (*Antilocapra americana*)

Not formally listed as a species of concern, the pronghorn antelope herd within the region is currently being affected by large-scale habitat fragmentation and loss, and the regional pronghorn population has declined during the last few decades (Bright and Van Riper III 2000). Although pronghorn are not known to occur within the existing boundary of the monument, they are known to use Bonito Park as a fawning ground (NPS 2002). Fawning, which occurs between February and May, has not been observed in Bonito Park in 2008.

Plants

Sunset Crater Beardtongue (*Penstemon clutei*)

The Sunset Crater beardtongue is a narrow endemic of volcanic cinder areas in north-central Arizona. The Sunset Crater beardtongue is a distinct species in a genus of about 300 species indigenous to America from Alaska to Guatemala (AGFD 2003). Usually found in and around volcanic cinder cones, either in open areas or under ponderosa pine trees in spots without leaf litter. There are approximately 36 known populations, mostly small clusters of plants in scattered pockets in Sunset Crater Volcano National Monument and the surrounding area (Center for Plant Conservation).

Threats include off-road vehicles, herbivory by domestic and wild ungulates, and timber salvage operations (Center for Plant Conservation; AGFD 2003). This species may be threatened by horticultural collecting (AGFD 2003). No Sunset Crater beardtongue has been found in the project area.

Saw Phacelia (*Phacelia serrata*)

The saw phacelia is a rare annual forb. The species is designated a "Species of Concern" or "Species at Risk" by the US Fish and Wildlife Service. It was originally

designated a Category One "Candidate Species" (Federal Register 41 p. 242 1980). The saw phacelia is endemic to volcanic cinders in only two disjunct regions of the world, approximately 260 miles apart, in Arizona and New Mexico. Although locally abundant, its presence is dependent upon volcanic cinders as its specific substrate. The populations of saw phacelia appear to be stable. It occurs in Sunset Crater Volcano National Monument where it is protected. It is often locally abundant in both Arizona and New Mexico. However, its abundance is dependent upon precipitation, and in drought years it will be scarce to rare even in prime habitat (NatureServe 2008).

Limited research has been conducted on the reproduction of this species. Flowering takes place from mid-June to mid-September and the species takes advantage of the monsoon rains to flower and set seed late in the year (Huisinga et al. 2000). Seeds lay dormant in the ground until favorable environmental conditions. This is an important survival mechanism that is an adaptation to the variable precipitation of the arid southwest. Specific pollinators of this species have not been identified.

Volcanic cinders are quarried for road construction materials and this is a potential threat to its critical habitat. No saw phacelia has been found in the project area.

Welsh's Scorpionweed (*Phacelia welshii*)

Welsh's scorpionweed is an herbaceous annual found Northeast of Flagstaff from Wupatki National Monument and Sunset Crater Volcano National Monument, north to Cameron and The Gap in northeastern Coconino County. This species is usually found in the red shale outcrops of the Moenkopi Formation, along roadside edges and gravelly washes. However, it has also been collected on black, sandy, volcanic ash (Phillips et al. 1982), such as those found in the project area.

Populations vary from rare to abundant based on the amount of winter and spring precipitation (Phillips et al. 1982). There are ten recorded occurrences in Arizona and six in the Navajo Nation, some of which may overlap with Arizona's (NatureServe 2003). No Welsh's scorpionweed has been found in the project area.

Cultural Resources

The National Historic Preservation Act requires agencies to take into account the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places. The process begins with an identification and evaluation of cultural resources for National Register eligibility, followed by an assessment of effect on those eligible resources, and concluding after a consultation process. If an action could change in any way the characteristics that qualify the resource for inclusion on the National Register, it is considered to have an effect. No historic properties affected means that no cultural resources are affected. No adverse effect means there could be an effect, but the effect would not be harmful to those characteristics that qualify the resource for inclusion on the National Register. Adverse effect means the effect could diminish the integrity of the characteristics that qualify the resource for the National Register.

Archeological Resources

Sunset Crater Volcano National Monument, and its well-known namesake cinder cone, has played a pivotal role in Flagstaff-area archaeology for many decades.

Although not specifically set aside to preserve archeological remains, the Monument protects an important piece of prehistory relating to the impact of the 11th-century Sunset Crater eruption on the prehistoric occupants of the southern Colorado Plateau. The development of the prehistoric Sinagua culture in the Flagstaff area was profoundly affected by the geologic forces that formed Sunset Crater. Previous studies of archeological sites in the vicinity of Sunset Crater have been instrumental in improving our understanding of the geologic processes and timing of events that shaped Sunset Crater while, at the same time, current studies of the volcano and associated lava flows are helping us to decipher the sequence of events that shaped human prehistory in the region. The area retains importance to numerous American Indian tribes.

Only two years before the establishment of Sunset Crater as a national monument, Dr. Harold S. Colton founded the Museum of Northern Arizona in Flagstaff. Colton and his colleagues linked the eruption of Sunset Crater with major changes in the local Sinagua culture (Downum 1988). Colton considered this to have been a pivotal event, and the timing of the eruptions (there were actually more than one, beginning about A.D. 1066) and the effects they had on past peoples remain one of the dominant research issues in Flagstaff area archaeology.

The archaeological history of Sunset Crater and Flagstaff archaeology has been well documented, with important syntheses available in Colton's own early volume on the Sinagua (1946), John Wilson's dissertation "The Sinagua and Their Neighbors" (1969), and Chris Downum's recent "One Grand History," subtitled "A Critical Review of Flagstaff Archaeology, 1851 to 1988" (1988). Important recent archaeological research related to development and cultural resource management in the Flagstaff area includes Baldwin and Bremer's survey of Walnut Canyon National Monument (1986), a survey of Wupatki National Monument, also in the 1980s (Anderson 1990), excavations along the Transwestern Pipeline corridor entitled "Before the Sky Fell: The Pre-Eruptive Sinagua of the Flagstaff Area" (Bradley 1994), excavations at sites along Highway 89 north of Flagstaff (e.g., Keuren et al. 2007, Elson 2007), archaeological investigations within administrative areas used by the NPS for Sunset Crater (Downum and Gumerman 1998), and an intensive survey of new lands added to Walnut Canyon National Monument (Neff and Spurr 2004).

A number of archeological sites have been documented within the boundaries of Sunset Crater Volcano or on the adjoining administrative lands. Some nearby areas lying outside monument boundaries on USFS lands have been inventoried at various levels of intensity, including most of the NPS administrative area, the USFS campground, and some of the forested terrain adjoining Bonito Park.

Fourteen prehistoric archeological sites are either bisected by FR 545 or are located in close proximity to the road (see Appendix A). Although the road crosses six sites, there should be no adverse effects because construction would be limited to previously disturbed sediments (i.e., the road shoulders). The proposed new turn-out may potentially affect one of the sites (AR-03-04-02-1664). The site boundary is adjacent the area of effect for the turn-out, but much of the surface area for the turn-out has already been disturbed by previous activities. The site, however, still maintains a high degree of integrity.

