

## Chapter Five: Environmental Consequences







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## INTRODUCTION

The Council on Environmental Quality (CEQ) regulations that implement the National Environmental Policy Act (NEPA) require that federal agencies discuss the impacts on the natural and social environments of proposed federal actions, feasible alternatives to that action, and any adverse environmental effects that cannot be avoided if a proposed action is implemented. In this case, the proposed federal action would be the adoption of a general management plan for Lava Beds National Monument. This chapter analyzes the environmental impacts of implementing the three alternatives on natural resources, cultural resources, visitor experience, monument operations, and socioeconomics. The analysis is the basis for comparing the beneficial and adverse effects of implementing the alternatives.

The alternatives in this general management plan provide broad management direction. Thus, this environmental assessment should be considered a programmatic document. If and when specific developments or actions are proposed subsequent to this general management plan for implementation, appropriate detailed environmental and cultural compliance documentation will be prepared in accordance with NEPA and National Historic Preservation Act of 1966 requirements. Those actions that implement guidance provided in the general management plan may tier from this environmental assessment.

This chapter begins with a discussion on terms and definitions used for determining environmental consequences, followed by a discussion on policy related to cumulative impacts, a description of the projects that make up the cumulative impact scenario, and finally a discussion on impairment. The impacts of the alternatives are then analyzed by impact topic in the order they appeared in the methodology section. Each impact topic includes a description of the methods and assumptions used for analyzing each impact topic, a description of the impact of the alternative, a discussion of cumulative effects, and a conclusion. Where data is limited, professional judgment has been used to project environmental impacts. Professional judgment was based, in part, on observation, analysis of conditions, and responses in similar areas.

The impacts of each alternative are also briefly summarized in the “Summary of Impacts” table at the end of the “Alternatives” chapter (Table 11).

## TERMS AND DEFINITIONS

The following section defines the terms used for determining the environmental consequences of the actions in the alternatives. The environmental consequences of each impact topic are defined based on impact type, intensity, and duration, and whether the impact would be direct or indirect. Cumulative effects are also identified.

### *Impact Type*

The effects that an alternative would have on an impact topic could be either adverse or beneficial. Adverse impacts involve a change that moves the resource away from a desired condition or detracts from its appearance or condition. Beneficial effects are those that involve a positive change in the condition or appearance of a resource or a change that moves the resource toward a desired condition. In some cases, the action could result in both adverse and beneficial effects for the same impact topic.

### *Intensity*

Defining the intensity or magnitude on an impact is taken directly from Director’s Order 12: Conservation Planning, Environmental Impact Analysis and Decision-making (NPS 2001). Impact intensity is the magnitude or degree to which a resource would be beneficially or adversely affected. Each impact was identified as negligible, minor, moderate, or major. Because definitions of intensity vary by topic, separate intensity definitions are provided for each impact topic in the methodology section. Due to the broad nature of actions called for in this general management plan, most intensity findings were expressed qualitatively.

### *Duration*

Duration refers to how long an impact would last. The planning horizon for the general management plan is approximately 15 to 20 years. Unless otherwise stated, in this document the following terms are used to describe the duration of the impacts:

*Short term:* The impact would be temporary in nature, lasting one year or less, such as the impacts associated with construction.

*Long term:* The impact would last more than one year and could be permanent in nature, such as the loss of soil due to construction of a new facility. Although an impact may only occur for a short duration at one time, if it occurs regularly over a longer period of time the impact may be considered a long-term impact. For example, the noise from a vehicle driving on a road would be heard for a short time and intermittently, but because vehicles would be driving the same road throughout the 20-year life of the plan, the impact on natural soundscape would be considered long term.

#### ***Direct versus Indirect Impacts***

Direct effects would be caused by an action and would occur at the same time and place as the action. Indirect effects would be caused by the action and would be reasonably foreseeable but would occur later in time, at another place, or to another resource.

#### **CUMULATIVE IMPACTS**

Cumulative impacts result from the incremental impact of an action when added to other past, present, and reasonable foreseeable future action, regardless of what agency or person undertakes such other action. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

Cumulative impacts are considered for all impact topics and alternatives. The NPS assumes the types of use that are occurring now will continue, but there may be new or different future uses. These actions are evaluated in conjunction with the impacts of each alternative to determine if they have any cumulative effects on a particular resource. For most of the impact topics, the geographic area defined for the analysis was the monument. In some cases, the area of consideration was the Tule Lake Basin.

To determine potential cumulative impacts, projects in the area surrounding the monument were identified. Projects included in this analysis were identified by examining other existing plans and by calls to local governments and to state and federal land managers. Projects identified for the purposes of cumulative impact analyses are past actions, plans or actions that are currently being implemented, and reasonable fore-

seeable plans or actions. These projects were considered regardless of what agency, organization, or person undertakes them. Projects included in the cumulative impact analysis do not affect all resources equally.

#### **ACTIONS AND PROJECTS OUTSIDE LAVA BEDS NATIONAL MONUMENT**

Listed below are ongoing and planned actions and projects on adjoining or nearby federal and private lands, and other actions that could affect the Monument, independent of this general management plan.

##### ***United States Fish and Wildlife Service Plans and Programs***

United States Fish and Wildlife Service (USFWS) lands are adjacent to the north end of the monument's main unit (Tule Lake National Wildlife Refuge). These lands are used primarily for conservation of wildlife with associated agricultural activities that provide an array of habitats for wildlife use. There are two main water bodies on the Tule Lake National Wildlife Refuge, Sump 1A and Sump 1B. Sumps 1A and 1B are located north of the monument and contain associated wildlife viewing blinds and a wildlife tour route road. The USFWS also sprays herbicides on lands adjacent to the monument to control weeds, and conducts prescribed burns. In addition, the USFWS manages a wildlife tour route through the refuge for recreational bird watching and they also administer a waterfowl hunting program. The refuge also has a high concentration of mule deer that attracts a number of visitors for wildlife viewing.

The USFWS initiated a Comprehensive Conservation Plan (CCP) in 2009. There will be an associated environmental impact statement with this planning effort. This plan will provide management direction for the Klamath Basin Refuge Complex for the next 15 years. The CCP planning process is expected to last approximately three years with a completion date expected in 2012. A core team of USFWS employees will lead this effort followed with involvement from sister agency representatives. The plan will cover the management for all five refuge units. While the plan is being developed, between FY2009 and FY2012, the USFWS will continue to manage by their "annual habitat management plans." These plans focus on water, grain production, fire management, water movement, and food sources for waterfowl. A biologist/irrigator was hired in 2008 to manage the movement of water on the refuge. Farming practices will continue to be managed on the

short term as is with burning of stubble and some use of organic farming.

In the 1950s, the Kuchel Act established lease land farming within the refuge. The act states that refuge lands will be managed for farming and optimal wildlife resources. Farming on refuge lands is expected to continue into the future.

The USFWS manages a program titled “Walking Wetlands.” This is a cooperative farming effort on the Tule Lake National Wildlife Refuge. These lands are turned into wetlands for three years and then rotated out of wetland use back into farmlands. The USFWS has the main responsibility of building infrastructure for these walking wetlands (dikes, roads, etc.). Walking wetlands are currently planned to occur east of sump 1A and would have no impact on the monument from a visual or habitat standpoint. Over the last ten years, approximately 7,000 acres of lands within the basin have been converted into these wetlands. No walking wetlands would be near the monument boundary.

The USFWS implements a full array of invasive weed control on the refuge and has the Regional Integrated Pest Management (IPM) coordinator located at the refuge office. There will be a continued need to control invasive weeds on the refuge. This area of focus could provide some participation between agencies. Control of nonnative vegetation and trespass grain crops into monument lands are the main topics. This will be a major effort that is continued on both the NPS and USFWS lands.

The USFWS is working on a duck modeling effort that is striving to increase duck and goose populations back to 1970 levels for ducks and 1990 levels for geese. This is an effort especially for the Tule Lake refuge, since numbers have continued to decrease. This would have a positive effect on the monument with visitors having more watchable wildlife to view from the overlooks and in the overall general area. USFWS biologists are leading this effort. The refuge is currently working on completing the assessment of duck numbers and the modeling document should be complete by the end of 2009. This information will be used in the CCP for planning efforts.

Changes to Sump 1A and 1B will be addressed in the CCP process. Every two years the refuge burns Sump 1A and Sump 1B. Over the next few years changes with fire and burning of stubble may include fall burning

requirements. On Sump 1A, the staff will be looking into increasing the size of the marsh and reducing open water. Annual/seasonal water reduction in Sump 1B to promote wetland vegetation will continue. During 2009, a new island was developed in Sump 1B to promote the nesting of Caspian terns. This island development will also bring additional opportunities for watching wildlife along the northern boundary of the monument.

The refuge is not planning on any visitor service infrastructure developments. A new signing effort within the refuge will take place to help the visitor learn about the refuge. No placement of structures is expected over the near future. The vehicle tour route on the Tule Lake National Wildlife Refuge will remain the same. The USFWS is open to evaluating a potential ridge trail from refuge headquarters to the monument that follows Sheepy Ridge. This potential trail would be assessed in the CCP process.

Bighorn sheep re-introduction is not a topic that the USFWS is considering. The only suitable habitat is on Sheepy Ridge, which could be used, but is not a topic of high priority.

#### *Proposed Medicine Lake Area Geothermal Developments*

The development of geothermal resources to generate electricity has been proposed on national forest lands at two sites near Medicine Lake. Each site would consist of multiple deep drilled wells to bring steam and hot water to the surface. Pipelines on the surface would connect the multiple wells to a generating station where it would be used to turn turbines and generate electricity. Electrical transmission lines would carry the electricity approximately 20- to 25-miles east to existing major electrical transmission lines near the community of Tionesta. Construction and operations vehicle traffic would access these sites also primarily from the east or south over Forest Service roads 97, 49, or 15. Commercial traffic servicing the developments would not be permitted to pass through the monument on the NPS owned roads.

One proposed site is known as Fourmile Hill and is located approximately five miles south of the monument, and two and one-quarter miles north of Medicine Lake on the Klamath National Forest. The other proposed site is known as Telephone Flat, and that is located approximately eight miles south of the monument and one and a half miles east of Medicine Lake on the Modoc National Forest. Both proposals

were analyzed in separate Environmental Impact Statements/Environmental Impact Reports (EIS/EIR's) in the late 1990s, and both projects have remained dormant since that time due to on-going legal actions with no work occurring on the ground beyond the exploratory drilling that occurred in the mid 1990s. If either or both proposed projects are constructed and begin electrical production, there likely would be some changes and impacts to the visual quality of views from the monument to the Medicine Lake highlands. These visual impacts would most likely be caused by the electrical transmission lines running from each site along the north slopes of the Medicine Lake highlands to the east. Steam emissions at each generating plant or wellhead might also be visible from the monument particularly in cold clear weather. The increased development and traffic from these proposals would likely also cause incremental degradation in wildlife habitats, recreation, and cultural resources.

Cumulative impacts would not differ regardless of the alternative selected for the Lava Beds General Management Plan.

#### ***Klamath and Modoc National Forests Travel Management Planning Process***

All national forests nationwide are currently in the midst of a Motor Vehicle Route Designation and Travel Management planning process. This process includes completing an inventory of all roads, trails, and areas used by motor vehicles; evaluation of the routes in relation to resource conflicts; environmental analysis of alternative route systems; and finally, designation of routes/areas open or closed for motor vehicle use. In alignment with national policy, cross country motorized travel off designated roads and trails would be prohibited. As of late 2009, the Modoc National Forest has completed its plan, and the Klamath National Forest has released its draft environmental impact statements and solicited public comments on its proposed plans. Around the monument, no routes are proposed to be closed or realigned. The only change that would occur would be the end of cross country motorized travel off of designated routes. This U.S. Forest Service policy change would likely reduce the incidents of motor vehicle trespass into Lava Beds from abutting national forest lands.

Cumulative impacts would not differ regardless of the alternative selected for the Lava Beds General Management Plan.

#### ***Privately owned timberlands along the southern boundary***

Along the southern boundary of the monument, within the boundary of the Modoc National Forest are approximately 2,500 acres of forestland owned by Fruitgrowers Supply, the timber-growing subsidiary of the Sunkist citrus cooperative. The land is forested primarily with second and third growth Ponderosa Pine, a valuable timber species. Fruitgrowers Supply intends to manage the land to continue to produce timber. Depending upon the methods and type of logging used to harvest timber in the future, there could be significant impacts on visual quality and other resources at the monument. Fruitgrowers Supply has expressed a desire to sell or trade these lands for others that are closer to their larger land holdings near the US 97 and I-5 corridors.

#### **IMPAIRMENT OF RESOURCES**

In addition to determining the environmental consequences of the alternatives, NPS policies (Interpreting the National Park Service Organic Act, Management Policies 2006) require that potential effects be analyzed to determine whether or not proposed actions would impair the resources or values of the monument. An evaluation of impairment is not required for topics related to visitor use and experience, operations, or the socioeconomic environment.

The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act (as amended) begins with a mandate to conserve resources and values. NPS managers must seek ways to avoid or minimize adverse impacts on the resources and values to the greatest degree practicable. However, laws do give the NPS management discretion to allow impacts on the resources and values when necessary and appropriate to fulfill the purposes of a unit, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS this management discretion, it is limited by the statutory requirement that the NPS must leave the resources and values unimpaired unless a particular law directly and specifically provides otherwise.

Impairment is an impact that in the professional judgment of the NPS manager would harm the integrity of the resources and values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact on any resource



or value may constitute impairment. An impact would be most likely to constitute impairment if it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the monument;
- Key to the natural or cultural integrity of the unit or to opportunities for enjoyment of the unit; or
- Identified as a goal in the general management plan or other relevant NPS planning documents.

Impairment might result from NPS activities in managing a unit, visitor activities, or activities undertaken by concessionaire, contractors, and others operating in the monument. Actions that occur outside monument boundaries could cause impairment, but these actions would not be a violation of the Organic Act unless the NPS was in some way responsible for the action. In this chapter, a determination about impairment is presented in the conclusion section for each required impact topic related to the unit's resources and values. When it is determined that an action(s) would have a moderate to major adverse effect, a justification for non-impairment is made. Impacts of only negligible or minor intensity would by definition not result in impairment.

## METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

The planning team based the impact analysis and the conclusions in this chapter largely on the review of existing literature and studies, information provided by experts in the NPS and other agencies, and monument staff insights and professional judgment. The team's method of analyzing impacts is further explained below. Impacts have been assessed assuming that mitigation measures, as described in Chapter 3, would be implemented. If mitigation measures were not applied, the potential for resource impacts and the magnitude of those impacts would increase.

The impact analyses for the no action alternative (alternative A) compare resource conditions throughout the life of the plan to existing conditions, based on the continuation of current management. The impact analysis for the action alternatives (alternatives B and C) compare the action alternative to the no-action. In other words, the impacts of the action alternatives describe the difference between no action and

implementing the action alternatives. To understand a complete "picture" of the impacts of implementation any of the action alternatives, the reader must also take into consideration that impacts would occur under the no action alternative.

## Natural Resources

Analysis of natural resources was based on research, knowledge of monument resources, and the best professional judgment of planners, biologists, geologists, and botanists who have experience with similar types of projects. Information on the monument's natural resources was gathered from several sources, including maps, satellites imagery of vegetation, and assorted resource inventories. As appropriate, additional data sources are identified under each topic heading.

Where possible, mapped locations of sensitive resources were compared with the locations of existing developments and proposed modifications, including management zoning. Predictions about short-term and long-term site impacts were based on previous studies of visitor and facility development impacts on natural resources.

Impacts were predominately assessed qualitatively, given the programmatic nature of this document and consistent with the level of detail provided in the alternatives. However, when possible, impacts were assessed with quantitative data and analysis.

## Air Quality

The area of consideration for this impact topic is the monument. Impacts on the monument's air quality would be based on anticipated changes from base data and national standards as measured at authorized stations. The thresholds of change for the intensity of an impact are as follows.

*Negligible:* There would be no perceptible visibility impacts. The first highest three-year maximum for each pollutant would be less than the national ambient air quality standards (NAAQS).

*Minor:* There would be slightly perceptible visibility impacts on less than 180 days per year. The first highest three-year maximum for each pollutant would be less than the national standards.

*Moderate:* There would be moderately perceptible visibility impacts on less than 180 days per year or slightly perceptible visibility impacts on 180 days or more per year. The first highest three-year maximum for each pollutant could be greater than national standards.

*Major:* There would be highly perceptible visibility impacts on 180 or more days per year. The first highest three-year maximum for each pollutant would be greater than national standards.

## **AIR QUALITY – IMPACTS FROM ALTERNATIVE A**

### *Analysis*

In this alternative, no new developments would occur that would increase the degradation of air quality within Lava Beds. The monument currently has a minimal effect on air quality, with vehicle emissions, monument operations, and the fire management program being primary contributors. Lava Beds is identified as an unimpaired type 1 air shed, though minimal to moderate impacts do occur from outside influences associated with transportation, industry, energy production, and residential heating.

Currently the fire program conducts prescribed burns that range annually from 500 to 2000 acres a year. The 2000-acre mark is the high end of what would naturally burn without human intervention during a season. Under alternative A, this would not change. Before prescribed burns are ignited, the monument coordinates with local air quality boards to burn only when conditions are correct and the effects on air quality are minimized. Wildfire (unplanned ignitions) and the use of prescribed fire (planned ignitions) would have short-term, minor, adverse effects on air quality (5-10 days per year average fire burn).

Improved maintenance practices to reduce washboarding of road surfaces on Medicine Lake Road (within the monument) would slightly improve vehicle efficiency and thus reduce vehicle emissions, as well as road dust in localized areas. These improvements would result in long-term, minor to moderate, beneficial effects on air quality.

## **Cumulative Impacts**

Most air pollution affecting the monument comes from external sources as a result of population growth, agricultural burns, and energy production. Additional outside influences are associated with transportation, industry, energy production, and residential heating. As a higher demand for energy is met, and communities continue to grow, a minor adverse effect on the monument's air quality is assumed. Actions from alternative A would not contribute to cumulative impacts.