Ethnographic Resources

The area that now comprises Sunset Crater Volcano National Monument and surrounding forest lands has been used by both prehistoric and historic Native Americans for millennia. That use includes—but is not limited to—hunting of game, gathering wild plants for food, farming of domesticates, and collecting plant, animals, and minerals for functional and ceremonial purposes. The landscape, including Sunset Crater, is also part of the living cosmos of numerous present-day tribes and Native peoples. Parts of the landscape have special meaning and uses, and have been identified as Traditional Cultural Properties (TCPs)

for the purposes of agency management and protection. As an example, the Navajo tribe recently completed an ethnographic overview entitled "*Nihikek'eh Nahaz's Our Place in the Land*" (Begay and Begay 2003), which concentrates on the Flagstaff area monuments from a Dinè perspective. During the public scoping portion of this Environmental Assessment, the Hopi Tribe raised concerns about the future of plant gathering in the Bonito Park area. Thus, the affected environment must include identified ethnographic resources in the project area.

Park Operations

The visitor center, entrance station, and associated maintenance and housing areas are all located on Coconino National Forest land and are operated under a memorandum of understanding with U.S. Forest Service. The visitor center/maintenance complex, vintage Mission 66 construction, is directly south of FR545, approximately ½ mile west of the monument. The facility contains a small museum and book-selling area, attached offices, and rest rooms. Bonito Campground, a large developed campground managed by the Forest Service, is directly across from the visitor center on FR545.

Staff, visitors, emergency and maintenance personnel, and local residents use FR 545 on a daily basis. Visitors increasingly use the road shoulders and turn-outs for parking and U-turns. At least one Native American tribe has indicated that they use FR 9129E, via the south entrance road, to access plant gathering area in Bonito Park. The upkeep of FR 545 and any associated turn-outs is critical for safe and efficient park operations, resource protection, and visitor enjoyment.

Visual Quality

The Flagstaff Area National Monuments are relatively small enclaves of National Park Service management located within a geographic area dominated by the much larger Coconino National Forest. The Flagstaff Area National Monuments are managed in accordance with the NPS mandate "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

For many visitors, Sunset Crater Volcano is largely a drive-through experience, often in conjunction with a visit to Wupatki National Monument. Spectacular views of the volcano, lava flow, nearby mountains, and the San Francisco Peaks are available to all visitors, and make up a highly significant element of the visitor experience. Sunset Crater Volcano, the primary geological feature, is a prominent landmark for miles around. The trail to the top was closed in 1973, owing to highly visible impacts from heavy use (NPS 2002).

The proposed shoulder repairs to FR 545 will not alter the visual quality of the Monument except during the relatively brief phase of construction. The proposed new turn-out would be visible from the primary entrance road to the monument (FR 545), and by those accessing Bonito Campground. The turn-out area, however, is already disturbed and thus the visual quality of the formalized turn-out will not demonstrably alter the current visual quality of Sunset Crater Volcano National Monument.

Introduction

This chapter describes the environmental consequences, or impacts, that would result if the proposed project was implemented. Environmental consequences are the effects and impacts on the physical, biological, social, and economic environment that may be caused by implementing either Alternative A or B. Direct, indirect, and cumulative environmental effects, as well as impairment, are analyzed for each resource topic carried forward. The chapter is organized by resource topic, with environmental impacts discussed under each alternative.

Methodology

All alternatives have been evaluated for their effects on the resources and values that were identified during the scoping process (also known as the impact topics). Direct, indirect, and cumulative effects, as well as impairment are analyzed for each resource topic carried forward. Potential impacts are described in terms of type, context, duration, and intensity. General definitions are defined as follows, while more specific impact thresholds are given for each resource at the beginning of each resource section.

- **Type** describes the classification of the impact as either beneficial or adverse, direct or indirect:
 - *Beneficial*: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
 - *Adverse*: A change that moves the resource away from a desired condition or detracts from its appearance or condition.
 - *Direct*: An effect that is caused by an action and occurs in the same time and place.
 - *Indirect*: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.
- **Context** describes the area or location in which the impact will occur. Are the effects site-specific, local, regional, or even broader?
- **Duration** describes the length of time an effect will occur, either short-term or long-term:
 - *Short-term* impacts generally last only during construction, and the resources resume their pre-construction conditions following construction.
 - *Long-term* impacts last beyond the construction period, and the resources may not resume their pre-construction conditions for a longer period of time following construction.
- **Intensity** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of

intensity vary by resource topic, intensity definitions are provided separately for each impact topic analyzed in this environmental assessment.

Cumulative Effects

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), require assessment of cumulative impacts in the decision making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and preferred alternative.

Cumulative impacts were determined by combining the impacts of the preferred alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Sunset Crater National Monument and, if applicable, the surrounding region. The geographic scope for this analysis includes elements mostly within the monument's boundaries, while the temporal scope includes projects within a range of approximately ten years.

The alternatives were evaluated based on other past, present, and reasonably foreseeable future actions (regardless of who undertakes these additional actions). Impacts from these actions could result in individually minor effects, but when considered cumulatively, could result in more intense effects taking place over a period of time.

Cumulative effects were determined by combining the effects of the alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions at Sunset Crater Volcano National Monument and in the surrounding region. Other actions that have the potential to have a cumulative effect in conjunction with this project include:

- Increased recreational use on surrounding Coconino National Forest lands.
- Increased unauthorized access into the Resource Preservation Zone within the monument.
- Increased rural and urban development.
- Planning and design of new wayside exhibits and museum exhibits is in progress, in accordance with the Flagstaff Area National Monument's Comprehensive Interpretive Plan, to improve visitor understanding and appreciation of Sunset Crater Volcano resources. New wayside exhibits will replace and expand the existing system of interpretive signs along FR545 and at major existing visitor use areas, that is, at Bonito Park, Lava Flow Trail, Lenox trail, and the Painted Desert picnic area.

The recently completed City of Flagstaff and Coconino County growth plans emphasize managed growth, environmental protection, and conservation of biodiversity. The Coconino National Forest also recently completed the Flagstaff-Lake Mary Ecosystem Amendment to the Coconino National Forest Land and Resource Management Plan, emphasizing natural scenic quality along the monument entrance road corridor, non-motorized recreation north of the entrance road corridor, and off-road motorized recreation south of the entrance road corridor.

Impairment

Management Policies 2006 require analysis of potential effects to determine whether or not actions would impair park resources (NPS 2006). The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values.

Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values. An impact to any park resource or value may constitute an impairment, but an impact would be more likely to constitute an impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

1. necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
2. key to the natural or cultural integrity of the park; or
3. identified as a goal in the park's general management plan or other relevant National Park Service planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. A determination on impairment is made in the *Conclusion* section for each of the resource topics carried forward in this chapter.

Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the Park Service applies a standard that offers greater assurance that impairment will not occur by avoiding unacceptable impacts. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. Therefore, for the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would

- be inconsistent with a park's purposes or values, or
- impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or

- unreasonably interfere with
 - park programs or activities, or
 - an appropriate use, or
 - the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park.
 - NPS concessioner or contractor operations or services.

In accordance with *Management Policies*, park managers must not allow uses that would cause unacceptable impacts to park resources. To determine if unacceptable impacts could occur to the resources and values of Sunset Crater Volcano National Monument, the impacts of proposed actions in this environmental assessment were evaluated based on the above criteria. A determination on unacceptable impacts is made in the *Conclusion* section for each of the resource topics carried forward in this chapter.

Cultural Resources and Section 106 of the National Historic Preservation Act

In this environmental assessment, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). Potential impacts to cultural resources (archeological resources, prehistoric or historic structures, cultural landscapes, and traditional cultural properties) either listed in or eligible to be listed in the National Register of Historic Places were identified and evaluated in accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the National Historic Preservation Act (36 CFR 800, *Protection of Historic Properties*): by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are National Register listed or eligible; (3) applying the criteria of adverse effect to affected resources; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either adverse effect or no adverse effect must also be made for affected National Register eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register (e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR §800.5, *Assessment of Adverse Effects*). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order-12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse.

A §106 summary is included in the impact analysis sections under the preferred alternative. The §106 summary is intended to meet the requirements of §106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Natural Resources

Geologic Resources

Methodology and Intensity Level Definitions

Scientific papers, technical reports, and maps of the geologic resources associated with Sunset Crater Volcano were reviewed. The proposed repairs to FR 545 and associated activities were assessed for potential impacts to these geologic features.

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that would cause no change and no impact to existing geologic features.

Minor: An action that would locally affect only widespread or common geologic features. The change would have barely perceptible consequences to the integrity of geologic resources.

Moderate: An action that would affect a unique and irreplaceable geologic feature or a large area of widespread geologic features. The change would result in permanent partial loss of the integrity of geologic resources.

Major: An action that would destroy or permanently impair unique and irreplaceable geologic features or most of a large-scale geologic resource. The change would result in permanent loss and/or largely compromise the integrity of geologic resources.

Alternative A – No Action

As no new ground disturbing activities would occur, there would be **negligible** long-term direct or indirect impacts to geologic resources. If the road were not repaired, and the existing turn-outs continued to be used, there could be adverse but negligible to minor direct and indirect impacts to areas adjacent to the road shoulder and turn-outs. These impacts will be site-specific and likely not spread because off-road vehicle use is not allowed in the project area.

Cumulative Impacts. Geologic resources in the monument are adversely affected by disturbance to the unique cinder cone, lava flow, spatter cone, and other volcanic features caused by human activities inside and outside park boundaries. Inside the monument, areas receiving heavy visitor use, particularly steep slopes may continue to erode, along with the breakage, collapse, and loss of lava and spatter cone surfaces. Both the widespread tephra deposits and a number of unique volcanic features associated with the Sunset Crater volcanic eruption have been impacted to varying degrees on surrounding Coconino National Forest, Arizona State Land Trust, and privately owned lands around the project area. Most private lands are rapidly being developed as housing subdivisions, and the Arizona state lands are subject to eventually being sold for similar development. Most of the geologic features associated with the Sunset “Ring-of-Fire” eruption are on neighboring Coconino National Forest lands, and are being impacted by off-road driving activities within the Cinder Hills Off-Highway Vehicle Area (Cinder Hills OHV). The Cinder Hills OHV is approximately 13,600 acres, but a considerably larger surrounding area is being impacted by off-road

driving activity. Some of the geologic features that have already been impacted or are at risk are unique features that are irreplaceable. These impacts are anticipated to continue and increase well into the future as a result of continued community growth and outdoor recreational demands on the region.

Cumulative impacts related to the project primarily concern use of the FR 545 road shoulders and two existing turn-outs. Due to the location of FR 545, cumulative impacts of the “No Action” alternative to geologic resources would be **negligible** over the long-term.

Conclusion: There would be negligible direct or indirect impacts to geologic resources. Cumulatively, impacts to geologic resources associated with the Sunset Crater volcanic eruption would be **negligible** over the long-term.

No impairment of the monument’s geological resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument’s general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Alternative B – Preferred Alternative

Only the existing roadbed will be disturbed with little or no previously undisturbed recent volcanic scoria disturbed or built-upon to reconstruct the road shoulders and new parking area. No unique geologic features associated with the Sunset Crater Volcano (cinder cones, spatter cones, fissure vents, fumerole vents, lava flows, lava “squeeze-ups”, lava tubes, etc.) would be impacted. Long-term direct impacts to geologic resources would be site-specific and adverse but **negligible**.

Cumulative Impacts. Cumulative impacts would be the same as Alternative A, and would be **negligible** over the long-term. No foreseeable future project will add to the negligible impacts of this project.

Conclusion: There would be no direct or indirect impacts to geologic resources. Cumulative impacts to geologic resources associated with the Sunset Crater volcanic eruption would be **negligible** over the long-term.

No impairment of the monument’s geological resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument’s general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Vegetation

Methodology

All available information on known native vegetation, as well as exotic plants and noxious weeds was compiled. Where possible, map locations of known populations were compared with location of the project area. Predictions about short- and long-term site impacts were based on fieldwork completed in April through June of 2008.

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that would result in no native vegetation disturbed or limited disturbance to individual plants, but there would be no effect on native species populations. The effects would be short-term, on a small scale, and no species of special concern would be affected. Additionally, the action could result in the spread of noxious weeds, but the change would be so small that it would not be of any measurable or perceptible consequence.

Minor: An action that could result in disturbance to some individual native plants and could also affect a relatively minor portion of that species' population. Mitigation to offset adverse effects, including special measures to avoid affecting species of special concern, could be required and would be effective. Additionally, the action could result in the spread of noxious weeds. The change would be small and localized and of little consequence.

Moderate: An action that could result in disturbance to some individual native plants and would also affect a sizeable segment of the species' population in the long-term and over a relatively large area. Mitigation to offset adverse effects could be extensive, but would likely be successful. Some species of special concern could also be affected. Additionally, the action could result in the spread of noxious weeds. The change would be measurable and of consequence to the species or resource but more localized.

Major: An action that could result in a considerable long-term effect on native plant populations, including species of special concern, and could affect a relatively large area inside or outside the park. Mitigation measures to offset the adverse effects would be required, extensive, and success of the mitigation measures would not be guaranteed. Additionally, the action could have a noticeable invasion of noxious weeds. The change would be measurable and result in a severely adverse or major beneficial impact, and possible permanent consequence, upon the biotic community or resource.

Alternative A – No Action

As little or no new ground disturbing activities would occur, there would be only negligible direct impacts to vegetation. Occasionally, motor vehicles will directly and adversely impact vegetation by parking or driving on the road shoulders of FR 545. However, direct impacts would be short-term, **negligible, and site specific**.

Cumulative Impacts: Past development has created disturbances that have allowed the introduction of exotic plants and noxious weeds into the park. Knapweed (*Centaurea* spp.) and camelthorn (*Alhagi maurorum*) are known to occur along FR 545, but have not been found in the project area. Increased development projects in the general area and natural environmental disturbances will increase the potential for noxious weeds and exotic plants to spread in the park at a rate that may be difficult for the existing control programs to manage. Mitigation measures will be implemented for this and any future projects, in order to reduce

the potential for spread or introduction of exotic plants or noxious weeds. Therefore, cumulative impacts to vegetation would be **negligible to minor**.

Conclusion: There will be no long-term impacts to vegetation from Alternative A of this project. When considering this project and foreseeable future projects in the area, the direct, indirect, and cumulative impacts to vegetation will be **negligible to minor** over the long-term.

No impairment of the monument's vegetation resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Alternative B – Preferred Alternative

Direct impacts to vegetation would be adverse but **minor** because vegetation within the project area is sparse and the extent of the disturbance is primarily part of the existing road base or previously disturbed areas. These are primarily areas where the establishment of vegetation is limited to native annuals and non-native species. Little or no new ground disturbance will be allowed to occur during project execution. No conifer trees are found within the proposed project footprint.