## **Conclusion**

Implementing alternative A is not expected to have any long-term effects on air quality. Alternative A would have minor, short-term, adverse impacts on the monument's air quality from operations and visitor use. Cumulative impacts associated with population growth and energy demands would contribute minor adverse impacts to air quality. The level of impact from alternative A would not be expected to constitute an impairment of the monument's resources or values.

## **AIR QUALITY – IMPACTS FROM ALTERNATIVE B**

### *Analysis*

The new infrastructure prescribed in alternative B includes an expansion of the visitor center and research center, the construction of new facilities at Petroglyph Point and trail expansion. None of these new developments would result in new emissions or in any substantial changes in visitation and thus would have no long-term adverse impact on the monument's air quality. As in alternative A, short-term impacts from wildfire (unplanned ignitions) and the use of prescribed fire (planned ignitions) would have short-term, minor, adverse effects on air quality. Additional conservation measures to encourage visitors to walk and bicycle between sites once they have arrived at the monument, and additional energy efficiency improvements in NPS vehicles and operations would slightly reduce air pollution emissions having long-term, negligible to minor, beneficial effects on monument air quality.

Realignment of the access road away from Petroglyph Point would have long-term, localized, minor to moderate, beneficial effects by reducing dust generation near the petroglyphs. Redirecting visitors to use the better maintained and paved northern entrance roads rather than the poor condition southeast entrance road (Forest Service Route 10) would slightly increase visitor vehicle miles driven for visitors accessing the



monument from the southeast. Given that Forest Service Route 10 only carries approximately 13% of total monument traffic, and that not all of the traffic would shift to the northern roads, this would constitute a negligible to minor adverse impact on air quality.

### *Cumulative Impacts*

Cumulative impacts to air quality would be same as alternative A. Generating the monument's entire electrical load from alternative sources such as photovoltaic panels and wind would slightly reduce off-site emissions. Increased educational and collaborative efforts between the monument and neighboring communities in alternative B may also increase awareness and reduce some air quality impacts. When the beneficial effects of alternative B are added to actions that have occurred and are likely to occur in the area surrounding the monument, there would be negligible, beneficial cumulative effects on the monument's air quality.

### *Conclusion*

Increased educational and collaborative efforts between monument and neighboring communities in alternative B and alternative energy generation would reduce some air quality impacts resulting in negligible to minor, beneficial cumulative effects. As in alternative A, wildfire (unplanned ignitions) and the use of prescribed fire (planned ignitions) would have short-term, minor, adverse effects on air quality. The level of impact due to alternative B would not be expected to constitute an impairment of the monument's resources or values.

## **AIR QUALITY – IMPACTS FROM ALTERNATIVE C**

### *Analysis*

In alternative C, new developments would be limited to Petroglyph Point, trail expansion, and expanded vehicle pullouts along the main monument road. Pullouts along the main road would not increase vehicle miles driven, which drives air quality emissions and impacts. None of the other development proposals would have a long-term, adverse impact on the monument's air quality. As in alternative A, short-term impacts from wildfire (unplanned ignitions) and the use of prescribed fire (planned ignitions) would have short-term, minor, adverse effects on air quality.

Additional conservation measures to encourage visitors to walk and bicycle between sites could offset impacts from additional recreational and trail opportunities.

Improvements in NPS electrical use would slightly reduce air pollution emissions having long-term, negligible to minor, beneficial effects on monument air quality.

Realignment and paving of the road at Petroglyph Point would have long-term, localized, moderate, beneficial effects by reducing dust near the petroglyphs.

Under this alternative, the monument would increase outreach efforts to promote more visitation and would collaborate with the Modoc National Forest on new recreational opportunities. Medicine Lake Road would be improved under alternative C, resulting in long-term, negligible to minor, beneficial effects as a result of improved vehicle efficiency from paving and reduced dust generation.

The monument would also provide additional recreational and interpretive trail opportunities and explore regional trail connections to national forest trails and sites, including shared trail systems. Encouraging visitors to park their cars and walk could offset some of these impacts.

### *Cumulative Impacts*

Cumulative impacts to air quality would be similar to alternative A. Generating the monument's entire electrical load from alternative sources such as photovoltaic panels and wind would slightly reduce off-site emissions. Increased educational and collaborative efforts between the monument and neighboring communities in alternative C may also increase awareness and reduce some air quality impacts. When the beneficial effects of alternative C are added to actions that have occurred and are likely to occur in the area surrounding the monument, there would be negligible, beneficial cumulative effects on the monument's air quality.

### *Conclusion*

Conservation measures and alternative energy generation would have long-term, negligible, beneficial effects on air quality. However, more visitors could lead to increased vehicle use and negligible to minor adverse impacts on monument air quality. As in alternative A, wildfire (unplanned ignitions) and the use of prescribed fire (planned ignitions) would have short-term, minor, adverse effects on air quality. The level of impact due to alternative C would not be expected to constitute an impairment of the monument's resources or values.

# Soundscape

The area of consideration for this topic is the monument. Context, time, and intensity together determine the level of impact for an action or activity related to soundscapes. Noise for a certain period and intensity would be a greater impact in a highly sensitive context, and a given intensity would be a greater impact if it occurred more often, or for longer duration. For example, in very low-level ambient soundscapes, like the wilderness, noises can be much more audible, thereby having greater impact intensities. It is usually necessary to evaluate all three factors together to determine the level of noise impact.

*Negligible:* Noise would rarely be greater than natural ambient sound levels, and/or there would usually be lengthy periods each day between noise events. Noise in a specific area would rarely result in a value for any noise metric that is more than a very small increment above the value for natural ambient sounds in the same area. Natural sounds would predominate.

*Minor:* Noise would be greater than natural ambient sound levels for a small portion of the day, and/or there would often be substantial periods each day between noise events. Noise in a specific area would rarely result in a value for any noise metric that is more than a small increment above the value for natural ambient sounds in the same area.

*Moderate:* Noise would be greater than natural ambient sound levels for an intermediate portion of the day, and/or there would rarely be more than intermediate periods each day between noise events. Noise in a specific area would rarely result in a value for any noise metric that is more than an intermediate increment above the value for natural ambient sounds in the same area.

*Major:* Noise would be greater than natural ambient sound levels for a large portion of the day, and/or there would rarely be more than short periods each day between noise events. Noise in a specific area would often result in a value for a noise metric that is more than an intermediate increment above the value for natural ambient sounds in the same area.

## SOUNDSCAPE – IMPACTS FROM ALTERNATIVE A

### *Analysis*

In this alternative, no new development would occur that could increase long-term impacts on soundscapes within the monument. The monument would continue to maintain existing facilities and roads with their associated short-term sound levels. No new trails would be developed under this alternative, limiting human impacts on wilderness soundscape. In developed zones, soundscapes would have short-term, minor to moderate, adverse levels of impact depending on increases or decreases in visitor use levels. During heavy visitor use periods, frequently used caves can be noisy, causing short-term, moderate, adverse impacts on certain cave soundscapes.

### *Cumulative Impacts*

Soundscape levels associated with human activities outside of the monument vary depending on location within the monument. The main impacts are from the combined potential increases in overhead airplane traffic, agricultural activities on U.S. Fish and Wildlife Service and private lands, and recreational vehicle noise associated with snowmobiles, vehicles and railroads. The backcountry zone is considered one of the most serene areas where visitors can experience natural quiet. However, cars and overflights can be heard in most areas of the monument and outside of the boundary. When the likely effects of continued public use of the monument under this alternative are added to the effects of actions outside the monument, there could be a long-term, minor, adverse cumulative impact on the area soundscape. However, visitor use and monument operations would likely be a relatively small part of the cumulative impacts on the area's soundscape.

### *Conclusion*

Long-term impacts associated with monument operations and visitor use in alternative A would have a negligible, adverse impact on the monument's soundscape. In some specific areas with visitor facilities there would be short-term, minor to moderate, adverse impacts from visitors and vehicles. There would be a long-term, minor, adverse cumulative impact on the area's soundscape. The level of impact due to alternative A would not be expected to constitute an impairment of the monument's resources or values.

## **SOUNDSCAPE – IMPACTS FROM ALTERNATIVE B**

### ***Analysis***

Most of the new developments or ground-disturbing activities in alternative B, including expansion of the visitor center and research center, the redesign and construction of new developments at Petroglyph Point, the development of new trails, and the development of backcountry campsites, would have minor to moderate, short-term, adverse impacts on the monument's soundscape during installation.

There would be a permanent change to the soundscape at Petroglyph Point with developments that include a seasonal visitor contact station, a picnic area, road redesign, trail redesign, and an amphitheater. This development would promote a longer stay for visitors in the area. However, visitor activities would not likely cause soundscape impacts when compared to existing external sound impacts from adjacent agricultural activities. Realignment of the road would have a long-term, moderate, beneficial effect on the soundscape at the petroglyphs.

The formalization of new trails would result in minimal soundscape disturbance. The actual construction of trails would be of short-term, negligible, adverse impacts and levels of visitor use in these new trail areas would follow Wilderness Stewardship Plan use level guidelines set to limit impacts on soundscape. Thus, the construction of new facilities and trails in alternative B would be expected to have a negligible, long-term, adverse impact on the monument's soundscape resources.

As in alternative A, in alternative B the soundscape in the backcountry zone would continue to be impacted at low to moderate levels from outside influences associated with agriculture on Tule Lake National Wildlife Refuge and private lands, airplanes, recreational vehicles and railroad noise impacts. The collaborative efforts between monument staff and the Tule Lake National Wildlife Refuge to restore "walking" or rotating wetlands along the northern boundary would have a long-term, moderate, beneficial effect on soundscapes in this area of the monument by reducing noise associated with agricultural activities.

Monument use levels are not expected to increase to levels where soundscapes would be impacted from trail use in frontcountry and backcountry areas of the monument. There is no reason to expect that there

would be any significant change in effects on soundscapes associated with visitor use within the monument.

Alternative B would have several beneficial impacts on soundscapes as a result of additional efforts to promote bicycle use along roads, including Cave Loop Road, and improved trail walking access to a number of the main destinations of the monument. Proposed trail improvements would likely result in more people walking in areas that currently have soundscape impacts associated with vehicle use and result in long-term, negligible, beneficial effects on soundscapes.

### ***Cumulative Impacts***

Cumulative impacts would be similar to alternative A. When the beneficial impacts of promoting bicycle use, providing more efficient trail route patterns and restoring wetlands on the northern boundary are added to the adverse effects of visitor use and activities outside of the monument, there could be a long-term, minor, adverse cumulative impact on area soundscapes. However, the beneficial and adverse effects of alternative B in the monument would likely be a very small part of the cumulative impacts on the area's soundscape.

### ***Conclusion***

Alternative B would have long-term, negligible beneficial effects on soundscape resources, primarily due to the improved trail system that connects primary visitor use destinations, the promotion of bicycle use and walking, and increased visitor education. There would be a long-term, minor adverse cumulative impact on soundscape resources, although alternative B would add small beneficial and adverse increments in localized areas to the overall cumulative impact. Construction activity from new developments would have short-term, minor to moderate, adverse impacts on soundscapes in localized areas. The Petroglyph Point soundscape would change with new uses and facilities. These changes would have an overall beneficial impact on soundscapes, primarily from the realignment of the current access road. The level of impact due to alternative B would not be expected to constitute an impairment of the monument's soundscape resources or values.



## SOUNDSCAPE – IMPACTS FROM ALTERNATIVE C

### *Analysis*

In this alternative, new developments would be limited to new facilities at Petroglyph Point, trail expansion, paving and realigning roads, and vehicle pullouts along the main monument road. As in the other alternatives, soundscapes in many areas of the monument would not be affected in alternative C. All of the new facilities and actions in alternative C would be built in previously disturbed areas. The short-term impacts on soundscape associated with construction of the new development would be minor to moderate, and adverse. The proposed development at Indian Well campground and along the main road shoulders would incur long-term, minor to moderate, adverse impacts on soundscapes in these areas of the monument. There would be a permanent beneficial change to the soundscape at Petroglyph Point as realignment and paving of the road would have a long-term, moderate, beneficial effect on the soundscape at the petroglyphs.

Medicine Lake Road would be paved under this alternative, allowing for increased traffic speeds. Paving would reduce noise in areas adjacent to Medicine Lake Road, having a long-term, negligible, beneficial effect on soundscapes in this area of the monument.

As in alternative A, the soundscape in the backcountry zone would continue to be impacted at low to moderate levels from outside influences associated with agriculture on Tule Lake National Wildlife Refuge and private lands, airplanes, recreational vehicles, and railroad noise impacts. The collaborative efforts between monument staff and the Tule Lake National Wildlife Refuge to restore “walking” or rotating wetlands along the northern boundary would have a long-term, moderate, beneficial effect on soundscapes in this area of the monument by reducing noise associated with agricultural activities.

New trails would provide access for visitors, which would directly contribute to changes over time with the natural soundscape. As many as 15 miles of new trails would be developed in the monument with an emphasis on loop trails. With visitor use levels expected to stay constant or increase over the life of this plan, soundscape resources could have negligible to minor, adverse, long-term, localized impacts in the backcountry zone. The development of a trail for hikers would potentially reduce Cave Loop vehicle traffic and improve the soundscape in this heavily used visitor area by limiting reliance on vehicle access to cave locations. This would

have a long-term, negligible, beneficial effect on the soundscape in this area.

A larger emphasis on interpretative efforts to educate the public on reducing impacts on soundscape resources would have a long-term, beneficial effect on soundscapes.

### *Cumulative Impacts*

Cumulative impacts on soundscape resources would be the same as alternative B.

### *Conclusion*

The promotion of bicycle use and walking and increased visitor education would have long-term, negligible, beneficial effect on soundscapes in some areas of the monument. The proposed development at Indian Well campground and along the main road shoulders would produce long-term, minor to moderate, adverse impacts on soundscapes in these areas. Construction activity from new development would have short-term, minor to moderate, adverse impacts on soundscapes in localized areas. The Petroglyph Point soundscape would have an overall beneficial impact on soundscapes from the realignment and paving of the current access road. There would be a long-term, minor adverse cumulative impact on soundscape resources. Alternative C would add small beneficial and adverse increments in localized areas to the overall cumulative impact. The level of impact due to alternative C would not be expected to constitute an impairment of the monument’s soundscape resources or values.

## Dark Night Skies

The area of consideration for this topic is the monument. Potential impacts from management actions are based on professional judgment and experience with similar actions. The thresholds of change for the intensity of an impact are as follows:

*Negligible:* The effects would be barely detectable and expected to have no discernable effect on dark night sky.

*Minor:* The effects would be slightly detectable, though not expected to have an overall effect on dark night sky.

*Moderate:* The effects would be clearly detectable and could have an appreciable effect on dark night sky.

*Major:* The effects would have substantial, highly noticeable influence and could permanently alter dark night sky.

## **DARK NIGHT SKIES – IMPACTS FROM ALTERNATIVE A (NO ACTION)**

### *Analysis*

Impacts on dark night skies are associated with unshielded and high output lighting on roads, facilities, and residences. Glare and impacts due to light pollution increase near frontcountry and developed zones of the monument. Remote areas in the backcountry zone currently provide high-quality dark night sky experiences.

In alternative A, no new developments would occur that would increase degradation of dark skies or nocturnal habitats within the monument. Existing facilities have already been retrofitted with reduced output lamps or shields. These fixtures will be retained for their suitable output and reduced glare levels. No new trails or trailheads would be developed under this alternative, limiting access infrastructure impacts on wilderness dark skies. In developed zones, particularly in the campground, low levels of impact may temporarily occur with high visitation levels.

Energy conservation measures under this alternative would reduce nightscape impacts associated with monument operations and management of visitor services. Future technologies, such as lights containing small photovoltaic panels and battery packs, could make it easier to introduce illumination into previously unlit areas. Unplanned use of these new technologies could lead to further degradation of dark skies.

### *Cumulative Impacts*

The largest threat to dark skies in the monument is the visible light dome over Klamath Falls, poorly lit development along the State Highway 139 corridor, and security lighting used around nearby agricultural operations. Visitor use and NPS operations in the monument would likely be a relatively small part of the cumulative impacts on the area's nightscape. As more unshielded/high output lighting is installed in surrounding communities, the cumulative effect could be the degradation of dark night skies in all zones of the monument resulting

in minor to moderate, adverse impacts on dark night skies. However, alternative A would not contribute to the cumulative impacts on dark night skies.

### *Conclusion*

Monument operations and visitor use would have no long-term adverse impacts on the monument's dark night skies in alternative A. There would be long-term, minor to moderate, adverse cumulative impacts from future growth and development in surrounding communities. The level of impact due to alternative A would not be expected to constitute an impairment of the monument's resources or values.

## **DARK NIGHT SKIES – IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)**

### *Analysis*

New infrastructure developments in alternative B include an expansion of the visitor center and research center, the construction of new facilities at Petroglyph Point, and the development of new trails. All of these developments could have a long-term, negligible, adverse effect on the monument's dark skies depending on the outside lighting design, and the types of fixtures used.

There would be a long-term change to the night-scapes at Petroglyph Point if proposed developments require the addition of nighttime lighting. This new development would introduce nighttime artificial lighting to this area for the first time. Nighttime illumination would have a potential harmful effect on the nocturnal habitat used by bird and bats that roost and forage from the cliffs above having long-term, minor, adverse, impacts on dark night skies at this location. However, relocation of the road at Petroglyph Point would have beneficial impacts by moving vehicle lights further away from the site. To limit effects on dark skies and nocturnal habitats, site-specific surveys and timed-sensored lighting systems would be used to limit impacts on wildlife.

Alternative B also includes an expansion of the visitor center. Lighting on expanded facilities could increase emissions of stray light. However, the monument would follow dark night sky protocols to reduce impacts to dark night sky. The proposed new trails in the front-country areas would not have an effect on dark night skies since no new lighting would be installed.

Alternative B would have several beneficial effects on dark night skies. New efforts to implement energy conservation measures under this alternative could reduce nightscape impacts associated with monument operations and management of visitor services. A larger emphasis on interpretative efforts to educate the public would have an effect on reducing impacts to dark night skies. Collaborative efforts between the monument and neighboring communities to shield lights and conserve energy through better light fixtures could reduce dark night sky impacts associated with these developments. The establishment of user capacity indicators and standards would help protect dark night sky resources. Taken together, these actions would have a minor to moderate, long-term, beneficial effect on the nightscape in localized areas.