With soil disturbance and exposure comes the potential opportunity for weedy plant invasion. Many weedy species are annuals and need very minimal requirements for establishment and propagation. Weed seed is carried from site to site on the tires of equipment and vehicles, in soils, on clothing, and by wind. As weedy species increase, native plants are often displaced. The staging and operation of construction equipment could trample soils which will have short-term impacts on understory vegetation; however, the vegetation is considered sparse within the project area, especially within the restricted 10-foot road shoulder area on either side of the existing pavement of FR 545, and in the area of the new turn-out.

Cumulative Impacts: Past development and maintenance activities have created soil and vegetation disturbances that have allowed the introduction of exotic plants and noxious weeds into the Monument and surrounding area. The proposed project, combined with foreseeable future projects in the area, will increase the potential for noxious weeds and exotic plants to spread in the Monument. Mitigation measures, including annual surveys and control, will be implemented for any future projects to reduce the potential for spread or introduction of exotic plants or noxious weeds. Therefore, cumulative impacts are expected to be **minor** and long-term.

Conclusion: Only vegetation growing on the existing road shoulder and in the turn-out parking area would be impacted, with no removal of trees. It is estimated that fewer than 10 shrubs will be removed. Long-term direct impacts to vegetation would be **minor** and site-specific. Direct, indirect, and cumulative impacts would also be **minor** and long-term.

No impairment of the monument's vegetation resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Wildlife

Methodology and Intensity Level Definitions

All available information on known wildlife corridors and special use areas was compiled. Where possible, map locations of sensitive areas were compared with the location of the project area. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that could result in changes that would be so slight that they would not be of any measurable or perceptible consequence to the wildlife species' population. Wildlife would not be affected or the effects would be at or below the level of detection, and would be short-term.

Minor: An action that could result in changes to wildlife that would be detectable, although the effects would be localized, and would be small and of little consequence to the species' population. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate: An action that could result in changes to wildlife that would be readily detectable, long-term and localized, with consequences at the population level. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.

Major: An action that could result in changes to wildlife that would be obvious, long-term, and would have substantial consequences to wildlife populations in the region. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

Alternative A – No Action

The no action alternative could adversely impact a very small area of wildlife habitat by continued visitor driving onto the soft shoulder. Driving off-road is prohibited in the project area, thus little or no habitat-disturbing activities are proposed under this alternative. This will result in adverse impacts that are **negligible** and site-specific to wildlife.

Cumulative Impacts: Wildlife habitat has been lost in and around the project area from the cumulative effects of past developments, road construction, and ongoing maintenance. Future projects may increase the potential for wildlife disturbance and habitat loss, resulting in a long-term **minor** to **moderate** cumulative impact to wildlife. These impacts could be long-term but limited to the local area.

Conclusion: There would be **negligible** short or long-term adverse direct, indirect, or cumulative impacts to wildlife as a result of this project. Cumulatively, impacts to wildlife will be **minor** to **moderate** over the long term.

No impairment of the monument's wildlife resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Alternative B – Preferred Alternative

The proposed development may have a long-term **minor** adverse effect on various species, wildlife habitat, or on localized natural processes; however, population level effects are not anticipated for any species. The project area is just west of the Monument boundary, where the wildlife community has already been exposed to considerable daytime human activity and associated traffic and noise disturbance. The habitat in and around the proposed project area will continue to provide for wildlife species that are habituated or highly adaptable to the human environment, such as deer, birds, squirrels, and rodents. Bonito Park, which the project traverses along the northern edge, was considered a fawning area for pronghorn, but this activity has not been documented for many years. Distribution and abundance of these wildlife species in and around the project area would not substantially change once construction was complete. Re-constructing the FR 545 road shoulders would not require disturbing any new wildlife habitat. The only species that will be directly adversely impacted by alternative B will be the Gunnison prairie dog, which has established 3-6 burrows into the existing road shoulder. However, the impacts of this project to the local prairie dog population will be negligible and site-specific.

Cumulative Impacts: Cumulatively, impacts to wildlife will be **minor** to **moderate** primarily from continued loss of adjacent forested habitats because of continued urban development adjacent to Sunset Crater Volcano National Monument and slow expansion of Flagstaff. The remaining ponderosa pine habitat, as well as other forested habitats, in the Sunset Crater Volcano National Monument area will continue to provide for wildlife that are habituated to or have a high tolerance to human activity. Future foreseeable projects may increase the potential for wildlife to be disturbed resulting in a long-term **minor** to **moderate** cumulative impact to wildlife.

Conclusion: Short-term impacts to wildlife would be negligible. Long-term habitat loss would not involve the loss of any previously undisturbed area. This will be considered a **negligible** adverse direct, indirect, or cumulative effect. Cumulatively, impacts to wildlife will be long-term and have a **minor** adverse effect, primarily from continued loss of habitat.

No impairment of the monument's wildlife resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Special Status Species

Methodology

Information on special status species was gathered from prior research at Sunset Crater Volcano National Monument. Map locations of habitat associated with these species were compared with the location of the project area. Known impacts caused by construction activities were also considered. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence.

Minor: An action that could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable but small and localized and of little consequence.

Moderate: An action that would result in some change to a population or individuals of a species or designated critical habitat. The change would be measurable and of consequence to the species or designated critical habitat.

Major: An action that would result in a noticeable change to a population or individuals of a species or resource or designated critical habitat.

WILDLIFE

Gunnison Prairie Dog (*Cynomys gunnisonii*)

Alternative A. No Action

No construction activities are proposed under this alternative, and the slow deterioration of the road will have little impact on Gunnison prairie dogs. Therefore, there would be **negligible** short and long-term impact to the Gunnison prairie dog from this alternative.

Cumulative Impacts: One future planned project is the removal of the buildings associated with the spring in Bonito Park. The area around these buildings contains numerous active Gunnison prairie dog burrows. The cumulative impacts of this project and Alternative A may have minor direct impacts to Gunnison prairie dogs as a result of implementing this alternative. However these impacts are expected to be site-specific and have little impact on the local population.

Conclusion: There would be **minor** long and short-term adverse direct, indirect, or cumulative impacts to Gunnison prairie dogs from this alternative.

No impairment of the monument's Gunnison prairie dog resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Alternative B. Preferred Alternative

The Gunnison prairie dog has constructed burrows near and into the shoulder of FR 545 within the Project area near Sunset Crater Volcano National Monument (Figure 3). The proposed project would destroy any active or non-active burrows within the 10-foot area from the edge of the pavement on both sides of the road. This will directly impact, through death or translocation, individuals if active burrows are present. As of July, 2008, there are 6 active burrows that are located within 10 feet of the edge of the pavement (Figure 6). Therefore, direct adverse impacts will occur but are expected to be **negligible** and site-specific. By the end of August, 2008, NPS staff will conduct surveys for the Gunnison prairie dogs and active burrows within 10 feet from the edge of the pavement. Any active burrows identified in the immediate disturbance zone would be protected and if necessary, the prairie dogs will be removed via trapping and relocation. It does not appear that trapping and relocation will be necessary, but if it is, this should have negligible adverse effects to the local and regional Gunnison prairie dog populations.

Cumulative Impacts: Several foreseeable future projects as well as the proposed project could destroy a number of active burrows in Bonito Park. Since individual burrows are only one part of an intricate series of interconnected burrows and underground pathways or tunnels, it is conceivable that the destruction of an active burrow would do negligible harm to a local individual or group. Gunnison prairie dog burrows have been found in a number of areas in Bonito Park. However, if some individuals are destroyed, the cumulative impacts to Gunnison prairie dogs is expected to be **negligible** to **minor**.

Conclusion: The proposed project could have a **minor** adverse effect on the Gunnison prairie dogs if relocation is necessary. If no relocation activities are required, the impacts will be **negligible**. Direct, indirect, or cumulative impacts to Gunnison prairie dogs as a result of implementing this alternative would also be **negligible**.

No impairment of the monument's Gunnison prairie dog resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.



Figure 6. Inactive Gunnison Prairie Dog Burrows Along the Edge of Pavement of Repair Shoulders Project, FR 545. Sunset Crater Volcano National Monument.

Bald Eagle (*Haliaeetus leucocephalus*)

Alternative A. No Action

No construction activities are proposed under this alternative and the slow deterioration of the road will have little impact on bald eagles and other wildlife. Therefore, there would be **negligible** long or short-term adverse impacts to bald eagles from this alternative.

Cumulative Impacts: Eagles are not known to breed in the project area, thus there would be **negligible** cumulative impacts to bald eagles as a result of implementing this alternative.

Conclusion: There would be **negligible** adverse direct, indirect, or cumulative impacts to bald eagles from this alternative.

No impairment of the monument's bald eagle resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Alternative B. Preferred Alternative

Roosting or perching of bald eagles within the project area at Sunset Crater Volcano National Monument would be a rare event, and the proposed activity should not disturb individual bald eagles, affect their survival, or affect their ability to reproduce during subsequent breeding seasons. Therefore, direct adverse impacts are expected to be **negligible**, short-term, and site-specific.

Cumulative Impacts: Several foreseeable future projects as well as the proposed project would be concentrated into already disturbed areas to the extent possible and would not affect the prey base for foraging bald eagles. None of the foreseeable actions would affect nesting habitat. Therefore, cumulative impacts to bald eagles are expected to be short-term and **negligible**.

Conclusion: The proposed project would have a **negligible** adverse effect on the bald eagles. Direct, indirect, or cumulative impacts to bald eagles as a result of implementing this alternative would also be negligible.

No impairment of the monument's bald eagle resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Golden Eagle (*Aquila chrysaetos*)

Alternative A. No Action

No construction activities are proposed under this alternative and the slow deterioration of the road will have little impact on golden eagles. Therefore, there would be **negligible** short and long-term adverse impacts to golden eagles from this alternative.

Cumulative Impacts: The closest golden eagle historic nest site is on the other side of O'Leary Peak, which is about 3 miles from the project area. Thus, there would be **negligible** cumulative impacts to golden eagles as a result of implementing this alternative and other planned projects in the area.

Conclusion: There would be **negligible** adverse long and short-term direct, indirect, or cumulative impacts to golden eagles from this alternative and foreseeable future projects in the area.

No impairment of the monument's golden eagle resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Alternative B. Preferred Alternative

Roosting or perching of golden eagles within the Project area at Sunset Crater Volcano National Monument is a very low probability and the proposed activity should only momentarily disturb individual golden eagles, nor will the project activities affect their survival, or affect their ability to reproduce during subsequent breeding seasons. Therefore, direct adverse impacts are expected to be **negligible** and short-term.

Cumulative Impacts: Several foreseeable future projects as well as the proposed project would be short-term and concentrated into already disturbed areas to the extent possible and would not affect the prey base for foraging golden eagles. None of the foreseeable actions would affect nesting habitat. Therefore, cumulative impacts to golden eagles are expected to be short-term, **negligible**, and site-specific.

Conclusion: The proposed project would have a **negligible** short and long-term adverse direct, indirect, or cumulative effect on the golden eagles. Cumulative impacts to golden eagles as a result of implementing this alternative and other planned projects will also be negligible.

No impairment of the monument's golden eagle resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Pronghorn Antelope (*Antilocapra americana*)

Alternative A. No Action

No construction activities are proposed under this alternative and the slow deterioration of the road will have little impact on pronghorn antelope. Therefore, alternative A would have **negligible** long or short-term adverse impacts to pronghorn antelope movements, fawning, or browsing.

Cumulative Impacts: There would be **negligible** cumulative impacts to pronghorn antelope as a result of implementing this alternative.

Conclusion: There would be **negligible** adverse direct, indirect, or cumulative impacts to pronghorn antelope from this alternative.

No impairment of the monument's pronghorn antelope resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Alternative B. Preferred Alternative

Fawning, browsing, and movement of pronghorn antelope within the Project area at Sunset Crater Volcano National Monument would not be impacted as a result of the proposed activity. Bonito Park, which the project traverses along the northern edge, was considered a fawning area for pronghorn, but this activity has not been documented for many years. Also, the project will not be occurring during fawning season. Thus, project activities would not effect their survival, or affect their ability to reproduce during subsequent breeding seasons. Therefore, direct and indirect adverse impacts are expected to be **negligible** and site-specific.

Cumulative Impacts: Several foreseeable future projects as well as the proposed project would be concentrated into already disturbed areas to the extent possible and would not affect the movement and foraging activities of pronghorn antelope. None of the foreseeable actions would affect reproduction activities. Therefore, cumulative impacts to pronghorn antelope are expected to be **negligible to minor**.

Conclusion: The proposed project would have a **negligible to minor** adverse effect on the pronghorn antelope. Direct, indirect, and cumulative impacts to pronghorn antelope as a result of implementing this alternative would also be site specific and negligible.

No impairment of the monument's pronghorn antelope resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

PLANTS

Sunset Crater Penstemon (*Penstemon clutei*)

Alternative A. No Action

No construction activities are proposed under this alternative and the slow deterioration of the road will have little impact on the Sunset Crater penstemon if it is present. Therefore, there will be **negligible** long and short-term adverse impacts to the Sunset Crater penstemon from this alternative.

Cumulative Impacts: There will be **negligible long and short-term** adverse cumulative impacts to Sunset Crater penstemon as a result of implementing this alternative.

Conclusion: There would be **negligible** direct, indirect, and cumulative impacts to Sunset Crater penstemon from this alternative, especially since this species has not been found in the project area.

No impairment of the monument's Sunset Crater penstemon resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Impacts of Alternative B (Preferred Alternative)

Direct/Indirect Impacts: The proposed project would not permanently remove any favorable habitat because no new ground would be disturbed. Fieldwork conducted in March-July, 2008 failed to document the presence of Sunset Crater penstemon within the proposed project area. No populations were noted. Prior to construction, NPS staff would conduct final surveys for the Sunset Crater penstemon. Any plants or populations of the Sunset Crater penstemon found in the immediate disturbance zone would be protected and, if necessary, removed consistent with Arizona Native Plant regulations (salvage restricted). Topsoil within a five-foot radius around each plant/population would be segregated and spread over the area of disturbance once construction is complete. Salvaging plants that would be destroyed from construction activities and segregating topsoil from areas surrounding known plants or populations of plants would result in **minor** adverse effects to Sunset Crater penstemon as a result of this alternative.