### *Cumulative Impacts*

Cumulative impacts would be similar to those in alternative A. Alternative B proposes collaborative efforts between the monument and neighboring communities to shield lights and conserve energy through better fixtures to reduce dark sky impacts associated with regional light pollution. When the beneficial effects of alternative B are added to actions that have occurred and are likely to occur in the area surrounding the monument, there would be negligible to minor, beneficial cumulative effects on the monument's dark night skies.

### *Conclusion*

The expansion of facilities in alternative B may require additional outdoor lighting resulting in long-term, negligible to minor, adverse impacts on dark night skies. These impacts may be mitigated through sensitive outside lighting design and attention to the types of fixtures used. Collaborative efforts between the monument and neighboring communities could improve the quality of dark skies, having a negligible to moderate, beneficial cumulative effect on dark night skies. The level of impact due to alternative B would not be expected to constitute an impairment of the monument's dark night sky resources or values.

## **DARK NIGHT SKIES – IMPACTS FROM ALTERNATIVE C**

### *Analysis*

In alternative C, new developments would be limited to Petroglyph Point improvements, trail expansion, and vehicle pullouts along the main monument road. Very

little visitation occurs after dark, thus parking pull-outs along the main monument road would have a short-term, negligible, adverse impact on the monument's dark night skies. As in alternative B, new trails would not have an effect on dark night skies since no new lighting would be installed at trailheads.

As in alternative B, new facilities at Petroglyph Point, and the development of new trails could have long-term, negligible, adverse impacts on the monument's dark night skies depending on the outside lighting design, and the types of fixtures used. However, relocation of the road at Petroglyph Point, would have beneficial effects by moving vehicle lights further away from the site. To limit effects on dark skies and nocturnal habitats, site specific surveys and timed-sensored lighting systems would be used to limit impacts on wildlife.

In alternative C, the monument would increase outreach efforts to promote more visitation and provide additional recreational and interpretive trail opportunities, including shared trail systems. Medicine Lake Road would be improved under this alternative, raising a slim possibility that traffic volumes would increase. The monument would also promote more winter use and additional specialized tour opportunities. There is no reason to expect that there would be a significant increase in negative effects on dark skies associated with these new recreational opportunities.

Alternative C would expand the Indian Well campground to accommodate larger recreational vehicles and visitor use groups. With this expansion, short-term impacts could be incurred with higher visitation levels, depending on lighting sources attached to recreational vehicles.

### *Cumulative Impacts*

Cumulative impacts would be similar to alternative A. The beneficial and adverse effects of alternative C would likely be a very small part of the cumulative impacts on dark night skies.

### *Conclusion*

Alternative C would have a long-term, negligible, adverse impact on the monument's dark night skies from new facilities that may require additional outdoor lighting. These impacts may be mitigated through sensitive outside lighting design and the types of fixtures used. There would be minor to moderate,



adverse cumulative impacts from future growth and development in surrounding communities. The level of impact due to alternative C would not be expected to constitute an impairment of the monument's dark sky resources or values.

## Viewsheds/Visual Resources

The area of consideration for this topic is the monument. Potential impacts from management actions are based on professional judgment and experience with similar actions. The thresholds of change for the intensity of an impact are as follows:

*Negligible:* The effects would be barely detectable and expected to have no discernable effect on scenic/visual resources and viewsheds.

*Minor:* The effects would be slightly detectable, though not expected to have an overall effect on scenic/visual resources and viewsheds.

*Moderate:* The effects would be clearly detectable and could have an appreciable effect on scenic/visual resources and viewsheds.

*Major:* The effects would have substantial, highly noticeable influence and could permanently alter scenic/visual resources and viewsheds.

### VIEWSHEDS/VISUAL RESOURCES – IMPACTS FROM ALTERNATIVE A (NO ACTION)

#### *Analysis*

In alternative A, no new developments are proposed that would impact scenic views within the monument. Existing structures within the monument, visible from backcountry and wilderness areas, would continue to impact viewsheds within the monument. Power lines located in the northern portion of the monument would continue to have a minor, adverse impact on scenic vistas from the monument.

Visibility in the monument can be affected by regional haze, dust from agricultural activities, smoke from wildland fires, and other outside sources of air pollution. Such activities would cause short-term, negligible to moderate, adverse impacts on the monument's viewsheds.

The monument would continue to work regionally with adjacent landowners on viewshed and visibility issues. For example, the monument would continue to work with the California Environmental Protection Agency, and other partners, to preserve its Class I air quality within and around its borders. Cooperating with adjacent landowners to implement air protection measures would also reduce the impact of air pollution on monument visibility and result in minor to moderate, long-term, beneficial effects on the monument's scenic vistas.

#### *Cumulative Impacts*

Potential development outside of the monument could have an effect on visual resources by altering scenic landscapes. Visual impacts associated with proposed geothermal facilities on U.S. Forest Service lands would most likely be caused by transmission lines running from each site along the north slopes of the Medicine Lake highlands to the east. In addition, steam emissions at each generating plant or wellhead might also be visible from Lava Beds, particularly in cold, clear weather. Logging activity on the southern border of the monument could cause visual impacts of an unknown magnitude, depending on the harvest method utilized.

Overall, the beneficial and adverse effects from the actions of alternative A, plus the adverse impacts from regional or neighboring sources, would result in minor to moderate, adverse cumulative impacts on the monument's visual resources.

#### *Conclusion*

Alternative A would have minor to moderate, long-term, adverse impacts on visual resources, primarily from visible infrastructure both within and outside of the monument. Some activities such as wildland fires would cause short-term, negligible to minor, adverse impacts on the monument's viewsheds. Regional pollution sources would continue to affect the monument, and over time would result in minor to moderate, cumulative adverse impacts on visual resources. Implementation of alternative A would not result in an impairment of monument resources or values.

## **VIEWSHEDS/VISUAL RESOURCES – IMPACTS FROM ALTERNATIVE B (PREFERRED)**

### *Analysis*

In alternative B, the monument would take undertake new efforts to directly improve monument viewsheds through facility improvements. Such improvements would include screening monument buildings, less obtrusive paint colors, less reflective roofing materials, minimal lighting, placing overhead utility lines underground near along Hill Road at the northwest entrance, and Petroglyph Point, and cooperating with the U.S. Fish and Wildlife Service to place north side utility lines underground. These actions would have a long-term, moderate, beneficial effect on viewsheds and visual resources.

Alternative B would emphasize restoration of geologic features and increased monitoring to protect geologic features from damage. Detering vandalism and other forms of damage to frequently viewed geologic resources, as well as active restoration, would lead to long-term, moderate, beneficial effects.

Alternative B also includes actions to rehabilitate or restore habitat in the northern portions of the monument. These actions would return those vegetated areas to their natural appearance, resulting in a long-term, moderate beneficial effect on viewsheds in the monument.

New visitor facilities proposed in alternative B that could affect viewsheds include new trails, campground renovations, new facilities at Petroglyph Point including relocation of the road and parking area, installation of photovoltaic panels, and small expansions to the visitor center and the research center. These facilities would affect visual experiences at both the site level and broader viewsheds.

Providing additional hiking trails should have a minor to moderate, long-term, beneficial effect on viewing experiences within the monument by providing additional opportunities for visitors to experience monument landscapes. However, some impacts on monument viewsheds would occur from siting new trails. New trails would be carefully sited to minimize such visual impacts.

Screening and separating tent camping and RV uses within the campground would have a long-term, moderate, beneficial effect on the visual experience of campers. Impacts on broader monument viewsheds

would depend on whether the campground improvements are visible from elsewhere in the monument. The monument would strive to create minimal intrusions when siting and locating any new facilities at the campground. Campground improvements could have a minor, long-term impact on broader monument viewsheds.

In the long-term, facility improvements at Petroglyph Point would provide moderate beneficial effects on the overall appearance of this site. A new protective fence is intended to provide a more aesthetically pleasing experience for visitors viewing the petroglyphs. Moving the existing road and parking area further away from the petroglyphs will further improve the visual quality of the area. Currently, through traffic creates noise intrusions and dust clouds. As stated in the mitigation measures in Chapter 3, the facilities at Petroglyph Point would be designed, sited, and constructed to minimize the adverse effects on visual intrusions. Within the context of the monument, the addition of the visitor contact station, outdoor education area, and new day use area would have an overall, minor impact on broader monument and Tule Lake Basin viewsheds.

Under alternative B, the monument would add alternate forms of electrical generation to offset monument's electrical energy use. This could require up to 18,000 square feet of photovoltaic panels. While half of the panels could be placed on existing building roofs, the remainder would need to be mounted on about ¼ acre of ground. Sites are available for this in the vicinity of the Indian Well housing area that would be screened from public view and could be connected to the electrical grid. The addition of photovoltaic panels would have a long-term, negligible to minor, adverse impact on monument viewsheds. The monument may also consider wind turbines as an alternative source of energy. Wind turbines are currently manufactured in a variety of shapes and sizes. With careful siting and use of small turbines that can be obscured, the addition of turbines to existing developed areas would likely have a negligible to minor adverse effect on monument viewsheds.

Small additions to the research and visitor centers would likely have little impact on existing monument viewsheds. These small additions would be located in already developed and disturbed areas of the monument. Careful siting and massing, vegetative screening, and choosing appropriate paint colors and roofing materials would greatly minimize visual

impacts. The new additions would have a long-term, negligible impact on monument viewsheds.

The construction of new trails and facilities would result in short-term, minor, adverse impacts on visual resources. Restoration of native habitats may have similar short-term adverse impacts.

As in alternative A, visibility can be affected by regional haze, dust from agricultural activities, smoke from western wildland fires, and other outside sources of air pollution. These factors would cause short-term negligible to moderate adverse impacts on the monument's viewsheds and night sky.

The monument would continue to work with the state of California Environmental Protection Agency and other partners to preserve its Class I air quality, within and around its borders. Cooperating with adjacent landowners to implement air protection measures would reduce the impact of air pollution on monument visibility and result in long-term, minor to moderate, beneficial effects on the monument's scenic vistas.

### *Cumulative impacts*

The cumulative effects on visibility in the monument would be similar to those described for alternative A. Alternative B would provide beneficial impacts from minimizing the current impact of built structures on the landscape and coordinating with surrounding agencies to prevent and remove visual intrusions on visual resources and viewsheds. When the beneficial and adverse effects from the actions of alternative B are added to the adverse impacts from regional or neighboring sources, the result would be cumulative, minor, adverse impacts on the monument's viewsheds and visual resources.

### *Conclusion*

The effects of facility improvements and habitat restoration proposed in alternative B would have moderate, long-term, benefits on visual resources. New facilities at Petroglyph Point and improvements at the campground would improve the visual quality at these sites. Negative visual impacts would primarily be short-term, during construction and active restoration of native habitat. The monument would minimize adverse cumulative impacts on visual resources through: 1) active management of viewsheds and visual resources within the monument; and 2) by working with adjacent landowners and others to minimize impacts. The beneficial

and adverse effects from the actions of alternative B, plus the adverse impacts from regional or neighboring sources, would result in cumulative, minor, adverse impacts on the monument's visual resources. Implementation of alternative B would not result in an impairment of monument resources or values.

## **VIEWSHEDS/VISUAL RESOURCES – IMPACTS FROM ALTERNATIVE C**

### *Analysis*

New visitor facilities proposed in alternative C that could affect viewsheds include new trails, campground renovations, additional road pullouts, paving and reconstructing the Medicine Lake Road, and new facilities at Petroglyph Point. These facilities would affect visual experiences at both the site level and broader viewsheds. Construction of these new trails and facilities would result in short-term, minor, adverse impacts on visual resources.

Alternative C proposes the most new trail opportunities for the monument. Providing additional hiking trails should have a long-term, beneficial impact on viewing experiences within the monument by providing additional opportunities for visitors to experience monument landscapes. A new foot trail on cave loop could improve the visual quality of this area if it allows social trails to be restored. Some impacts on monument viewsheds would occur from altering the landscape to site new trails. However, any new trails would be sited to minimize visual impacts. Overall, new trails proposed under alternative C could have a long-term, minor impact on viewsheds and a long-term, moderate beneficial effect on viewing experiences at the monument.

Under alternative C, the monument would add alternate forms of electrical generation to offset monument's electrical energy use. This could require up to 18,000 square feet of photovoltaic panels and would be screened from public view and could be connected to the electrical grid. The addition of photovoltaic panels would have a long-term, negligible to minor, adverse impact on monument viewsheds. The monument may also consider wind turbines as an alternative source of energy. Wind turbines are currently manufactured in a variety of shapes and sizes. With careful siting and use of small turbines that can be obscured, the addition of turbines to existing developed areas would likely have a negligible to minor adverse effect on monument viewsheds.



Physically separating tent camping and RV camping through a new RV loop would have a long-term, moderate, beneficial effect on the visual experience of campground users. The proposed new RV loop would expand the footprint of the campground and create more of a visual disturbance at both the local site level and possibly on broader monument viewsheds. The monument would take every effort to create minimal intrusions when siting and locating new facilities at the campground. Campground improvements would have a minor to moderate, long-term impact on broader monument viewsheds.

Alternative C proposes to construct new automobile pullouts along the main road to allow for informal, dispersed recreation. This action would have a long term, minor, adverse impact on viewsheds. Additional pullouts would removing native habitat and possibly some geologic features. Additional access through pullouts may also encourage the creation of new social trails, causing long-term, minor, adverse impacts on visual quality.

In the long-term, facility improvements at Petroglyph Point would provide moderate, beneficial effects on the overall appearance of this site. Construction of a new protective fence is intended to provide a more aesthetically pleasing experience for visitors viewing the petroglyphs. Moving the existing road further away from the petroglyphs will further improve the visual quality of the area. Currently, through traffic creates noise intrusions and dust clouds. As stated in the mitigation measures in Chapter 3, the facilities at Petroglyph Point would be designed, sited, and constructed to minimize the adverse effects on visual intrusions. Within the context of the monument, the new day use area would have an overall, minor impact on broader monument viewsheds that include Petroglyph Point.

As in alternatives A and B, visibility in the monument would be affected by regional haze, dust from agricultural activities, smoke from fires, and other outside sources of air pollution. These factors would cause short-term, negligible to moderate, adverse impacts on the monument's viewsheds and visual resources.

As in alternatives A and B, the monument would continue to work with the California Environmental Protection Agency and other partners to preserve its Class I air quality within and around its borders. Cooperating with adjacent landowners to implement air protection measures would reduce the impact of air

pollution on monument visibility and result in minor to moderate, long-term, beneficial effects on the monument's scenic vistas.

### *Cumulative Impacts*

The cumulative effects on visibility in the monument would be similar to those described for alternative A. When the beneficial and adverse effects from the actions of alternative C are combined with the adverse cumulative impacts from regional or neighboring sources, the result would be minor to moderate, cumulative adverse impacts on the monument's visual resources. Alternative C's contribution to such impacts would be relatively small.

### *Conclusion*

The effects of proposed actions under alternative C would have both adverse and beneficial effects on visual resources. The monument would continue to minimize impacts on visual resources within the monument and would work with adjacent landowners and others to minimize impacts on scenic resources from cumulative actions outside the monument. Negative visual impacts would primarily be short-term, during construction or renovation of new facilities. Long-term negative effects are primarily associated with new roadside pullouts, paving the Medicine Lake Road, and the creation of new trails. The beneficial and adverse effects from the actions of alternative C, plus the adverse impacts from regional or neighboring sources, would result in minor to moderate, adverse cumulative impacts on the monument's visual resources. Implementation of alternative C would not result in an impairment of monument resources or values.

## **Cave Resources**

Lava Beds National Monument contains some of the most extensive and least impacted lava tube caves in the western United States. Many caves are in remote, isolated areas and are not well known to the general public. The area of consideration for this topic is the monument. Potential impacts from management actions are based on, available information about caves, professional judgment, and experience with similar actions. The thresholds of change for the intensity of an impact are as follows:

*Negligible:* The impact would be at the lower levels of detection or not measurable.

*Minor:* A cave feature or environment might suffer some slight alteration that would be noticeable.

*Moderate:* Cave features or the environment would be obviously altered, or a number of features would show changes.

*Major:* Impacts on cave features or the environment would result in the permanent loss of an important cave feature or in highly noticeable widespread changes in many cave features or the environment.

## **CAVE RESOURCES– IMPACTS FROM ALTERNATIVE A (NO ACTION)**

### ***Analysis***

Under alternative A, Lava Beds National Monument would continue to follow current management objectives related to cave resources. Visitors would still be allowed to experience self-guided cave tours. New facility developments would not be built over or degrade cave resources, thus, no impacts to cave resources would occur from construction. Cave resources easily accessible to visitors from trails, roads, picnic areas, and off-trail areas are vulnerable to disturbance, inadvertent damage, and vandalism, particularly if visitor use increases or focuses on specific cave resource areas. Many of the highly visited caves contain trails, which would continue to be used for visitor or administrative uses. These trails need to be maintained to protect caves from potential visitor impacts. Long-term, minor to moderate, deterioration of cave resources would continue to occur and may expand to new cave resources with shifting visitation trends, regular facility and trail maintenance, and field research. Formation of social trails within caves would continue to degrade cave resources. Monument staff would continue efforts to minimize visitor use impacts through education and restoration of some impacted caves, creating a long-term, minor, beneficial effect on cave resources.

The monument's ability to identify, inventory, conduct research and document cave abiotic and biotic resources would continue to be limited by staffing constraints. Long-term monitoring and assessment of cave conditions and cave biota population trends would be minimal, if not inadequate. The lack of inventories and monitoring could lead to unknown deterioration

of cave resources. Opportunities for facilitating cooperative research with universities and independent researchers would be limited.