Cumulative Impacts: Because of the limited distribution and restrictive habitat requirements for this species, other foreseeable future actions outside of Sunset Crater Volcano National Monument would have negligible impacts on this species. Therefore, cumulative impacts to Sunset Crater penstemon as a result of implementing this alternative would be **negligible**.

Impairment: There would be **negligible** impairment of the Sunset Crater Volcano National Monument's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur to the Sunset Crater penstemon. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the monument, or resources that are vital to the natural or cultural integrity of the monument, or resources identified as a goal in the monument's General Management Plan or other relevant NPS planning documents.

Conclusion: No Sunset Crater Penstemon plants have been found in the project area. Thus, alternative B would have **negligible** impacts on Sunset Crater penstemon populations. Cumulative impacts as a result of implementing this alternative would be negligible. There would be negligible impairment of the Monument's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Saw Phacelia (*Phacelia serrata*)

Alternative A . No Action

No construction activities are proposed under this alternative. Therefore, there would be **negligible** impact to the saw phacelia from this alternative. In fact, existing populations would probably continue to spread, thus providing a beneficial impact.

Cumulative Impacts: There would be **negligible** short and long-term cumulative adverse impacts to the saw phacelia as a result of implementing this alternative.

Conclusion: There would be **negligible** direct, indirect, and cumulative adverse impacts to the saw phacelia from this alternative.

No impairment of the monument's saw phacelia resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Alternative B. Preferred Alternative

Fieldwork was conducted in March-July, 2008 and revealed the presence of a small population of the saw phacelia at the east end of the proposed project area. Plants were found on both sides of the road within a 50 meter area, with 25 plants on the north side and 17 plants on the south side. The project area lies within favorable habitat, and reconstruction of the FR 545 road shoulder would not permanently remove any habitat. Immediately prior to construction, NPS staff should conduct pedestrian surveys for the plant species. Any plants or populations identified in the immediate disturbance zone would be protected and if necessary removed consistent with Arizona Native Plant regulations (salvage restricted), and topsoil within a five-foot radius around each plant/population would be segregated and spread over the area of disturbance once construction is complete. Salvaging seeds from plants that would be destroyed from construction activities and segregating topsoil from areas surrounding known plants or populations of plants would result in **minor** adverse effects to the saw phacelia as a result of Alternative B.

Cumulative Impacts: Because of the limited distribution and restrictive habitat requirements for this species, other foreseeable future actions inside and outside of Sunset Crater Volcano National Monument would have **negligible** long and short-term adverse cumulative impacts on this species. In fact, it has been shown that this species responds favorably to disturbance, as long as the proper soil texture and type is conserved.

Conclusion: Minimizing disturbance to as many plants as possible, salvaging plants and seeds that would be destroyed from construction activities, and segregating topsoil from areas surrounding known plants or populations of plants would result in **minor** long and short-term direct, indirect, and cumulative adverse effects to the saw phacelia as a result of this alternative.

No impairment of the monument's saw phacelia resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Welsh's Scorpionweed (*Phacelia welshii*)

Alternative A . No Action

No construction activities are proposed under this alternative. Therefore, there would be **negligible** long or short-term adverse impacts to Welsh's scorpionweed from this alternative especially since this species has not been found in the project area.

Cumulative Impacts: There would be **negligible** cumulative adverse impacts to Welsh's scorpionweed as a result of implementing this alternative.

Conclusion: There would be **negligible** impact to Welsh's scorpionweed from this alternative.

No impairment of the monument's Welsh's scorpionweed resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Alternative B. Preferred Alternative

Direct/Indirect Impacts: Fieldwork was conducted in March-July, 2008 and did not reveal the presence of Welsh's scorpionweed within the proposed project area. The project area lies within favorable habitat, and re-construction of the FR 545 road shoulder would not permanently remove any habitat, only previously disturbed soils. Immediately prior to construction, NPS staff should conduct pedestrian surveys for Welsh's scorpionweed. Any plants or populations identified in the immediate disturbance zone would be protected and if necessary removed consistent with Arizona Native Plant regulations (salvage restricted), and topsoil within a five-foot radius around each plant/population would be segregated and spread over the area of disturbance once construction is complete. Salvaging seeds from plants that would be destroyed from construction activities, and segregating topsoil from areas surrounding known plants or populations of plants would result in **minor** adverse effects to Welsh's scorpionweed as a result of this alternative.

Cumulative Impacts: Because of the limited distribution and restrictive habitat requirements for this species, other foreseeable future actions inside and outside of Sunset Crater Volcano National Monument would have negligible long and short-term adverse impacts on this species. Therefore, cumulative impacts to Welsh's phacelia as a result of implementing this alternative would be **negligible**.

Conclusion: Minimizing disturbance to as many plants as possible, salvaging plants and seeds that would be destroyed from construction activities, and segregating topsoil from areas surrounding known plants or populations of plants would result in **minor** adverse effects to Welsh's scorpionweed as a result of this alternative. Direct, indirect, and cumulative impacts as a result of implementing this alternative would be **negligible**, especially in light of the fact that no Welsh's scorpionweed plants have been found in the project area.

No impairment of the monument's Welsh's scorpionweed resources or values will occur because there will be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Sunset Crater Volcano National Monument; (2) key to the natural or cultural integrity of the monument; or (3) identified as a goal in the monument's general management plan or other relevant National Park Service planning documents. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS Management Policies 2006.

Cultural Resources

Archaeological Resources

Methodology

To analyze the effect of each alternative on cultural resources, all available information on known archeological sites, historic properties, traditional cultural properties, and other ethnographic resources was compiled from NPS cultural resource files. Where possible, map locations of known sites/historic properties were compared with the location of the project area. Predictions about short- and long-term site impacts were based on previous and recent studies.

The thresholds of change for the intensity of an impact are defined as follows:

Negligible:

Impact(s) is at the lowest levels of detection - barely perceptible and not measurable.

Minor:

Adverse – Impact would not affect the character defining features of a National Register of Historic Places eligible or listed site, structure or building.

Beneficial – The impact is of minor benefit and the preservation of features is in accordance with the *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation*.

Moderate:

Adverse – The impact would alter a character defining feature(s) of the site, structure or building but would not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized.

Beneficial - The impact is of moderate benefit and the preservation of features is in accordance with the *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation*.

Major:

Adverse – The impact would alter a character defining feature(s) of the structure or building, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed in the National Register. For purposes of Section 106, the determination of effect would be *adverse effect*.

Beneficial - The impact is of exceptional benefit and the preservation of features is in accordance with the *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation*.

Alternative A – No Action

Direct/Indirect Impacts: Little or no ground disturbing activities would be conducted under this alternative; therefore, there would be **negligible** impact to cultural resources.

Cumulative Impacts: No ground disturbing activities would be conducted under this alternative; therefore, there would be **negligible** cumulative impacts to cultural resources.

Impairment: There would be **no impairment** of Sunset Crater Volcano National Monument's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Conclusion: There would be **negligible** adverse or beneficial impact (direct, indirect or cumulative) to cultural resources from this alternative.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: Ten National Register-eligible sites either straddle FR 545 or are near the construction limit. The locations of these sites are presented in Figure 4. Table 3 summarizes the sites with respect to minor indirect impacts and minor adverse effects. To minimize impacts to cultural resources, a qualified archeologist would monitor construction activities to assist crews in avoiding disturbance to any known sites or artifacts. Any sites or artifacts that are discovered during construction would be evaluated by the monitor and action would be taken to minimize impacts.

Conclusion: The proposed construction could have a long-term **negligible to minor** indirect impacts and adverse effects on 10 National Register-eligible sites. The preferred alternative would result in **negligible** beneficial impacts to the sites.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR §800.5, *Assessments of Adverse Effects*), the National Park Service concluded that implementation of the preferred alternative would have the potential for **minor adverse effects** on any National Register eligible sites or properties (Table 3).

Table 3. Minor Indirect Impacts and Minor Adverse Effects National Register-Eligible Site Summary.

Site No.	Site Type	Temporal Affiliation	Potential for Minor Indirect Impacts	Potential for Minor Adverse Effects
AR-03-04-02-1359	Artifact scatter	AD 800-1050 (pre-eruptive; Pueblo I and II)	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit
AR-03-04-02-1360	Probable pit structure and associated artifacts	AD 800-1050 (pre-eruptive; Pueblo I and II)	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit
AR-03-04-02-1361	Probable pit structure and associated artifacts	AD 600?-950 (pre-eruptive; Basketmaker III - Pueblo I)	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit
AR-03-04-02-1362	Probable pit structure and associated artifacts	AD 600?-950 (pre-eruptive; Basketmaker III - Pueblo I)	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit
AR-03-04-02-1663	Probable pit structures and associated artifacts	AD 800-950 (pre-eruptive; Pueblo I and II)	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit
AR-03-04-02-1664	Probable pit structure and associated artifacts	AD 600?-950 (pre-eruptive; Basketmaker III - Pueblo I)	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit
AR-03-04-02-1665	Probable pit structures and associated artifacts	AD 1050-1200 (post-eruptive; late PII to early PIII)	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit
AR-03-04-02-1667	ceramic scatter associated with a rock shelter/historic artifact scatter and associated depression	AD 950-1150 (pre/post-eruptive; PI to late PII)/AD 1870-1917	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit
AR-03-04-02-1668	Probable pit structures and associated artifacts/historic artifact scatter	AD 800-1050 (pre-eruptive; Pueblo I and II)/post AD 1900	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit
AR-03-04-02-1669	Probable pit structures and associated artifacts/historic artifact scatter	AD 600?-1050 (pre-eruptive; Basketmaker III – Pueblo II)	Yes, if construction equipment hits undisturbed soil during the cinder shoulder material removal process	Yes, if the monitoring archaeologist needs to collect artifacts with the 10-foot construction limit

Ethnographic Resources

Methodology

In this section “ethnographic resources” refers specifically to plant-gathering areas of importance to Native Americans, although it can also refer to a myriad of natural and cultural resources of importance to tribal members (e.g., ceremonial areas, Traditional Cultural Properties (TCPs), burials, etc.). A total of 13 tribes were contacted during the public scoping phase of this project. The Hopi Tribe responded with a specific concern about plant gathering in the Bonito Park area. The tribe was concerned that their access to the park would be denied or restricted if FR 9129E was re-closed.

No other concerns regarding ethnographic resources were communicated to the NPS. The potential impact of the alternatives on ethnographic resources of the project area was evaluated through an on-site visit and visual inspection of FR 545 and the Old Haul Road (FR 9129E) with both NPS and Hopi tribal members. All available information on ethnographic resources in the Sunset Crater area was also compiled. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that could result in a change in ethnographic resources that is barely detectable. The impact would have a negligible impact on the resource or the ability of tribal members to access or use the resource.

Minor: An action that could result in a change in ethnographic resources that is slightly detectable and may be noticed by some tribal members and other interested parties. The impact would have a minor impact on the resource or the ability of tribal members to access or use the resource.

Moderate: An action that could result in a change in ethnographic resources that is readily apparent and would be noticed by many tribal members and other interested parties. The impact would have a moderate impact on the resource or the ability of tribal members to access or use the resource.

Major: An action that could result in an extreme change in ethnographic resources that would be noticed by the majority of tribal members and interested parties. The impact would have a major impact on the resource or the ability of tribal members to access or use the resource.

Alternative A – No Action

Direct/Indirect Impacts: No construction activities would occur under this alternative; therefore, the ability to access or use local ethnographic resources, such as plant gathering areas, would not change if this alternative were selected. The Old Haul Road (9129E) has been officially closed since the 1990s. The road would remain closed under this alternative. Access to Bonito Park, via 9129E, is available by parking at an existing pull-out near the intersection of FR9129E and FR 545. Therefore, the alternative would have **negligible** direct/indirect impacts regarding ethnographic resources.

Cumulative Impacts: No action in this analysis means that the proposed project would not be undertaken. Therefore, there would be **negligible** cumulative impacts to ethnographic resources as a result of this alternative.

Impairment: There would be **no impairment** of the Sunset Crater Volcano National Monument’s ethnographic resources or values if this alternative were implemented. This is

concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Conclusion: There would be a **negligible** impact to ethnographic resources under this alternative. There would be no impairment of the Monument's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: During the public scoping portion of this Environmental Assessment, the Hopi Tribe expressed concerns about the re-closure of FR 9129E restricting their ability to gather plant resources in Bonito Park. For all practical purposes, the intersection of FR 9129E with the south entrance road is already closed and has been for over a decade. The Preferred Alternative proposes additional work (e.g., new barriers, a new road-closed sign) that would reduce or eliminate access to the Old Haul Road from FR 545. In addition, an existing parking area near the FR 9129E/545 intersection provides adequate parking and pedestrian access to this part of Bonito Park. Therefore, there would be a **negligible** impact to ethnographic resources, or the ability of tribes to access those resources, as a result of this alternative.

Cumulative Impacts: This alternative does not change the status of FR 9129E, which would remain closed to motorized vehicles under either alternative. However, the cumulative closure of roads in the Monument area may have a **minor** impact on access to ethnographic resources, specifically on the ability of tribal members to gather plants for food, medicinal and other ceremonial purposes.

Impairment: There would be **no impairment** of the Sunset Crater Volcano National Monument's ethnographic resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Conclusion: Little or no areas that have not been previously disturbed would be impacted by the repairs to FR 545 and related activities. Re-closure of FR 9129E would not reduce access to ethnographic resources along the Old Haul Road below current levels. Direct and indirect impacts would be considered **negligible**. Cumulative impacts would be long-term **minor**. There would be no impairment of the Monument's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR §800.5, *Assessments of Adverse Effects*), the National Park Service concluded that implementation of the preferred alternative would have **no adverse effect** on any ethnographic resource.

Visual Quality

Methodology

Visual quality affects both visitor enjoyment and perception of Sunset Crater Volcano National Monument. All available information on visual resources was compiled. The potential impact of the alternatives on visual resources of the project area was evaluated through an on-site visit and visual inspection of FR 545. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: An action that could result in a change in visual quality that is barely detectable.

Minor: An action that could result in a change in visual quality that is slightly detectable and may be noticed by some visitors.

Moderate: An action that could result in a change in visual quality that is readily apparent and would be noticed by many visitors.

Major: An action that could result in an extreme change in visual quality that would be noticed by the majority of visitors.