### ***Cumulative Impacts***

Most caves in the monument retain their natural character, without alterations. Varying degrees of disturbance from past use has occurred in some caves, particularly in the cave loop area and other primary visitor caves. Past damage includes broken features, trampled invertebrates, compacted soils, sediment transport on clothes, litter, and alteration of airflow and microclimates due to digging. Management provisions to maintain and improve conditions over the long term would continue (e.g., removing litter, cleaning dispersed sediments). No future development of caves is proposed. Most caves would remain unaffected and in good condition, and current restoration efforts would continue.

No regional activities or proposals are expected to have a cumulative impact on cave resources at the monument. Significant regional population growth is not expected and monument visitation would likely remain stable, with modest increases over time. Plans and projects on the adjacent Modoc National Forest and Tule Lake National Wildlife Refuge are not expected to have an effect on caves in the monument.

Overall, the effects of past, present, and reasonably foreseeable future projects have resulted in negligible to moderate, adverse cumulative effects on cave resources. Alternative A's contribution to these impacts would be relatively small.

### ***Conclusion***

Alternative A would have both beneficial and adverse impacts on cave resources. Some long-term, minor to moderate, adverse impacts would occur in local areas due to current visitor use levels and the potential for increased visitor use levels. However, continuing efforts to mitigate cave resource damage through education and restoration would likely have a long-term, minor, beneficial effect. The effects of past, present, and reasonably foreseeable future projects have resulted in long-term, negligible to moderate, adverse cumulative effects on cave resources. Alternative A's contribution to these impacts would be relatively small. None of the cave resource impacts that would occur in this alternative would be sufficient to result in an impairment of the monument's resources and values.

## CAVE RESOURCES – IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)

### *Analysis*

Cave resources at Lava Beds receive the greatest amount of resource damage due to visitation and the development of facilities such as trails within the cave system. Visitation can be a product of recreation, research, and administrative uses. The primary methods in which the monument can prevent cave resource degradation is through limiting access to cave systems and educating visitors on low impact caving techniques. Alternative B proposes several actions that could result in increased access to cave resources.

The provision of new opportunities to experience wilderness areas in alternative B could increase visitation to backcountry cave systems and subsequently introduce adverse impacts to those cave systems. In addition, increased education and outreach on wilderness areas may improve knowledge of sensitive cave locations, leading to increased visitation. On the other hand, increased outreach and education would improve overall visitor knowledge of appropriate caving techniques and ethics, which will help mitigate degradation to cave resources and improve overall visitor experience at the monument.

Wilderness dependent research would continue to be encouraged. The Schonchin Lava Tubes Research Natural Area, a 134-acre plot of land set aside for research, would continue to be maintained by allowing natural physical and biological processes to prevail without human intervention.

The provision for more trail opportunities with an emphasis on traditional interpretive methods or new technologies as appropriate could produce adverse cave resource impacts. The construction of a geology trail could have long-term, negligible to minor, adverse impacts on cave resources. Similarly, the construction of loop trails or trails connecting visitor use areas could lead to impacts on cave resources if these trails require construction over caves or ease access to cave systems.

Overall increases in recreational opportunities, including winter recreation, could lead to adverse impacts from increased use or alternative uses (i.e. climbing). Furthermore, the increase of recreational opportunities on adjacent federal lands may lead to cave impacts within and outside of the monument. An improved virtual cave experience could reduce impacts to cave resources by lowering visitation, minimizing

the construction of cave infrastructures, and reducing impacts associated with maintenance of trails within caves.

The proposal for several day use areas for large groups could have both adverse and beneficial impacts to cave resources. Large groups are often associated with inappropriate behaviors in cave systems. The encouragement of more large groups could lead to both cave degradation and reduction of overall visitor experience for those expecting a wilderness experience in the monument's caves. If the group picnic and camp sites are in proximity to known cave resources, it is highly likely those caves will receive increased use and increased adverse impacts. However, providing facilities to accommodate large groups where the monument staff can interact with group leaders and influence the knowledge, behavior, timing, and size of groups could mitigate potentially adverse impacts of large groups.

The reduction of automobiles on cave loop would improve the overall cave experience and the safety of cavers who use the road to travel between cave systems. The creation of trail linkages to reduce automobile use could have both adverse and beneficial impacts on cave systems, dependent upon the proximity of trail linkages to cave resources.

Maintaining approximately 1.8 miles of Lyons Road for administrative vehicle access to Fern Cave should have no new adverse impacts to cave resources. Continued visitation (planned or random) to Fern Cave could have minor long-term impacts on cave resources. Access and parking may be redesigned to better protect resources and should have no impacts to cave resources.

The introduction of more concessionaire services could have long-term, minor to moderate, adverse impacts on cave resources. The allowance of limited, seasonal, retail and food service vendors could increase the amount of litter present in the cave systems, particularly in the cave loop and visitor center area. The introduction of commercial tours would provide more visitor opportunities, but would also increase the potential impact on caves. Group size and behavior would have to be strictly monitored and regulated. Commercial tours could benefit cave resources, if tour operators work in close contact with monument staff and strive for visitor services, safety, and resource protection.

The installation of toilets on Cave Loop would be beneficial for cave resources. The installations could reduce



social trails which promote use of non-primary caves. They would also reduce the frequency of human waste inside caves, dramatically reducing damage to cave ecosystems and improving visitor experiences.

Increased restoration, research, and cave management efforts would have an overall beneficial impact on cave resources at the monument. The establishment of formal relationships with citizens, high schools, colleges, and universities to conduct research should be beneficial towards the protection, restoration, and understanding of cave resources. The advancement of knowledge related to cave resources and management would improve the ability of the monument to manage changing visitation and technologies. There could be a minor, adverse impact if large-scale research begins which involves considerable human presence in backcountry and pristine cave environments.

New facility developments would not be built over or degrade cave resources, thus, impacts to cave resources from infrastructure development are unlikely within this alternative.

Overall, new recreational opportunities proposed in alternative B would have long-term, minor adverse impacts on cave resources. Moderate, adverse impacts would occur in some high visitation areas such as the Cave Loop. Increased education, restoration, monitoring, and research would have beneficial effects, offsetting some of the impact from new recreational opportunities.

### *Cumulative Impacts*

As described under alternative A, varying degrees of disturbance from past use have occurred in some of the more accessible caves. No regional activities or proposals are expected to have a cumulative effect on cave resources in the monument. New visitor opportunities proposed in alternative B could have an impact on cave resources over time. However, alternative B proposes increased cave restoration, improved monitoring, more cave education, and research that would, over time, benefit cave resources.

Overall, the effects of past, present, and reasonably foreseeable future projects would result in adverse, minor to moderate, cumulative effects on cave resources. Alternative B's contribution to these impacts would be relatively small.

### *Conclusion*

Under alternative B, proposed actions that focus on improving access to monument resources, either through trail development or through increased interpretation, could have long-term, negligible to minor adverse impacts on cave resources. The monument would take appropriate steps to mitigate initial impacts and continue monitoring use of caves in the backcountry. Long-term, moderate, adverse impacts on cave resources could occur in localized areas within the developed and interpretive backcountry zones. Alternative B addresses this concern with the proposed implementation of a variety of resource management actions, education and outreach improvements, enhanced protection measures, and improved monitoring and research related to caves. Cumulative impacts would be the same as alternative A. The adverse and beneficial impacts of alternative B's contribution to these impacts would be relatively small. None of the cave resource impacts that would occur in this alternative would be sufficient to result in an impairment of the monument's resources and values.

## **CAVE RESOURCES – IMPACTS FROM ALTERNATIVE C**

### *Analysis*

The expansion of outreach to the travel and tourism industry to maintain or increase visitation, and in turn raise the regional profile of the monument, could impact cave resources. Impacts from new recreational opportunities, increased tours, new food concessions, and proposed new facilities such as day use areas and loop trails would be similar to alternative B and could result in minor to moderate, adverse impacts to cave resources in the Cave Loop area and other primary visitor caves. Such impacts could be mitigated through additional education and interpretation promoting responsible visitation to caves.

The construction of pullouts on the main road to allow for informal, dispersed recreation could have localized, moderate, adverse impacts on cave resources depending on their location. The primary protection method for cave resources is the lack of knowledge of their location. New access points throughout the monument would increase use of caves that currently have had very little to no visitation. It can be expected, using Cave Loop as an example, that the establishment of new access points to visit backcountry caves, and caves within developed and interpretive backcountry zones, would cause long-term, moderate adverse

impacts to some cave resources. In addition, direct impacts could result from the construction of pullouts directly over or adjacent to caves. However, this could be mitigated through careful selection of sites for new pullouts.

The improvement of the campground to better accommodate large vehicles by adding a new RV loop and reducing other campsites should represent minor to no adverse impacts to cave resources. The stipulation that no hookups would be provided for RV sites would also lower the probability of adverse impacts to cave resources. However, depending on the location of proposed campground improvements, there could be some minor to major impacts from site construction and site use on cave resources, if construction occurs adjacent to or over a cave.

Overall increases in recreational opportunities, including winter recreation, could lead to adverse impacts from increased use or alternative types of use (i.e. rock climbing). Furthermore, the promotion or increase of recreation opportunities on adjacent federal lands may lead to cave impacts within the monument.

Additional interpretation of Civilian Conservation Corps-era monument features could provide a method for mitigating cave impacts by fostering appreciation of CCC-built cave trails. Informing visitors should benefit cave resources or, at least, cause no adverse impact.

### *Cumulative Impacts*

As described under alternative A, varying degrees of disturbance from past use have occurred in some of the more visitor accessible caves. No regional activities or proposals are expected to have a cumulative effect on cave resources in the monument. New visitor opportunities such as caving tours and new trail loops could have localized impacts on some cave resources.

Overall, the effects of past, present, and reasonably foreseeable future projects would result in adverse, minor to moderate, cumulative effects on cave resources. Alternative C would make a modest contribution to these effects, primarily from new caving opportunities and new visitor facilities such as trails.

### *Conclusion*

Under alternative C, several proposed actions focus on improving access to monument resources either through trail development or through increased recre-

ational opportunities. The impacts from these actions should have minor impacts on cave resources as long as, appropriate steps are taken to mitigate initial impacts and proper monitoring of backcountry and wilderness caves takes place. If proper mitigation (e.g. trail location, education, protection services) is not employed, long-term, moderate, adverse impacts could occur to non-renewable cave resources. Cumulative impacts would be the same as alternative A. Alternative C would make a modest contribution to these effects, primarily from new caving opportunities and new visitor facilities such as trails. None of the cave resource impacts that would occur in this alternative would be sufficient to result in an impairment of the monument's resources and values.

## **Geologic Resources**

The area of consideration for this topic is the monument. Available information on surface geologic resources and processes, including soils, in the monument was compiled. Potential impacts from management actions are based on professional judgment and experience with similar actions. The thresholds of change for the intensity of an impact are as follows.

*Negligible:* An action that could result in a change to a geologic feature or process, but the change would be so small that it would not be of any measurable or perceptible consequence.

*Minor:* An impact that could result in a change to a geologic feature or process, but the change would be so small that it would not be of any measurable or perceptible consequence.

*Moderate:* An action that would result in a change to a geologic feature or process; the change would be measurable and of consequence.

*Major:* An action that would result in a noticeable change to a geologic feature or process; the change would be measurable and the level of disturbance would be severe.

## **GEOLOGIC RESOURCES– IMPACTS FROM ALTERNATIVE A (NO-ACTION)**

### ***Analysis***

The majority of the monument's primary visitor sites are non-renewable geologic features. This includes Fleeners Chimneys, Black Crater, Petroglyph Point, Schonchin Butte, and Captain Jacks Stronghold. The elements of alternative A would have, at a minimum, minor adverse impacts on the monument's geologic resources. The geologic features of Lava Beds would likely continue to be worn, damaged, and/or degraded by visitors activities in localized areas, particularly adjacent to existing trails, near visitor facilities, and wherever social trails exist.

Increases in visitation, or shifting of visitor use toward specific geologic resources, could dramatically increase the extent of geologic resource damage. Monument staff and outside researchers would likely continue to use existing trails and social trails, and would have a minor, adverse impact on adjacent geologic features in the monument, as long as travel is dispersed and infrequent. In some areas, new human-created, social trails may form with increased visitation, particularly in areas with high visitor numbers. Currently, social trails at Black Crater and Fleeners Chimneys are causing long-term, minor to moderate, adverse impacts to geologic resources. Off trail travel on cinder cones represents potential minor, adverse impacts to the geologic resources. For example, sliding down slopes creates noticeable scars on the surface and encourages future reciprocal behaviors. Proposed restoration efforts could have short-term, moderate beneficial impacts on these resources and the establishment of improved low-impact trails around these resources could further mitigate impacts from visitation. Cave geologic features would continue to receive long-term, minor to moderate, adverse impacts in the form of disturbance and compaction from visitors.

Alternative A includes no formal plans for construction of new facilities, thus no geologic features would be altered due to construction. Maintenance of existing facilities would cause minimal degradation of geologic features, resulting in negligible to minor, long-term, adverse impacts in localized areas.

### ***Cumulative Impacts***

Geologic features throughout the monument have been altered by past management practices and infrastructure developments. Past developments have resulted

in the loss or alteration of some geologic features. However, much of the monument's geologic features remain in their natural character.

No regional activities or proposals are expected to have a cumulative impact on geologic resources at the monument. Increases in visitation will likely continue to be modest and regional population growth is not expected to increase significantly. Plans and projects on the adjacent Modoc National Forest and Tule Lake National Wildlife Refuge are not expected to have an effect on geologic features in the monument.

Overall, the effects of past, present, and reasonably foreseeable future projects and uses have resulted in minor to moderate, adverse cumulative effects on geologic resources. Alternative A actions are not expected to contribute to these impacts.

### ***Conclusion***

Most of the monument's geologic features would not be affected by the ongoing use in alternative A. However, some specific geologic features would be worn, damaged, or altered, due to increased visitor use in localized areas such as along trails, in caves, and at major visitor locations. Visitor use of primary frontcountry geologic resources could result in long-term, moderate, adverse impacts on the monument's geologic. Geologic resources in backcountry and wilderness areas would receive little visitation, and thus negligible, long-term, adverse impacts.

The effects of past, present, and reasonably foreseeable future projects have resulted in minor to moderate, adverse cumulative effects on geologic resources. Alternative A actions are not expected to contribute to these impacts. No impairment to the monument's resources and values would result from geologic feature impacts in this alternative.

## **GEOLOGIC RESOURCES – IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)**

### ***Analysis***

In alternative B, some geologic features would be lost to degradation or substantially altered in local areas where disturbance would occur due to the development of trails, parking areas, campsites, and other facilities. The development of new visitor facilities at Petroglyph Point could have minor to moderate, short-term adverse impacts on local geologic features, particularly

if trails are developed to improve access. Additionally, the expansion of the monument visitor center, the creation of new wilderness trails, and the creation of new areas for large groups, could have moderate, short-term, adverse impacts on geologic features near the site. Mitigation efforts could help reduce the impact on the geologic features in the area. The adverse impact on geologic features would likely be moderate in the specific areas, but the adverse impact on the monument's overall geologic features, due to new developments, would be long-term, minor and adverse.

Several actions would occur in areas that have already been disturbed by people. These actions include alterations to the campground, Petroglyph Point, and expansion of the research center and visitor center. Little additional geologic feature disturbance would be required. Thus, these actions would have a long-term, minor, adverse impact on geologic features in these areas. As in alternative A, maintenance of existing facilities would probably result in some disruption of geologic features, resulting in a negligible to minor, long-term, adverse impact on geologic features in localized areas.

The monument staff and the Cave Research Foundation would likely continue to use existing trails and social trails throughout the monument in order to work in remote caves, creating a long-term, negligible to minor, adverse impact on geologic features by contributing to additional geologic feature wear in the monument. Encouragement of increased research in the monument, could increase the impacts on geologic features, but are considered to be minor, adverse impacts. Future research may also benefit geologic features through increased understanding of the extent, type, and condition of geologic features within the monument.

The creation of a interpretive geology trail could have long-term, minor to moderate, impacts on resources, depending on level of use on the trail and the ability of the monument to promote resource conservation along the trail corridor. Improved interpretation of geologic resources on the trail and in general throughout the monument could have long-term, moderate, beneficial impacts on cave resources. In some areas in the monument, new social trails may be created as visitation increases. The long-term, adverse impacts on geologic features from visitation would likely be moderate and localized in extent.

Expanded recreational opportunities and additional trails could lead to moderate, short-term, adverse impacts on geologic resources. The creation of backcountry campsites, with associated networks of social trails, could create long-term, moderate, adverse impacts to the immediate area and minor long-term impacts radiating outward from the sites. The encouragement of more backcountry trail use could potentially increase adverse impacts to wilderness geologic features. The geologic features in these areas are often pristine and, even with relatively few visits (staff or visitors), can result in long-term, moderate, adverse impacts.

Efforts to remove social trails would help reduce degradation and could result in a long-term, minor to moderate, beneficial effect on geologic features. This should reduce wear, erosion, and degradation compared to the present conditions, and would result in a minor to moderate, long term, beneficial effect. Instituting and monitoring user capacity indicators and standards should help ensure that an unacceptable increase in the number of human-created trails (and resulting increased geologic feature disruption) does not occur in the interpretive backcountry and backcountry zones. Compared to alternative A, this alternative would result in a moderate, long term, beneficial impact.

### *Cumulative Impacts*

As described under alternative A, past management practices and infrastructure improvements have altered geologic features. Overall, the effects of past, present, and reasonably foreseeable future projects have resulted in minor to moderate, adverse cumulative effects. Alternative B's contribution to these impacts would be relatively small.

### *Conclusion*

Most of the monument's geologic features would not be directly affected by the actions in alternative B. However, some geologic features could be disturbed and lost while other features could be altered. This would be due to construction projects and increased visitor use in localized areas, such as along trails and inside caves. Overall, these adverse impacts would likely be minor and long-term in extent.

Establishing and monitoring user capacity indicators and standards and additional restoration efforts should help prevent the establishment of new human-created



trails and resulting geologic feature degradation. This would have a moderate, long term, beneficial effect. When the impacts in alternative B are added to other impacts from past and foreseeable future actions, there would be the potential for a long-term, minor to moderate, adverse cumulative impact on area geologic features, although the actions in alternative B would add a very small increment to this overall cumulative impact. No impairment to the monument's resources and values would result from geologic feature impacts in this alternative.

## **GEOLOGIC RESOURCES – IMPACTS FROM ALTERNATIVE C**

### ***Analysis***

In alternative C, increases in visitation, or shifting of visitor use toward specific geologic resources could increase the extent of geologic resource damage. Some geologic features would be lost to degradation or substantially altered in local areas where disturbance occurs due to the development of trails, parking areas, campsites, and other facilities. The development of new visitor facilities at Petroglyph Point could have minor to moderate, short-term adverse impacts on local geologic features, particularly if a trail is developed to the top of the point.

The creation of new picnic and camp areas for groups, could have moderate, short-term, adverse impacts on geologic features near the site. Site preparation and landscaping work could disturb geologic features in these areas, and geologic features could be paved over and lost in the footprint of the facilities. Mitigation efforts could help reduce these impacts. The adverse impact on geologic features would likely be moderate at the site level, but adverse impacts on the monument's overall geologic features due to new developments would be minor and long term.

The creation of new loop trails and backcountry campsites, and/or the formalizing of several existing social trails would have long-term, minor, adverse impacts on geologic resources. Increased visitation as a result of the creation of the trail systems could result in long-term, moderate, adverse impacts on geologic resources if they become a planned or unplanned destination (i.e. Ross Chimney near Thomas-Wright Battlefield).

The creation of additional automobile pullouts along the main monument road would create a new opportu-

nities for social trail formation, leading to the possible disturbance of nearby geologic features. This could cause moderate, long-term, adverse impacts to the immediate area and minor, long-term impacts radiating outward from the sites.

The encouragement of more backcountry trail use could potentially increase adverse impacts to wilderness geologic features. The geologic features in these areas are often pristine and even with relatively few visits (staff or visitors), can receive localized, moderate to major levels of adverse impact.

As in alternative A, maintenance of existing facilities would probably result in the minor degradation or alteration of geologic feature properties, resulting in negligible to minor, long-term, adverse impacts in localized areas. Geologic features in the monument would likely continue to be degraded by hikers in local areas, such as along the sides of trails. This causes minor, adverse impacts, which could be exacerbated if, as detailed in alternative B, efforts are made to promote more visitation not only in frontcountry zones, but in backcountry and wilderness zones as well. However, it is likely that the overall impacts from increased visitation will be minor in general, and moderate in specific locations. In some areas, new social trails may form with increased visitation, particularly in areas with high visitor numbers. Efforts to close and revegetate social trails, such as near Cave Loop, would help reduce degradation and would result in a long-term, beneficial impact on geologic features.

Instituting and monitoring user capacity indicators and standards also should help ensure that an unacceptable increase in the creation of human-created trails does not occur. Compared to the alternative A, this would result in a minor to moderate, long-term, beneficial impact.

### ***Cumulative Impacts***

As described under alternative A, past management practices and infrastructure improvements have altered geologic features. Overall, the effects of past, present, and reasonably foreseeable future projects have resulted in adverse, minor to moderate cumulative effects. Alternative C's contribution to these impacts would be relatively small.

## *Conclusion*

Most of the monument's geologic features would not be affected by the actions in alternative C. However, some geologic features would be degraded and/or lost and some geologic feature properties would be altered due to new developments and increased visitor use in localized areas such as along trails and in caves. The overall adverse impacts would likely be minor and long-term in extent. A potential increase in backcountry use where features are pristine with relatively few visits could receive localized, moderate to major, levels of adverse impact. However, establishing and monitoring user capacity indicators and standards should help prevent the establishment of new human-created trails and prevent resulting geologic feature degradation.

When the impacts in alternative C are added to impacts from other past and foreseeable future actions, there would be the potential for a long-term, minor to moderate, adverse cumulative impact on area geologic features, although the actions in alternative C would add a very small increment to this overall cumulative impact. No impairment to the monument's resources and values would result from geologic feature impacts in this alternative.

## **Soils**

See "Geologic Resources" for impact thresholds related to soils.

### **SOILS – IMPACTS FROM ALTERNATIVE A (NO-ACTION)**

#### *Analysis*

Soils will likely continue to be disturbed, compacted, and eroded by visitors in localized areas, particularly along existing trails, near visitor facilities, and near social trails. Monument staff and outside researchers would likely continue to use existing trails and social trails, and thus would have a long-term, negligible to minor, adverse impact on adjacent soils in the monument, as long as travel is dispersed and infrequent. In some areas, new human-created, social trails may form with increased visitation or changes to visitation patterns, particularly in areas with high visitor numbers. These long-term, adverse visitor impacts to soils would likely be minor and limited in extent. Cave soils would continue to receive long-term, minor to moderate, adverse impacts in the form of disturbance

and compaction from visitors. Alternative A includes no formal plans for construction of new facilities, thus no soils would be altered due to construction.

#### *Cumulative Impacts*

Soils throughout the monument have been altered by past grazing practices and infrastructure developments. The loss and alteration of soils due to past land uses and future management actions would result in a minor to moderate, adverse cumulative impact on area soils. Cumulative impacts to cave soils are unknown, and presumed to be minor to moderate based on visitation levels. The level of adverse impacts could increase with increased visitation to cave systems, particularly backcountry/wilderness caves.

When the potential minor effects from increased visitation in the monument are added to the past and future impacts external to the monument, there would be a long-term, minor to moderate, adverse cumulative impact on area soils. The actions in alternative A would contribute a very small increment to the overall impact.

## *Conclusion*

Most of the monument's soils would not be affected by the actions proposed in alternative A. However, some soils would be compacted and disturbed, and soil properties would be altered due to increased visitor use in localized areas such as along trails and in caves. These adverse impacts would likely be minor, adverse, and long-term in extent. When the impacts in alternative A are concentrated to localized areas, such as social trails and inside caves, impacts may be more moderate and long-term. There would be a long-term, minor to moderate, adverse cumulative impact on area soils from past grazing practices and infrastructure improvements. The actions in alternative A would contribute a very small increment to the overall impact. Overall, no impairment to the monument's resources and values would result from soil impacts in this alternative.

### **SOILS– IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)**

#### *Analysis*

As in alternative A, soils would continue to be disturbed, compacted, and eroded by visitors in localized areas, particularly along existing trails, near visitor facilities, and in the vicinity of social trails.

In alternative B, some soils would be lost to degradation, compaction, or disturbance, or substantially altered in local areas due to the development of new trails, parking areas, campsites, and other facilities. The development of new visitor facilities at Petroglyph Point could have minor to moderate, short-term, adverse impacts. The expansion of the visitor center, the creation of new wilderness trails, the creation of new picnic areas for groups, and alteration of the campground could have moderate, short-term, adverse impacts on soils near those sites. Site preparation and landscaping work would disturb soils temporarily, and soils would be modified in the footprint. Construction equipment would also likely disturb and compact soils in the project areas. Mitigation efforts could help reduce the impact on the soils in the area. These actions would have minor, adverse, long-term impacts on soils in those areas.

Expanded recreational opportunities and additional trails could lead to moderate, short-term, adverse impacts on monument soils. Diversification of recreational opportunities could have a minor to moderate, adverse impact on soils along newly designated trails and adjacent areas. The creation of backcountry campsites could create new areas of compacted and disturbed soils, with associated networks of social trails. Moderate, long-term, adverse impacts could occur in the immediate area, with minor, long-term impacts radiating outward from the sites.

Cave soils will continue to receive minor to moderate, adverse impacts from visitors in the form of disturbance and compaction. The soils of highly visited caves with debris cones will continue to incur adverse, minor impacts with continued use. The encouragement of more backcountry trail use could potentially increase adverse impacts to wilderness soils and the use of backcountry caves. The soils in these caves are often pristine, and even with relatively few visits (staff or visitors), can receive moderate levels of adverse impacts.

Efforts to remove social trails would help reduce soil degradation and result in a long-term, beneficial impact on soils. This should reduce compaction and disturbance compared to the present conditions, and would result in a minor to moderate, long term, beneficial effect. Instituting and monitoring user capacity indicators and standards should help ensure that an unacceptable increase in the number of human-created trails (and resulting increased soil disruption) does not occur

in the backcountry zones. Compared to the no-action alternative, this alternative would result in a negligible, long term, beneficial effect.

Encouragement of increased research in the monument, could heighten the impact of these activities on soils in the monument. Monument staff and outside researchers would likely continue to use existing trails and social trails throughout the monument in order to work in remote caves, creating a negligible to minor impact on soils by contributing to additional soil compaction and disturbance in the monument. Future research may potentially benefit soils through increased understanding of the extent, type, and condition of soils within the monument. In some areas in the monument, new social trails may be created as visitation patterns change. The long-term, adverse impacts on soils would likely be moderate and localized in extent.

### *Cumulative Impacts*

Cumulative impacts on soils would be the same as alternative A. When the past and future impacts are added to the potential adverse and beneficial effects of alternative B, there would be a long-term, minor to moderate, adverse cumulative impact on area soils. However, the actions in alternative B would contribute a very small increment to the overall impact.

### *Conclusion*

Most of the monument's soils would not be affected by the actions in alternative B. However, some soils would be disturbed, altered, and lost due to construction projects and increased visitor use in localized areas such as along trails and inside caves. Overall, the long-term, adverse impacts would likely be minor. Establishing and monitoring user capacity indicators and standards should help prevent the establishment of new human created trails and prevent resulting soil degradation. This would have a negligible, long term, beneficial effect. When the impacts in alternative B are added to other impacts from past and foreseeable future actions, there would be the potential for a long-term, minor to moderate, adverse cumulative impact on area soils—although the actions in alternative B would add a very small increment to this overall cumulative impact. No impairment to the monument's resources and values would result from soil impacts in this alternative.

## SOILS – IMPACTS FROM ALTERNATIVE C

### *Analysis*

In alternative C, some soils would be lost to degradation or substantially altered in local areas where ground disturbance occurs due to the development of trails, parking areas, campsites, and other facilities. The development of new visitor facilities at Petroglyph Point could have minor to moderate, short-term, adverse impacts on local soils. Several actions would occur in areas that have already been disturbed. These include improvements and redesigning of picnic areas and Indian Well campground, the creation of new loop trails, backcountry campsites, and the formalizing of several existing social trails. Little additional soil disturbance would be required in these areas, and thus these actions would have minor, long-term, adverse impact on soils. The conversion of the Powerline road to a trail could benefit soils along the portions of the road that would be reclaimed and in surrounding areas through a reduction of off road travel. However, it could have minor to moderate, adverse impacts on surface soils and cave soils if a trail was created and popularized. New social trails would develop to cave resources, and these caves would incur greater visitation, leading to compaction and disturbance of cave soils.

Expanded recreational opportunities and additional trails could lead to moderate adverse impacts on monument lands. Diversification of recreational opportunities could have minor to moderate impacts on soils along the newly designated trails and adjacent areas. The creation of automobile pullouts along the main park road would create a new opportunities for compacted and disturbed soils through the formation of new social trail networks. These would cause moderate, long-term, adverse impacts to the immediate area and minor, long-term impacts radiating outward from the sites.

Cave soils will continue to receive minor to moderate, adverse impacts from visitors in the form of disturbance and compaction. The soils of highly visited caves with debris cones will continue to incur adverse, minor impacts with continued use. The encouragement of more backcountry trail use could potentially increase adverse impacts to wilderness soils and the use of backcountry caves. The soils in these caves are often pristine, and even with relatively few visits (staff or visitors), can receive moderate levels of adverse impacts.

Soils in the monument would likely continue to be compacted and degraded by hikers in local areas, such as along the sides of trails. This causes minor adverse impacts, which could be exacerbated if, as detailed in alternative C, efforts are made to promote more visitation in both the frontcountry and backcountry zones. However, it is likely that the overall impacts from increased visitation would be minor overall, and moderate in specific locations. In some areas, new social trails may form with increased visitation, particularly in areas with high visitor numbers. Efforts to close and revegetate social trails, such as near Cave Loop, would help reduce degradation and would result in a long-term, beneficial effect on soils. The long-term, adverse visitor impacts would likely be minor and limited in extent. Instituting and monitoring user capacity indicators and standards also should help ensure that an unacceptable increase in the creation of human-created trails does not occur in frontcountry and backcountry zones. Compared to the no-action alternative, this would result in a negligible, long-term, beneficial effect.

### *Cumulative Impacts*

Cumulative impacts on soils would be the same as alternative A. When these past and future impacts are added to the potential adverse and beneficial effects of alternative C, there would be a long-term, minor to moderate, adverse cumulative impact on area soils. However, the actions in alternative C would contribute a very small increment to the overall impact.

### *Conclusion*

Most of the monument's soils would not be affected by the actions in alternative C. However, some soils would be degraded and lost and some soil properties would be altered due to new developments and increased visitor use in localized areas, such as along trails and in caves. These adverse impacts would likely be minor and long-term in extent. Establishing and monitoring user capacity indicators and standards should help prevent the establishment of new human-created trails and prevent resulting soil degradation resulting in negligible, long-term, beneficial effects. When the impacts in alternative C are added to impacts from other past and foreseeable future actions, there would be the potential for a long-term, minor to moderate, adverse cumulative impact on area soils—although the actions in alternative C would add a very small increment to this overall cumulative impact. No impairment to the monument's



resources and values would result from soil impacts in this alternative.

## Vegetation

The area of consideration for this topic is the monument. Available information on vegetation in the monument was compiled. Potential impacts from management actions are based on professional judgment and experience with similar actions. The thresholds of change for the intensity of an impact are as follows.

*Negligible:* The impact of vegetation (individuals or communities) would not be measurable. The abundance or distribution of individuals would not be affected or would be slightly affected. Ecological processes and biological productivity would not be affected.

*Minor:* An action would not necessarily decrease or increase an area's overall biological productivity. An action would affect the abundance or distribution of individuals in a localized area but would not affect the viability of local or regional populations or communities.

*Moderate:* An action would result in a change in overall biological productivity in a small area. An action would affect a local population sufficiently to cause a change in abundance or distribution, but it would not affect the viability of the regional population or communities. Changes to ecological processes would be of limited extent.

*Major:* An action would result in a change in overall biological productivity in a relatively large area. An action would affect a regional or local population of a species sufficiently to cause a change in abundance or in distribution to the extent that the population or communities would not be likely to return to its/their formal level (adverse), or would return to a sustainable level (beneficial). Key ecological processes would be altered.

## VEGETATION IMPACTS FROM ALTERNATIVE A (NO ACTION)

### Analysis

No impacts on vegetation would occur due to new development or improvement of facilities. Visitor use levels in Cave Loop and within 1/4 mile of trailheads would continue to cause moderate, adverse impacts and potentially minor to moderate, adverse impacts in localized areas if use levels increase, change, or continue. Some vegetation may be lost near popular use areas in the monument due to human created social trails. None of these impacts would affect the integrity, distribution, or presence of native plant communities throughout the monument. Overall, visitor use would likely continue to have a long-term, minor, adverse impact on the monument's native vegetation in localized areas.

As noted in the "Affected Environment", the spread of nonnative plants is a problem in the monument. Agricultural use on the Tule Lake National Wildlife Refuge would continue along the northern boundary of the monument. The potential spread of agricultural plants and invasive weeds from these fields into monument lands would continue to have an adverse effect on native vegetation. Vehicles driving through the monument would continue to be a potential source of nonnative plant transport and establishment. Even with education efforts, some nonnative plants could be introduced or spread by visitors in the monument. Continued use of integrated pest management techniques should help contain the spread of some nonnative species. Zones of infestation, depending on the nonnative plant species, would continue to be present during the life of this plan.

Climate change, the resultant spread of cheat grass into higher elevations, and the continued arrival of new invasive weeds into the monument are expected to adversely affect vegetation. Even with continued monitoring and weed control efforts, these adverse impacts would be moderate to major in the northern half of the monument and minor to moderate in the southern half of the monument. Continuing efforts to conduct selective cutting would reduce juniper numbers in the lower elevations of the monument and reinvigorate grasslands. Care in the use of prescribed fire and wildland fire in the lower elevations may limit the continued spread of cheat grass. A mosaic of woodlands, grasslands, and intermediate successional vegetative communities would continue to be promoted in most of the monument with additional treatments

in the southern portions of the monument to support pine forests. These continuing efforts would result in a moderate, long-term, beneficial impact on the monument's vegetation.

### *Cumulative Impacts*

Actions outside the monument would likely continue to affect the area's native vegetation. Over time, most native bunchgrass/sagebrush steppe communities have been affected by human activities such as agricultural operations, grazing, construction, and other developments.

Continued agricultural practices on the Tule Lake National Wildlife Refuge may also promote the spread on nonnative plants, and the subsequent reduction of native plants. Rotating wetlands could have a minor to moderate beneficial effect. Livestock grazing on U.S. Forest Service lands would likely result in the loss of some additional native vegetation and continued spread of nonnative plants. In the area around the monument's two units (main unit and Petroglyph Point), there have been moderate to major, adverse cumulative impacts to native vegetation.

When the adverse and beneficial effects of alternative A are added to actions that have occurred and are likely to occur in the area surrounding the monument, there would be a minor to moderate, long-term, adverse cumulative impact on the area's native vegetation. However, other actions in this alternative would add a relatively moderate beneficial increment to this overall impact, given how much change has already occurred in the vegetative communities.

### *Conclusion*

Long-term, minor, adverse impacts would occur in local areas due to current visitor use levels and the potential for increased visitor use levels. Current weed control efforts, selective cutting, and prescribed burning would continue to result in moderate, long-term beneficial effects. When the effects of this alternative are added to the effects of other past, present, and foreseeable future actions, there would be a minor to moderate, long-term, adverse cumulative impact on native vegetation. However, the actions in alternative A would add moderate beneficial increments to this cumulative impact. None of the vegetation impacts that would occur in this alternative would be sufficient to result in an impairment of the monument's resources and values.