Alternative A – No Action

Direct/Indirect Impacts: No construction activities would occur under this alternative; therefore, visual quality would not change if this alternative were selected. Therefore, there would be **negligible** or no impacts.

Cumulative Impacts: No action in this analysis means that the repairs to FR 545 would not be undertaken. However, visitor use of the two informal turn-outs would continue, and possibly increase. The use of informal turn-outs and casual parking along the roadside may interfere with the scenic nature of the entrance road. Therefore, there would be **minor** impacts to visual quality as a result of these activities.

Impairment: There would be **no impairment** of the Sunset Crater Volcano National Monument's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Conclusion: There would be **negligible** or no direct/indirect impacts to visual quality under this alternative. There may be cumulative **minor** impacts in the long-term. There would be no impairment of the Monument's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: Sunset Crater Volcano National Monument is well known for its spectacular beauty. The south entrance road (FR 545) is necessary for visitors to access the Monument and enjoy its natural and cultural resources. This alternative would be restricted to mostly previously disturbed areas, and would eliminate two informal turn-outs and add one formalized parking area; the latter area is already disturbed. During the implementation of the preferred alternative, visual quality of the entrance area of the monument will be degraded

only during the time of construction. Therefore, impacts would be considered short-term **minor** to long-term **moderate**.

Cumulative Impacts: Existing motor vehicle use has created disturbances that are visible within the Monument and along the south entrance road accessing Sunset Crater. Constructing the proposed formalized turn-out would increase the potential for diminishing the visual quality of the area. However, it would also eliminate two informal turn-outs that are seeing increased use and degrading visual quality. Therefore, cumulative impacts would be long-term **minor** to **moderate**.

Impairment: There would be **no impairment** of the Sunset Crater Volcano National Monument's visual quality resources or values if this alternative were implemented. In fact, the visual quality of the area will be enhanced. This is concluded because no major adverse impacts would occur and disturbance alongside the road minimized. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Conclusion: Repairs to the road shoulder of FR 545, the addition of one formalized turn-out along the south entrance road, and the re-closure of FR 9129E are activities that would be mostly restricted to previously disturbed areas. This project will enhance visual quality of the area. Thus impacts would be considered short-term **minor** to long-term **moderate**. Cumulative impacts would also be long-term **moderate**.

Park Operations

Methodology

For this analysis, park operations are the human and fiscal resources available to protect and preserve natural and cultural resources at Sunset Crater Volcano National Monument and provide for safe and enjoyable visitor experiences. The discussion of impacts to park operations focuses on rangers and other staff that ensure visitor and employee safety and opportunities for quality experiences, as well as the ability of the resource management staff and trail crew to protect and preserve resources at current staffing and funding levels. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Sunset Crater Volcano National Monument operations would not be affected or the effect would not be apparent to park staff or the public.

Minor: Impacts would be measurable but would not have an appreciable effect on or consequences for park operations.

Moderate: Impacts would be readily apparent and would result in a measurable change in park operations in a manner noticeable to staff and the public.

Major: Impacts would be readily apparent and would result in a substantial change in park operations in a manner noticeable to staff and the public.

Alternative A – No Action

Direct/Indirect Impacts: Under the No Action Alternative, impacts to park operations would be **minor** to **moderate** adverse. If the road shoulders to FR 545 are not repaired, the shoulders will continue to degrade in the short- and long-term. This will de-stabilize the edge of the

asphalt surface, which is already occurring in some areas. Long-term erosion of the shoulders and road edges will adversely affect operational efficiency and visitor safety.

Cumulative Impacts: Growth and development of the city of Flagstaff and the outlying communities, as well as increased visitor traffic over time, would have a long-term **minor to moderate** adverse effect on operational efficiency of Sunset Crater Volcano National Monument. The most significant effect would be an increase in the number of visitors, resulting in an increased need for safe access into and out of the Monument. Such use could also result in unregulated and unauthorized use of closed areas (such as the informal turn-outs and FR 9129E), resulting in intentional and unintentional impacts to park resources.

Impairment: There would be **no impairment** of the Sunset Crater Volcano National Monument's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Conclusion: Direct, indirect, and cumulative impacts to park operations would be long-term and **minor to moderate** adverse under this scenario because of the more limited efficiency and effectiveness of park staff and a possible decrease in visitor safety. There would be no impairment of the Monument's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Alternative B – Preferred Alternative

Direct/Indirect Impacts: The proposed project would have a **moderate** beneficial impact to operational efficiency and safety. Many of the existing deficiencies concerning use of FR 545 and associated turn-outs would be addressed and mitigated.

Cumulative Impacts: Growth and development of the city of Flagstaff and the outlying communities would have a long-term minor to moderate adverse effect on operational efficiency of Sunset Crater Volcano National Monument. The most significant effect would be an increase in the number of visitors coming to the park, resulting in an increased need for safe access and improved park efficiency. For these reasons, the alternative would have a long-term, cumulative **moderate** beneficial impact.

Impairment: There would be **no impairment** of the Sunset Crater Volcano National Monument's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park, or resources identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Conclusion: The proposed project, which includes repairs to the road shoulder of FR 545, elimination of two turn-outs, creation of a new, formalized turn-out, and re-closure of FR 9129E where it intersects with FR 545, would have a **moderate** beneficial impact on operational efficiency and visitor safety as many of the existing deficiencies concerning the south entrance road would be addressed and mitigated. Cumulative beneficial impacts would be long-term **moderate**. There would be no impairment of the Monument's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Introduction

This chapter identifies the persons responsible for preparing this document, lists the individuals that were consulted or coordinated with for information regarding the document content, and provides a bibliographic citation for all referenced material. During the preparation of this EA/AEF, input was also received from federal, tribal, and county agencies; non-governmental organizations; and, private individuals. These entities and individuals are listed at the end of this chapter.

Preparers

Museum of Northern Arizona

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Flagstaff Area Monuments

Charles Schelz, Ecologist

Consultation/Coordination

The following agencies, organizations and tribes were contacted for information or assisted in identifying important issues or analyzing impacts.

Agencies

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Arizona State Historic Preservation Office

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U.S. Fish and Wildlife Service

Shaula Hedwall

Tribes

Havasupai Tribe
Hopi Tribe
Hualapai Tribe
Kaibab Band of Paiute Indians
Navajo Nation
Pueblo of Zuni
San Juan Southern Paiute Tribe
Tonto Apache
Yavapai Apache
Yavapai Prescott
White Mountain Apache

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APPENDIX A Cultural Resources Specialists Review

I have reviewed this preferred alternative for conformity with requirement for the § 106 process, with the 1995 Servicewide Programmatic Agreement (if applicable), and applicable parts of the Secretary of the Interior's Stands and Guidelines for Archeology and Historic Preservation, MPS Management Policies, and DO-28. I have stated any additional stipulation that should apply, and I concur in the recommended assessment of effect above.

Signed: _____
Archaeologist Date

Comments: _____

Signed: _____
Cultural Landscape Architect Date

Comments: _____

Signed: _____
Curator Date

Comments: _____

Signed: _____
Ethnographer Date

Comments: _____

Signed: _____
Historian Date

Comments: _____

Signed: _____
Historical Architect Date

Comments: _____

Approved: _____
Park Compliance Coordinator Date

Approved: _____
Superintendent Date