## **VEGETATION – IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)**

### *Analysis*

The new facilities and other actions in alternative B, including the redesign of Petroglyph Point, trail development, and Indian Well campground footprint expansion would occur in previously undisturbed areas where native vegetation is currently present. Removal of the East and West Wildlife Overlook roads would restore approximately two acres of vegetation. Expansion of the visitor center would occur within disturbed areas where native vegetation already has been substantially altered. Given previous vegetation disturbance and the use of appropriate mitigation measures (e.g., ensuring that equipment stays within project area boundaries, revegetating disturbed areas, and taking steps to avoid the spread of nonnative plants), the long-term, adverse effects on native vegetation from the new developments would be negligible to minor in localized areas.

With current use levels, and if use levels over time in the monument were to increase, more native vegetation might be adversely affected in local areas due to people wandering off of the trails. None of these impacts would affect the overall integrity, distribution, or presence of native plant communities in the monument. Thus, visitor use would likely have long-term, minor to moderate, adverse impacts on the monument's native vegetation in localized areas within the developed and interpretive backcountry zones.

As in alternative A, the spread of nonnative plants would continue to be a problem in the monument in alternative B. Agricultural use on the Tule Lake National Wildlife Refuge would continue along the northern boundary of the monument. The potential spread of agricultural plants and invasive weeds from these fields into monument lands would continue to have an effect on native vegetation. Vehicles driving through the monument would continue to be a potential source of nonnative plant transport and establishment. Administrative vehicle access on 3.8 miles of Lyons Road would potentially continue the spread of nonnative plants into the backcountry. Even with education efforts, some nonnative plants could be introduced or spread by visitors in the monument. Continued use of integrated pest management techniques should help contain the spread of some nonnative species. Zones of infestation, depending on the nonnative plant species, would continue to be present during the life of this plan.

Increased visitor access and use in the monument would intensify the potential for the spread of nonnative species, especially at Petroglyph Point, picnic areas, and new trail installations. Continued use of integrated pest control measures should help contain the spread of some nonnative species in limited areas. But even with these measures and visitor education efforts, some nonnative plants might be introduced or spread by visitors (as well as by wildlife and vehicles) in the monument.

Pockets of nonnative species would continue to be present in the monument during the life of this plan and would potentially spread at new localized developed areas. It is difficult to determine the impact this would have on native species, due to uncertainties about the type of species that might be introduced and the locations and frequencies of such introductions. However, it is expected that even with continuing monitoring and weed control efforts the impacts would be long-term, adverse, and moderate.

Alternative B would have several beneficial effects on vegetation. Expanded efforts to conduct prescribed burns and selective removal of juniper in the northern reaches of the monument would include restoration of the monument's vegetation to a fire-dependent community that is not dominated by juniper in the lower grassland/sage steppe elevations and re-establishes a healthy ponderosa pine forest in the southern reaches of the monument. In addition, the removal of the Powerline administrative road and the East and West Wildlife Overlook spur roads would have long-term, beneficial impacts. A larger emphasis on interpretative efforts to educate the public would have an effect on reducing impacts to vegetation. Finally, the establishment of user capacity indicators and standards would help prevent the spread of additional unofficial trails, and thus prevent the loss and disturbance of native vegetation in the monument. Taken together, these actions would have a minor to moderate, long-term, beneficial effect on native vegetation in localized areas.

### *Cumulative Impacts*

Cumulative impacts would be the same as described under alternative A. When the adverse and beneficial impacts of alternative B are added to actions that have occurred and are likely to occur in the area surrounding the monument, there would be a minor to moderate, long-term, adverse cumulative impact on the area's native vegetation. Given how much change has already occurred to the vegetative communities once present,

the actions in alternative B would add both moderate beneficial impacts and a minor to moderate adverse increments to this overall landscape impact.

### *Conclusion*

New development and visitor use in alternative B would result in long-term, minor to moderate impacts on native vegetation in localized areas. However, efforts to restore native plant communities, remove administrative vehicle access, and the establishment of user capacity indicators and standards would result in long-term, minor, beneficial effects. When the effects of alternative B are added to the effects of their past, present, and foreseeable future actions there would be a minor to moderate, long-term, adverse cumulative impact on native vegetation. The actions in alternative B would add both small beneficial and small adverse increments to this overall cumulative impact. None of the vegetation impacts that would occur in alternative B would be sufficient to result in an impairment of the monument's resources and values.

## **VEGETATION – IMPACTS FROM ALTERNATIVE C**

### *Analysis*

New facilities and actions in alternative C would be built within relatively undisturbed areas. These actions include pullouts along the main park road, new facilities at Petroglyph Point, a Indian Well campground footprint expansion, and new trails in the backcountry and wilderness portions of the monument. The development of a cave loop trail for hikers would still trample and crush some plants, resulting in the loss of some additional native vegetation and the potential formation of additional social trails. Given previous vegetation disturbance and the use of appropriate mitigation measures (e.g., ensuring that equipment stays within project area boundaries, revegetating disturbed areas, and taking steps to avoid the spread of nonnative plants), the long-term, adverse effects on native vegetation from the new developments would be moderate in localized areas. An effort to limit nonnative plant spread along new trail corridors would be a new mitigation measure implemented by the monument. This would help prevent the spread of nonnative plants into the wilderness areas of the monument.

As in alternatives A and B, most visitors would stay on trails and not affect the monument's native vegetation. None of these impacts would affect the overall integrity, distribution, or presence of native plant communities in

the monument. Thus, visitor use would likely continue to have an overall long-term, negligible to minor, adverse impact on the monument's native vegetation.

The spread of nonnative plants would continue to be a problem in the monument in alternative C. Areas north of the monument with well-established noxious weeds would continue to be a seed source. Vehicles traveling through the monument also would continue to be a potential source of nonnative plant seeds. Increased visitor use in the monument would raise the potential for the spread of nonnative species. Even with education efforts, some nonnative plants could be introduced or spread by visitors (as well as by wind and foot traffic) in the monument. Thus, pockets of nonnative species would continue to be present during the life of this plan. Continued use of integrated pest measures should help contain the spread of some nonnative species in limited areas. However, it is difficult to determine the impact on native species due to the uncertainties about the type of species that might be introduced in the future, and the locations and frequencies of such introductions. It is likely that, even with continuing monitoring and weed control efforts, these long-term, adverse impacts will be minor to moderate.

Alternative C would have several beneficial impacts on vegetation. Continuing efforts to conduct prescribed burns and selective removal of juniper in the northern half of the monument would have minor to moderate, long-term, beneficial impacts. The establishment of user capacity indicators and standards would help prevent the creation of additional unofficial trails, and thus prevent the loss and disturbance of vegetation in the monument. Taken together, these actions would have a minor to moderate, long-term, beneficial impact on the native vegetation in localized areas.

### ***Cumulative Impacts***

Cumulative impacts would be the same as described in alternative A. When the adverse and beneficial impacts of alternative C are added to actions that have occurred and are likely to occur in the area surrounding the monument, there would be a minor to moderate, long-term, adverse cumulative impact on the area's native vegetation. The actions in alternative C would add both a relatively minor beneficial and moderate adverse increment to this overall impact, given how much change has already occurred to the native vegetative communities.

### ***Conclusion***

New development and visitor use in alternative C would result in long-term, minor to moderate impacts on native vegetation in localized areas. However, current weed control efforts, selective cutting, prescribed burning, and the establishment of user capacity indicators and standards would result in long-term, minor to moderate, beneficial effects. When the adverse and beneficial impacts of alternative C are added to actions that have occurred and are likely to occur in the area surrounding the monument, there would be a minor to moderate, long-term, adverse cumulative impact on the area's native vegetation. None of the vegetation impacts that would occur in this alternative would be sufficient to result in an impairment of the monument's resources and values.

## **Wildlife and Wildlife Habitat**

The area of consideration for this topic is the monument. Impacts on wildlife are closely related to the impacts on habitat. The evaluation considered whether actions would be likely to displace some or all individuals of a species in the park or would result in loss or creation of habitat conditions needed for the viability of local or regional populations. Available information on wildlife and wildlife populations was compiled. Predictions about short- and long-term impacts were based on previous studies of impacts to natural resources and recent monitoring data from the park. The thresholds of change for the intensity of an impact are as follows.

*Negligible:* Effects on wildlife would be at or below the level of detection, would be short term, and the changes would be so slight that they would not be of any measurable or perceptible consequence to the species' population.

*Minor:* Effects on wildlife would be detectable, but localized, small, and of little consequence to the species' population. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

*Moderate:* Effects on wildlife would be readily detectable but localized, with consequences at the population level. Mitigating measures, if needed to offset adverse effects, would be extensive and likely successful.



*Major:* Effects on wildlife would be obvious and would result in substantial consequences to the wildlife populations at the regional level. The change would result in a severely adverse or major beneficial impact, and possible permanent consequence on the species. Extensive mitigating measures would be needed to offset any adverse effects and their success would not be guaranteed.

## **WILDLIFE AND WILDLIFE HABITAT– IMPACTS FROM ALTERNATIVE A (NO ACTION)**

### *Analysis*

The human use of the monument is concentrated on roads, in developed areas and caves, and along trails. Animals sensitive to human activities primarily avoid these areas when people are present, with an exception being the Townsend's big-eared bat, which forms breeding maternity colonies within one of the heaviest visitor use areas of the monument; Cave Loop. The bat protection measures implemented by the monument since the early 1990s would continue under all alternatives, which are based primarily on cave closures during seasonal periods. Wildlife that occupy developed areas, such as ground squirrels, jackrabbits, and mule deer, are mostly adapted to the presence of people and would not be noticeably affected by the actions being taken in alternative A.

Peer reviewed literature widely documents that sound plays a critical role in intra-species communication, courtship and mating, predation and predator avoidance, and effective use of habitat. Additionally, similar studies have shown that wildlife can be adversely affected by sounds and sound characteristics that intrude on their habitats. While the severity of the impacts varies depending on the species being studied and other conditions, research strongly supports the fact that wildlife can suffer adverse behavioral and physiological changes from intrusive sounds (noise) and other human disturbances. Documented responses of wildlife to noise include increased heart rate, startle responses, flight, disruption of behavior, and separation of mothers and young (Selye 1956, Clough 1982, National Park Service 1994, U.S. Department of Agriculture 1992, Anderssen et al. 1993).

Where recreational use is high, such as developed zone areas, the presence and noise associated with human activity could displace various wildlife species and cause other conflicts. Some of the most common conflicts between recreation and wildlife would involve

noise from motor vehicles and places where high visitor use causes frequent noise and disturbance.

Staff and visitor observations suggest that vehicle traffic along the main monument road produces noise well beyond the road corridor. Motorcycles in particular are often perceived to be very loud, especially when traveling in large groups. Additional soundscape studies would be needed to quantify existing noise and monitor the trends in noise duration, frequency and intensity in relation to visitor use and monument operations.

On occasion, some animals would continue to be injured or killed by motor vehicles on roads. Especially susceptible are snakes that sunbathe on paved roads and rodents (kangaroo rats and ground squirrels) that are attracted to roadside vegetation. Some animals would also continue to be attracted to food being offered by people or to areas where food and trash receptacles are present, although the monument is currently in the process of switching to wildlife proof garbage receptacles. Overall, the impacts of visitor use on wildlife populations in alternative A would be localized and negligible, resulting in no measurable changes to the monument's wildlife populations.

Continued efforts to restore native bunchgrass/sagebrush steppe communities would have both beneficial and adverse impacts on different wildlife populations. In particular, efforts to control the spread of western juniper would benefit species that are found in open areas or an open understory, such as sagebrush lizard, gopher snake, belding ground squirrel, greater sage-grouse, badger, burrowing owl, yellow-bellied marmot, and pronghorn. This would have a moderate to major, long-term, beneficial effect on these species, since a number of these species have become very rare or extirpated from the monument. On the other hand, species commonly found in juniper woodlands, such as great horned owl, mourning dove, townsend's solitaire, and wood rats would likely decline in numbers over time.

Continued administrative vehicle access on 3.8 miles of the Lyons Road would have the potential to cause a minor to moderate, adverse negative impact on greater sage-grouse restoration and other wildlife dependent on open non-disturbed sagebrush steppe habitat. This road would continue to be maintained as an unpaved, two track access, thus limiting vehicle speed and additional maintenance requirements. Long-term studies to determine primary habitat within Lava Beds would

need to be implemented to assess the full scale of impact current roads within the monument have on greater sage-grouse.

### *Cumulative Impacts*

Like vegetation, most wildlife populations surrounding the monument have been substantially altered by human activities, such as the draining of Tule Lake, farming, ranching, and road development, resulting in fewer numbers of some native wildlife species, such as greater sage-grouse and pronghorn. Fire suppression, efforts to control predators, spread of invasive weeds, and hunting also affect wildlife populations in the area. Thus, actions outside the monument have had a moderate to major, adverse impact on native wildlife populations surrounding the monument. One mitigating action is the regional inter-agency recovery strategy for greater sage-grouse and sagebrush ecosystems, in which the monument is a participant. Steps to restore sagebrush habitat through juniper removal and participation with the U.S. Fish and Wildlife Service, the U.S. Forest Service, and the State of California in sage grouse re-establishment will provide direct action steps to restore this species back to its historic range.

When the beneficial and adverse impacts of alternative A are combined with the impacts that have occurred and are likely to occur in the vicinity of the monument, there would be a long-term, minor to moderate, adverse cumulative impact on the area's wildlife populations and habitats. However, alternative A would contribute a very small adverse increment to this overall cumulative impact, as well as a small beneficial increment by continuing to provide an area where wildlife habitat continues to be managed and protected.

### *Conclusion*

Alternative A would have some adverse and beneficial impacts on the monument's wildlife populations and habitats. Most wildlife in the monument would not change as a result of the actions in this alternative. No actions would affect key migration routes or areas known to be important for breeding, nesting, or foraging. No actions would interfere with feeding, reproduction, or other activities necessary for the survival of wildlife species. Long-term, negligible, adverse impacts would continue to occur in localized areas due to continuing visitor use of the monument. Continuing efforts to prevent the spread of western juniper and control the spread of nonnative species would result in minor to moderate, long-term, benefi-

cial impacts on some wildlife populations. When the beneficial and adverse impacts of alternative A are added to the external impacts that have occurred in the vicinity of the monument, there would be a long-term, minor to moderate, adverse cumulative impact on the area's wildlife populations and habitats. However, the actions in alternative A would contribute only a small beneficial increment and a very small adverse increment to this impact. None of the wildlife impacts resulting from alternative A would constitute an impairment of the monument's resources and values.

## **WILDLIFE AND WILDLIFE HABITAT – IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)**

### *Analysis*

The human use of the monument is concentrated in caves and in developed areas such as picnic areas, the campground, trails, roads, and in the Cave Loop area. Animals sensitive to human activities primarily avoid these areas when people are present, with the exception being the Townsend's big-eared bat, which forms breeding maternity colonies within one of the heaviest visitor use areas of the monument; Cave Loop. Wildlife that occupy developed areas, such as ground squirrels, scrub jays, jackrabbits, and mule deer, are mostly adapted to the presence of people and would not be noticeably affected by the actions being taken in alternative B.

As in alternative A, along the main monument road in particular, noise from vehicles, especially extremely loud vehicles such as motorcycles, would continue to cause disturbance to wildlife, prompting avoidance of road corridors and other behavioral affects such as flushing (such as noise can flush birds from nests). Some animals would continue to occasionally be injured or killed by motor vehicles on the monument's roads. Some animals would also continue to be attracted to food being offered by people or to areas where food and trash receptacles are present, although the monument is currently in the process of switching to wildlife proof garbage receptacles.

New developments or ground-disturbing activities in alternative B, including expansion of the visitor center and research center, the redesign and construction of new developments at Petroglyph Point, the development of new trails in frontcountry and backcountry, and the development of backcountry campsites, would have the potential for minor to moderate, short-term and long-term effects on the monument's wildlife.

There would be a long-term, adverse and beneficial impact to wildlife at Petroglyph Point with developments that include a visitor contact station, picnic area, road relocation, trails, and exhibits. This development would promote a longer stay for visitors in the area, contributing to the potential increase in wildlife disturbance. On the other hand, relocation of the road, parking, and trailhead from sensitive resources would benefit wildlife. NEPA and Endangered Species Act environmental compliance would also occur, including site-specific surveys and design of wildlife friendly infrastructure. New trails in backcountry and frontcountry areas could result in varying levels of impact, depending on location of these trails. The actual construction of trails would be of short-term impact, but long-term visitor use in some areas of the monument could cause wildlife use habits to change. Thus, the construction of new facilities and trails in alternative B would be expected to have a potential minor, long-term, adverse impact on the monument's wildlife, dependent upon design and placement adjacent to sensitive habitats.

The development of a foot trail around the Cave Loop area could have adverse impacts on wildlife due to secondary social trails, resulting in access to more undeveloped caves and disturbance of pika and sensitive bat species. The development of new trails at Petroglyph Point could also affect rare pallid bat populations. Increased visitor use of backcountry and frontcountry caves could pose additional risk to wildlife dependent upon these resources for refuge and breeding habitat.

Continued use of 3.8 miles of the Lyons Road for administrative vehicles could pose long-term adverse impacts to the re-establishment of sage grouse. Removal of the Powerline and wildlife overlook roads would contribute to additional habitat for sensitive wildlife species dependent on unbroken grassland/sagebrush steppe habitat.

Alternative B would have several beneficial effects on wildlife. Under alternative B, monument management would expand restoration efforts, place a larger emphasis on interpretative efforts to educate the public, and efforts to promote bicycle use along main roads and the Cave Loop. Creation of new trails and connecting current trails would likely result in more people walking to destinations instead of using vehicles, slightly reducing wildlife and vehicle collisions. This would result in minor, beneficial effects.

### *Cumulative Impacts*

As described under alternative A, actions outside the monument have had a moderate to major, adverse impact on native wildlife surrounding and migrating into the monument. When the beneficial and adverse impacts of alternative B are added to the impacts that have occurred near the monument, there would be a long-term, minor to moderate, adverse cumulative impact on the area's wildlife populations and habitats. However, alternative B would contribute a very small adverse increment to this overall cumulative impact, as well as a small beneficial increment by continuing to provide an area where wildlife habitat continues to be managed and protected.

### *Conclusion*

Alternative B would have both adverse and beneficial impacts on the monument's wildlife populations and habitats. The construction of new trails and facilities would result in minor to moderate, short-term and long-term effects on the monument's wildlife dependent upon design and placement outside of sensitive habitats. Expanded vegetation restoration efforts, the addition of lands in Petroglyph Point, and the closure and revegetation of the Powerline administrative and Wildlife Overlook roads would result in long-term, beneficial impacts on some wildlife populations.

When the beneficial and adverse impacts of alternative B are added to the impacts that have occurred near Lava Beds National monument, there would be a long-term, minor to moderate, adverse cumulative impact on the area's wildlife populations and habitats. However, the actions in alternative B would contribute only a small beneficial increment and a very small adverse increment to this impact. None of the wildlife impacts resulting from alternative B would constitute an impairment of the monument's resources and values.

## **WILDLIFE AND WILDLIFE HABITAT – IMPACTS FROM ALTERNATIVE C**

### *Analysis*

New developments or ground-disturbing activities in alternative C, including the redesign and construction of new developments at Petroglyph Point, and the development of up to 15 miles of new trails in frontcountry and backcountry would have the potential for moderate to major short-term and long-term effects on the monument's wildlife. There would be a long-term

impact to wildlife at Petroglyph Point with the proposed development including a new day use area, road relocation, and an expanded trail system. Paving of the Petroglyph Point road would likely increase wildlife mortality and could constitute a minor to moderate, long-term, adverse impact. Moving facilities away from sensitive resources, however, would also add a beneficial effect. This development would promote a longer stay for visitors in the area, contributing to the potential increase in wildlife disturbance. To limit impacts on wildlife, site-specific surveys and design of wildlife friendly infrastructure would be undertaken before any ground disturbance occurs in areas that could affect wildlife dependent on undisturbed habitats.

New trails in backcountry and frontcountry areas could result in a varying levels of impact, depending on placement of these trails. The actual construction of trails would be of short-term impact, but long-term visitor use in some areas of the monument could cause wildlife use habits to change. Thus, the construction of new facilities and trails in alternative C would be expected to have a minor to moderate, long-term, adverse impact on the monument's wildlife, dependent upon design and placement outside of sensitive habitats.

Under this alternative, the monument would increase outreach efforts to promote more visitation and would collaborate with the Modoc National Forest on new recreational opportunities. Alternative C would also make changes to the Indian Well campground to accommodate larger recreational vehicles and visitor use groups. Medicine Lake road would be paved under this alternative, allowing for increased speeds, which would increase wildlife mortality causing long term, adverse impacts. The monument would also promote more winter use and additional specialized tour opportunities. Additional vehicle pullouts along the main monument road would be developed. All of these proposed actions would have varying levels of impacts to wildlife, depending on design and placement of developments. Noise from vehicles traveling along the main monument road, especially extremely loud vehicles such as motorcycles, would continue to cause disturbance to wildlife, prompting avoidance of certain areas and other behavioral affects such as flushing (such as noise can flush birds from nests). A number of the proposals listed above would occur in previously undisturbed areas. This would also have a direct adverse impact on wildlife in localized areas. Increased noise levels from visitor use and new developments

at the Indian Well campground could pose negative impacts upon wildlife. The increased development of visitor use areas at Petroglyph Point would result in the presence of people and equipment for long periods. Some wildlife, such as ground squirrels, jackrabbits and marmots, would be displaced. As a result, there would likely be a negligible to minor, long-term, adverse impact on wildlife populations in this localized area.

The establishment of user capacity indicators and standards would help protect wildlife populations and the removal of the Powerline and West Wildlife Overlook roads would improve wildlife habitat. Taken together, these actions would have a minor to moderate, long-term, beneficial impact on wildlife.

### *Cumulative Impacts*

As described in alternative A, actions outside the monument have had a moderate to major, adverse impact on native wildlife surrounding Lava Beds National Monument.

When the beneficial and adverse impacts of alternative C are added to the impacts that have occurred near Lava Beds National Monument, there would be a long-term, minor to moderate, adverse cumulative impact on the area's wildlife populations and habitats. However, the actions in alternative C would contribute only a small beneficial increment and a small to moderate adverse increment to this impact.

### *Conclusion*

Alternative C would have both adverse and beneficial impacts on the monument's wildlife populations and habitats. Most wildlife populations and habitats in the monument would not change because of the actions in this alternative. Development actions would have the potential to affect important breeding, nesting, and foraging habitats in localized areas such as Petroglyph Point. Long-term, negligible, adverse impacts would continue to occur in localized areas due to continuing visitor use of the monument. On the other hand, there would be long-term, beneficial impacts on some wildlife populations due to continuing vegetation restoration efforts, the addition of lands at Petroglyph Point, and the closure of the Powerline administrative road. Continued vehicle access out to Fern Cave and effects to wildlife would be mitigated through the continued low vehicle speeds and maintenance of the road as a two-track dirt access route.



When the beneficial and adverse impacts of alternative C are added to the impacts that have occurred near Lava Beds National Monument, there would be a long-term, minor to moderate, adverse cumulative impact on the area's wildlife populations and habitats. However, the actions in alternative C would contribute only a small beneficial increment and a very small adverse increment to this impact. None of the wildlife impacts resulting from alternative C would constitute an impairment of the monument's resources and values.

## Special Status Species

The area of consideration for this topic is suitable and known occupied habitat in the monument. Information on threatened, endangered, candidate species, and species of general concern was gathered from responsible agencies, research, and specialists. Known locations of habitat associated with threatened, endangered, candidate species, and species of special concern were compared with locations of development and facilities, and modifications of existing facilities.

In accordance with language used to determine effects on threatened and endangered species under the federal Endangered Species Act (USFWS 1998), potential effects on special status species are categorized as follows:

No effect – The proposed actions would not affect special status species or critical habitat.

May affect / not likely to adversely affect – The effects on special status species would be extremely unlikely to occur and could not be meaningfully measured, detected, or evaluated or they would be completely beneficial.

May affect / likely to adversely affect – Any adverse effect to listed species that might occur as a direct or indirect result of proposed actions, and the effect would not be discountable or would be beneficial.

Is likely to jeopardize proposed species / adversely modify proposed critical habitat – The appropriate conclusion when the National Park Service or the U.S. Fish and Wildlife Service identifies situations in which an action could jeopardize the continued existence of a proposed species or adversely modify critical habitat to a species within or outside park boundaries.

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

*Negligible:* The action would have no measurable effect to a listed species, suitable, potential, or critical habitat, resulting in a no effect determination.

*Minor:* The effects of the alternative would be discountable (extremely unlikely to occur), insignificant (not able to be meaningfully measured, detected, or evaluated), or completely beneficial. Any change would be small and localized and of little consequence, and result in a not likely to adversely affect determination and require informal consultation with the U.S. Fish and Wildlife Service.

*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 but would most likely result in a not likely to adversely affect determination and require informal consultation with the U.S. Fish and Wildlife Service.

*Major:* An action that would result in a noticeable change to a population or individuals of a species or designated critical habitat. Any adverse effect to the species that may occur as a direct or indirect result of the alternative and the effect is not discountable, insignificant, or completely beneficial. Incidental take is anticipated to occur as a result of the action. The change would result in a likely to adversely affect determination and require formal consultation with the U.S. Fish and Wildlife Service.

## FEDERALLY LISTED AND STATE LISTED THREATENED AND ENDANGERED SPECIES – IMPACTS FROM ALTERNATIVE A (NO ACTION)

### Analysis

Lava Beds has no federally listed, proposed, or candidate species within the borders of the monument, as of February 2009 (USFWS, Modoc, and Siskiyou county listings). However, the greater sage-grouse (*Centrocercus urophasianus*) was identified as a candidate species for the threatened and endangered species lists for Modoc and Siskiyou counties (U.S. Fish and Wildlife Service 2010). Certain populations of bats and birds could become listed over the lifespan of this plan that would directly affect monument operations. California State listed, proposed, or candidate species within the borders of the monument, as of February 2009, include the bald eagle (state endangered) and the

Swainson's hawk (state threatened). As of 2009, species that are in decline (Species of Concern) are not being maintained/listed by the USFWS or the State of California. Current trends in the greater sage-grouse and a number of bat species may entail inclusion into the threatened and endangered species list over the next 20 years, due to documented declines and current efforts to have certain species listed, i.e., greater sage-grouse.

In this alternative, no new developments would occur that could increase long-term impacts on threatened and endangered species. Existing facilities and roads would continue to be maintained. No new trails would be developed under this alternative. Energy conservation measures would continue to be implemented. Western juniper removal would continue to occur in areas where the species has expanded into grassland/sagebrush steppe habitat. Special precautions to prevent impacts on Swainson's Hawk nesting habitat would be followed. The monument would continue to take steps to assure the conservation of bald eagle winter roost habitat. Expansion of preferred habitat by greater sage-grouse would continue under this alternative. Steps to protect sensitive bat species within the monument from visitor use impacts would also continue.

The continued administrative vehicle use of 3.8 miles of Lyons Road would have the potential to cause a minor to moderate, adverse negative impact on greater sage-grouse restoration and other wildlife dependent on open non-disturbed sagebrush steppe habitat. This road would continue to be maintained as a dirt two-track access to Fern Cave, thus limiting vehicle speeds and minimizing maintenance requirements. Long-term studies to determine primary habitat within Lava Beds would need to be implemented to assess the full scale of impact that current roads within the monument have on greater sage-grouse.

### *Cumulative Impacts*

Adverse impacts to threatened and endangered species over the last 100 years have been significant when looking at landscape changes that have occurred with the draining of Tule Lake, expansion of western juniper, and the establishment of invasive weeds.

Future impacts would primarily be from the continued expansion of invasive weeds, and general human population growth and urban development. However, habitat improvements for greater sage-grouse, Swainson's hawk, and bald eagle on U.S. Fish and Wildlife

Service, U.S. Forest Service, and monument lands would likely have a beneficial effect on these species, due to large landscape restoration efforts. When the likely effects of continued monument management of habitats are added to the effects of actions outside the monument, there could be a long-term, minor, adverse cumulative impact on threatened and endangered species.

### *Conclusion*

Alternative A would be expected to have no long-term adverse impacts on the monument's threatened and endangered species from monument operations and visitor use. Continued administrative vehicle use on the Lyons Road could have the potential to cause long-term, minor to moderate, adverse impacts. The level of impact due to alternative A would not be expected to constitute an impairment of the monument's resources or values.

## **FEDERALLY LISTED AND STATE LISTED THREATENED AND ENDANGERED SPECIES – IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)**

### *Analysis*

Most of the new developments or ground-disturbing activities in alternative B, including expansion of the visitor center and research center would have no effect on the monument's threatened and endangered species. There would be a permanent change to the habitats at Petroglyph Point with developments that include visitor contact station, picnic area, road relocation, trails, and exhibits. The monument would also provide additional recreational and interpretive trail opportunities and explore regional trail connections to national forest trails. This development would promote a longer stay for visitors in the area, contributing to the potential increase in impacts on rare bat species and birds of prey. To limit impacts on threatened and endangered species, site specific surveys would be undertaken before any ground disturbance occurs in areas that could impact rare species. The formalization of backcountry campsites, and new trails in backcountry and frontcountry areas, could pose minor to moderate, long-term, adverse impacts on certain rare species, primarily greater sage-grouse, bats and Swainson's hawk.

Impacts to wildlife near the Lyons Road would be the same as in alternative A. The monument would need

to implement long-term studies to assess the impact of current roads within the monument on greater sage-grouse habitat.

### *Cumulative Impacts*

Cumulative impacts to threatened and endangered species would be same as alternative A. Alternative B's proposed developments within the monument would likely be no more than a small part of the cumulative impacts on the area's threatened and species.

### *Conclusion*

Compared to alternative A, alternative B would be expected to have a long-term, minor to moderate, adverse impact on threatened and endangered species, primarily due to the potential impacts that new trail systems could have on rare species. Cumulative impacts would be the same as in alternative A. The level of impact due to alternative B would not be expected to constitute an impairment of the monument's threatened and endangered species.

## **FEDERALLY LISTED AND STATE LISTED THREATENED AND ENDANGERED SPECIES – IMPACTS FROM ALTERNATIVE C**

### *Analysis*

In alternative C, new developments would be limited to Petroglyph Point, trail expansion, and vehicle pullouts along the main monument road. There would be a permanent change to the habitats at Petroglyph Point with developments that include a picnic area, road redesign, and trail redesign. Under this alternative, the monument would increase outreach efforts to promote more visitation and would collaborate with the Modoc National Forest on new recreational opportunities. The monument would also provide additional recreational and interpretive trail opportunities within the monument and explore regional trail connections to national forest trails and sites, including shared trail systems. Alternative C would make changes to the Indian Well campground to accommodate larger recreational vehicles and visitor use groups. Medicine Lake Road would be paved under this alternative, allowing for increased traffic speeds and causing long-term, minor to moderate, adverse impacts on threatened and endangered species. The monument would promote more winter use and additional specialized tour opportunities.

As in alternative B, trail development would occur in a number of areas within the monument. As many as 15 miles of new trails would be developed in the monument, with an emphasis on loop trails. New trails in the backcountry zone would provide greater access for visitors, which would contribute to potential disturbance of rare species such as bats in caves, nesting raptors, and sage-grouse. With visitor use levels expected to stay constant or increase over the life of this plan, threatened and endangered species could incur minor, adverse, long-term impacts, depending on location and habitats affected.

### *Cumulative Impacts*

Cumulative impacts to threatened and endangered species would be same as alternative A. Alternative C's proposed developments within the monument would likely be a small part of the cumulative impacts on the area's threatened and endangered species.

### *Conclusion*

Compared to alternative A, alternative C would be expected to have a long-term, minor to moderate, adverse impact on threatened and endangered species, primarily due to potential impacts of new trails systems and the paving of Medicine Lake Road. Cumulative impacts would be similar to alternative A. The level of impact due to alternative C would not be expected to constitute an impairment of the monument's threatened and endangered species.

## **Cultural Resources**

### **CULTURAL RESOURCES LISTED, OR ELIGIBLE TO BE LISTED, IN THE NATIONAL REGISTER OF HISTORIC PLACES**

Potential impacts to those resources listed or eligible for listing in the National Register of Historic Places were identified and evaluated. The categories considered include archeological resources, cultural landscapes and historic buildings and structures. Evaluation was completed in accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800, Protection of Historic Properties). This evaluation was done by (1) determining the area of potential effects; (2) identifying

cultural resources in the area of potential effects that are listed in or eligible for listing in the national register; (3) applying the criteria of adverse effect to affected resources; and (4) considering ways to avoid, minimize or mitigate adverse effects. Information used in this assessment was obtained from relevant literature and documentation, maps, and consultation with cultural resource professionals, as well as from interdisciplinary team meetings, field trips, and site visits.

Under the regulations of the Advisory Council on Historic Preservation, a determination of adverse effect or no adverse effect must be made for affected national register-listed or national register-eligible cultural resources. An adverse effect occurs whenever an action alters, directly or indirectly, any of the characteristics of a cultural resource that qualify it for inclusion in the national register; that is, the action diminishes the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CRF 800.5(a)(1)). A determination of no adverse effect means there is an effect, but the effect would not meet the criteria of adverse effect (36 CFR 800.5(b)).

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

*Negligible:* The effects on cultural resources would be at the lowest levels of detection, barely measurable without any perceptible consequences, either beneficial or adverse to cultural landscape resources, historic buildings or structures, or archeological resources. For the purposes of Section 106 and the National Historic Preservation Act, the determination of effect would be no adverse effect.

*Minor:* The effects on cultural resources would be perceptible or measurable, but would be slight and localized within a relatively small area. The action would not affect the character or diminish the features of a NRHP eligible or listed cultural landscape, historic structure, or archeological site, and it would not have a permanent effect on the integrity of any such resources. For the purposes of Section 106 and the National Historic Preservation Act, the determination of effect would be no adverse effect.

*Moderate:* The effects would be perceptible and measurable. The action would change one or more

character-defining features of a cultural resource, but would not diminish the integrity of the resource to the extent that its NRHP eligibility would be entirely lost. For the purposes of Section 106 and the National Historic Preservation Act, the cultural resources' NRHP eligibility would be threatened and the determination of effect would be adverse effect.

*Major:* The effects on cultural resources would be substantial, discernible, measurable, and permanent. For NRHP eligible or listed cultural landscapes, historic structures, or archeological sites, the action would change one or more character-defining features, diminishing the integrity of the resource to the extent that it would no longer be eligible for listing in the national register. For purposes of Section 106, national register eligibility would be lost and the determination of effect would be adverse effect.

The relationships between definitions of effects, including beneficial effects, and treatments of cultural resources, are analyzed in the impact analysis for each of the alternatives. Levels of beneficial effect are not directly linked to specific types of treatments; rather they depend on the particular treatment of given cultural resources. All treatments proposed under all of the alternatives would be in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties. All treatments proposed under all of the alternatives would have no adverse effect on known cultural resources.

## Archeology

### ARCHEOLOGY- IMPACTS FROM ALTERNATIVE A (NO ACTION)

#### *Analysis*

Alternative A does not propose any significant changes to infrastructure or the organization of monument programs. The monument would continue to address shortcomings concerning the documentation of cultural resources and continue to support improvement of the quality of archeology site and associated collection documentation for interpretive and research use.

The monument archeologist and other NPS archeologists would continue to conduct compliance under the National Historic Preservation Act (NHPA) and National Park Service policies and continue to conduct



field research. Both pre-project surveys and monitoring would continue, under existing management, to ensure the preservation of archeology sites. Significant archeological sites would be avoided during expected trail maintenance. Thus, no adverse effects are anticipated concerning archeological resources at the monument. In the unlikely event that direct or indirect impacts to a site could not be avoided, mitigation efforts would be conducted to salvage archeological materials and data. This would be done in consultation with the Klamath Tribes and the California State Historic Preservation Office.

A number of threats, most of them from natural processes, to archeological sites exist within the monument. Recommendations for lessening threats and mitigating damage to sites would be provided to the monument. Damages to sites from visitors and natural forces would continue to be documented by both visiting archeologists and monument staff. While more baseline data is needed to assess the level of impacts, natural processes could have a negligible to moderate, adverse impact on archeological resources.

### *Cumulative Impacts*

The entirety of Lava Beds National Monument has been designated as a National Register of Historic Places Archeological District. The process for this designation identified and documented sites that are likely to yield data relevant to anthropologic and historic themes within the region. These themes include the Modoc War, early settlement, shifts in pre-contact land use, and technological change. Today, archeology sites within the boundary of Lava Beds National Monument reflect a relatively small sample of sites that inform us of pre-contact life ways. Because of the known disturbance to sites outside of the boundary, the need for preservation of site integrity within the monument is high.

Lava Beds National Monument has operated since its establishment without an archaeologist on staff. During 2010, the monument hired a cultural resource manager. Over the years, visitors have caused direct damage to known sites. This is evident at some exposed rock art sites, particularly at Petroglyph Point. Indirect damage by visitors has been difficult to measure but is assumed to affect sites that are adjacent to roads, trails, caves, and picnic areas. Areas like Petroglyph Point, Captain Jacks Stronghold, open and developed caves, and the sites on the north end of the monument have visible surface and aboveground archeological features.

Though generally respected by monument visitors, their exposure draws attention that, over time, could result in damage.

Natural processes, including erosion and sediment deposition from neighboring agricultural fields, also have an impact on sites. The rock art images at Petroglyph Point, for instance, could become obscured from the sediment erosion from agricultural fields and the unpaved road. Alternative A does not offer a strategy for addressing documentation of the rock art face or strategic steps for minimizing adverse impacts. In general, Petroglyph Point sites would continue to be at a high risk for direct damage by people and indirect impacts by visitors and natural processes.

Overall adverse cumulative impacts, primarily from natural processes, on archeological sites throughout the monument would be long-term, negligible to minor. Given the remote location and relative lack of NPS presence at Petroglyph Point, this area would continue to experience long-term, minor to moderate, cumulative adverse impacts.

### *Conclusion*

Since no new development is planned in alternative A, adverse impacts on archeological resources from construction activities are unlikely. The continuation of the current management approach to preserve and document archaeological resources is in keeping with NPS responsibilities as they pertain to NHPA. This would ensure no adverse impacts to archeological sites or associated collections. Negligible to moderate cumulative impacts have been incurred from past development, staffing constraints, and natural processes. Alternative A would not actively contribute to the adverse cumulative impact of other past, present, and reasonably foreseeable actions. This alternative does not propose management or infrastructure changes that would impair archeological sites or associated collections.

## **ARCHEOLOGY - IMPACTS FROM ALTERNATIVE B (PREFERRED)**

### *Analysis*

In alternative B, the current focus on the preservation of archeological sites and associated collections would be enhanced by directed actions toward improved documentation for research, interpretive programs, and educational outreach. These improvements include

updated and corrected information concerning site status and location and intensive surveys of areas with only cursory survey coverage. In addition, diverse research approaches would be applied to existing archeological collections to study culture differences across the region, as well as culture changes over time. The outcome of these improvements would benefit the public by providing new assessments and information to the monument's interpretive program. Much of this work would be carried out with greater consultation with the Klamath Tribes. Their input would greatly enhance the quality of information available for education. Alternative B would pursue preservation and educational outreach to increase learning opportunities for both visitors and the community through partnerships with other agencies and organizations.

Alternative B proposes an organizational shift from a relatively loose assembly of monument programs to more integrated programs that share common goals in research and education. New staff positions would enhance the diversity of in-monument expertise. The monument would become a research and learning center for regional cultural topics as well as nationally important history and anthropology themes. Background research would be conducted to ensure the monument accurately portrays the composition of resources within its boundary and new research would help facilitate a more contextualized interpretation of past occupation in the Tule Lake Basin.

A number of construction projects are proposed under alternative B. These include the construction of new facilities and trails at Petroglyph Point, the expansion of existing trails and facilities in the main monument, and changes to accommodate visitors at the campground including the removal/rehabilitation of social trails and plant screening.

The overall effects of alternative B to the monument's archeological resources would be long-term, minor to moderate, and beneficial. The proposed improvements to Petroglyph Point would address the appearance and protection of the site by providing a more distinct National Park Service presence at the unit. Expansion of the collection spaces and the research center laboratory would provide much needed space and equipment to conduct analysis at the monument and near the interpreted resources. The emphasis on data gathering and analysis for regional research questions would result in updated documentation of sites and associated collections that would better serve the monument

through interpretive programs and exhibits and would highlight the value of the archeological resource. The proposed construction would be in keeping with sensitive and sustainable development techniques. This approach would minimize the need for extensive subsurface data recovery projects at significant archeology sites and support in-situ preservation.

The potential effect to the monument's archeological resources under alternative B would be driven primarily by increased compliance activity associated with trail and facility development. The proposed development at Petroglyph Point and the campground could result in needed recovery of archeological materials to mitigate the impact of building a day use area and expanding visitor facilities. The construction of new trails, including the proposed accessibility improvements to trails at Hospital Rock, Gillem's Camp, Petroglyph Point, and Captain Jacks Stronghold, would also involve archeological surveys to assess the level of impact and the eligibility of sites in the area to the National Register of Historic Places. Other impacts from increased research, interpretation, and use of archeological materials for educational purposes would depend on the level of staffing provided for oversight and the management of museum collections. Staff would need to remain actively involved in oversight and interpretive planning to prevent the degradation of the collections. Without this oversight, long-term adverse impacts could be negligible to minor.

### *Cumulative Impacts*

As in alternative A, cumulative impacts are primarily from past actions, natural processes, direct and indirect damage from visitors, and disturbance to sites outside of the boundary. The implementation of alternative B would result in no adverse effects to either archeological sites or associated collections. Alternative B, in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a negligible to minor adverse cumulative impact.

### *Conclusion*

The actions identified in alternative B would generally benefit the preservation and interpretation of archeology sites and associated collections despite the proposed new construction. No adverse impacts to archeological resources are anticipated. Cumulative impacts would be negligible to minor, and adverse. Alternative B, however, would not contribute to this adverse impact. If impacts

to archeological resources that are documented as significant or identified as contributing to the Archeological District are unavoidable for any of the proposed actions, mitigating efforts would be developed between the State Historic Preservation Office (SHPO) and the Klamath Tribes. The level of impact due to alternative B would not be expected to constitute an impairment of the national monument's archeological resources or values.

## **ARCHEOLOGY - IMPACTS FROM ALTERNATIVE C**

### *Analysis*

In alternative C, the monument would continue to follow current management objectives, preserving existing archeology sites and associated collections and documenting newly identified sites. Actions in alternative C would expand the range of visitor programs and recreational opportunities while developing a more visible identity for the monument. Many of the actions identified for this alternative involve increased interpretation of resources. The museum collections would be utilized for archeological information for interpretive and educational programs. The overall intention of alternative C is to create a wider range of visitor experiences through field tours and self-guided trails. Management of the monument's archeological resources would rely on cultural resource staff to orchestrate much of the archeology work through partnerships with other parks, the regional office, and subject matter experts from other organizations.

The potential effect to the monument's archeological resources under alternative C would be driven by compliance requirements associated with trail and facility development. The proposed development at Petroglyph Point and the campground could result in needed recovery of archeological materials to mitigate the impact of building a day use area and expanding visitor facilities. The construction of new trails, including the accessibility improvements to trails at Hospital Rock, Gillem's Camp, Petroglyph Point, and Captain Jacks Stronghold, would also involve archaeological surveys to assess the level of impact.

The overall impacts on archeological resources from proposed development projects and new visitor experiences would be long-term, minor, and adverse. There would be some beneficial effects from visitor education regarding archeological resources. However, there would be more potential for adverse impacts from increased visitation.

### *Cumulative Impacts*

As in alternative A, cumulative impacts are primarily from past actions, natural processes, direct and indirect damage from visitors, and disturbance to sites outside of the boundary. The development proposed at Petroglyph Point would likely draw greater interest by monument visitors and encourage a longer stay at the site. Many of these actions (e.g. increased NPS presence, road realignment, a new protective fence, etc.) would decrease the indirect impacts from natural processes and could be designed to deter visitors from damaging the rock art and other sites in the unit. Open sites (like surface lithic scatters) at Petroglyph Point would continue to be at a moderate risk for direct damage by people and indirect impacts by visitors and natural processes. The implementation of alternative C would result in long-term, minor, adverse effects to archeological resources. This determination, in combination with the adverse impacts of other past, present, and reasonably foreseeable future actions, would result in the potential for negligible to minor, adverse cumulative impacts, particularly at Petroglyph Point. However, actions proposed in alternative C would not contribute to the adverse cumulative impact and may benefit known sites.

### *Conclusion*

Changes to the infrastructure planned under alternative C would require investment in compliance with existing preservation laws and agreements. Since much of the archeology conducted under alternative C would be driven by compliance instead of research, the opportunity to improve general knowledge about past occupants in the Tule Lake Basin through directed analysis of archeological materials could be diminished. The overall impacts on archeological resources from proposed development projects and new visitor experiences would be long-term, minor, and adverse. Cumulative impacts would be negligible to minor and adverse. However, alternative C would not contribute to the adverse cumulative impact. The level of impact due to alternative C would not be expected to constitute an impairment of the national monument's archeological resources or values.

# Cultural Landscapes, Historic Buildings, and Structures

## CULTURAL LANDSCAPES, HISTORIC BUILDINGS, AND STRUCTURES - IMPACTS FROM ALTERNATIVE A (NO-ACTION)

### *Analysis*

In alternative A, the monument would continue to follow current management objectives, preserving and maintaining cultural resources associated with the Modoc War Historic District as well as the Public Works Administration (PWA), Civilian Conservation Corps (CCC), and Mission 66 development. To appropriately preserve and protect historic buildings, structures, and cultural landscapes that are listed or eligible for listing on the National Register of Historic Places, all stabilization, preservation, and rehabilitation efforts, as well as daily, cyclical, and seasonal maintenance, would be undertaken in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (1995). Stabilization, preservation, and rehabilitation would have no adverse effects upon historic buildings, structures, or cultural landscapes.

Under alternative A, no new construction would be undertaken. The monument would continue to utilize existing buildings and structures for visitor and/or administrative uses, while the National Register listed Modoc War era-structures would continue to be used primarily for interpretation. The monument would continue to develop baseline inventories for historic buildings, structures, and cultural landscapes. The completion of these baseline inventories would directly benefit the public by providing new information to supplement the interpretive program at Lava Beds, resulting in long-term, negligible to minor beneficial effects on historic buildings, structures and cultural landscapes.

Monument managers would continue to follow the general guidance and stabilization measures provided in the 2005 Modoc War Historic District Cultural Landscape Inventory. Prescribed burns and other treatment would continue to be used to restore the historic landscape and control the spread of invasive species. While many of the recommended stabilization measures associated with the removal of vegetation, such as western juniper and the control of invasive species, have been already been implemented to a limited extent, additional restoration efforts are needed

to ensure that the stabilization objectives are achieved district-wide.

### *Cumulative Impacts*

Although the Modoc War Historic District cultural landscape continues to reflect many of its character-defining features, the historic district has undergone a number of changes since the period of significance, 1872-1873. As a result of continued use through time, portions of the historic district have been altered by the effects of grazing as well as many other activities. During the 1930s and early 1940s, the PWA and CCC altered the Modoc War cultural landscape with the construction of buildings, roads, and trails at sites such as Gillems Camp and Captain Jacks Stronghold. The NPS also altered the district as a result of Mission 66 construction development of the North Boundary Road and subsequent visitor experience, safety, and operational improvements.

As a result of a fire that burned 5,420 acres within the northern limits of the monument in 2008, archeological features that contribute to the Modoc War Historic District cultural landscape were exposed and are susceptible to the effects of looting and vandalism.

Decades after the Modoc War, the PWA, and CCC established and built the infrastructure of Lava Beds National Monument. During their tenure in the monument, enrollees constructed roads, trails, buildings, and structures. Some of the rustic historic buildings and structures have been lost, while many of the original permanent buildings remain. In addition, the overall alignment of some roads and trails remains similar to that which was constructed by the PWA and CCC, although widespread reconstruction and paving occurred during the Mission-66 program. These past impacts have adversely affected the integrity of PWA and CCC development; however, the landscape, and its associated features, continue to convey its historical significance.

Cumulatively, natural processes, such as fire, as well as past development in the monument have resulted in the disturbance and loss of cultural resources, which have had a minor to moderate, cumulative adverse effect on the integrity of the Modoc War cultural landscape.

As described above, the implementation of alternative A would result in no adverse effects to historic buildings, structures, or cultural landscape features. The no adverse impacts of the alternative A, in combination



with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in an a minor to moderate, adverse cumulative impact. However, alternative A would not contribute to the adverse cumulative impact.

### ***Conclusion***

Under alternative A, the monument's ability to identify, inventory, conduct research and document cultural resource significance would continue to be limited by staffing constraints. While significant, these constraints would have long-term, negligible to minor adverse effects (no adverse effect) on historic buildings, structures, and cultural landscapes. No new construction would be undertaken and the monument would continue to utilize existing buildings and structures for visitor and/or monument administrative uses, while National Register listed Modoc War era structures would continue to be used primarily for interpretation. The no adverse impacts alternative A, in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a minor to moderate, adverse cumulative impact. However, alternative A would not contribute to the adverse cumulative impact. The level of impact due to alternative A would not be expected to constitute an impairment of the national monument's cultural landscapes, historic buildings, and structures.

## **CULTURAL LANDSCAPES, HISTORIC BUILDINGS, AND STRUCTURES - IMPACTS FROM ALTERNATIVE B (PREFERRED)**

### ***Analysis***

In alternative B, the monument would continue to follow current management objectives, preserving and maintaining cultural resources associated with the Modoc War Historic District as well as Public Works Administration (PWA), Civilian Conservation Corps (CCC), and Mission 66 development within the monument. Actions in alternative B would be implemented to increase visitor learning opportunities and resource preservation through collaboration. To appropriately preserve and protect historic structures and cultural landscapes that are listed or eligible for listing on the National Register of Historic Places, all stabilization, preservation, and rehabilitation efforts—as well as daily, cyclical, and seasonal maintenance—would be undertaken in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (1995). Stabilization, preservation, and reha-

bilitation would have no adverse effects upon historic structures or cultural landscapes.

Under alternative B, Lava Beds would serve as a center for cultural resource research and learning (publications, partnerships, research, etc.). Research topics would address a range of cultural resource issues related to the Klamath Basin. Interpretive and educational programming materials would also be developed for 20th century historic structures as well as for CCC sites located both inside and outside of the boundaries of the monument. Moreover, the NPS would increase efforts to collect local oral histories.

The monument would also conduct additional research in order to understand to the full context all topics related to the Modoc War (survey, fortification studies, battlefield reviews, etc.). Additional research would be conducted to understand early human use prior to the Modoc War. Specific research would look at collections and the hundreds of sites found out on the landscape. New research and battle forensics would enhance interpretation and knowledge of the Modoc War sites, inside and outside of the monument, while prescribed burns and other treatment would continue to be used to restore the historic landscape and control the spread of invasive species, thus achieving a multitude of natural and cultural resource objectives. Additional research related to the Modoc War, the Klamath Basin, and the collection of oral histories may serve as a benefit, educating the public about the value of cultural resource stewardship, historic preservation and archeology. Overall, the actions in B would have long-term, minor to moderate, beneficial effects.

Alternative B proposes to minimize the intrusion of existing buildings on monument views by utilizing techniques such as screening, paint colors and less reflective roofing material to conceal the location of buildings and structures. The CCC and Mission 66 houses and structures would not be affected by this action since the asphalt and cedar shingle roofing originally installed on these structures are the most visually compatible. Modifications since this time have adversely affected the landscape.

Removal of the East and West Wildlife Overlooks, which were developed during the Mission 66 period, could have an adverse effect if the overlooks are found to be determined eligible for the National Register of Historic Places as part of the larger Mission 66 circulation system. This could have long-term, minor to

moderate, adverse impacts on the Mission 66 circulation system.

In alternative B, the campground would be redesigned to improve the visitor experience. Initially developed by the CCC and supplemented with later Mission 66-era development, a redesign may negatively affect the historic character of the campground. Additional analysis needs to be performed to assess potential impacts.

The NPS would provide more opportunities for trails that are accessible, especially in locations such as Hospital Rock, the first quarter mile of Captain Jacks Stronghold, Gillems Camp, and Petroglyph Point. All of the aforementioned sites are located within a National Register Archeological District as well as within the Modoc War Historic District cultural landscape. As a result, new trail development may have a long-term, negligible to minor, adverse effect on the historic character and setting of the locale, especially in locations such as Captain Jacks Stronghold where minimal development has occurred.

Despite the aforementioned changes, the selected alternative would have negligible to minor adverse effects (no adverse effect) and minor to moderate beneficial effects on cultural resources. It would not result in the loss or destruction of significant buildings, structures, or cultural landscape features.

### *Cumulative Impacts*

As described under alternative A, natural processes and past infrastructure improvements have altered the monument's historic buildings, structures, and cultural landscape features.

The implementation of alternative B would result in no adverse effects to historic buildings, structures, or cultural landscape features. This determination in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in minor to moderate, adverse cumulative impacts. However, alternative B would not contribute to the adverse cumulative impact.

### *Conclusion*

The implementation of alternative B would result in no adverse effects to historic buildings, structures, or cultural landscape features. Some long-term, negligible to minor, adverse impacts may occur from the addition

of accessible trails to several monument attractions. Alternative B would also contribute no adverse effects to the overall adverse cumulative impact of other past, present, and reasonably foreseeable actions. Any actions would follow approved standards and guidelines and would enhance NPS preservation objectives for the Modoc War Historic District, CCC-era historic buildings and structures, and any other potential cultural landscapes.

In addition, the monument would continue to preserve and maintain its historic structures and cultural landscapes. Any actions would follow the Secretary of the Interior's Standards for the Treatment of Archeology and Historic Preservation, and the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes; this would result in no adverse effects to historic structures and cultural landscapes. The level of impact due to alternative B would not be expected to constitute an impairment of the national monument's cultural landscapes, historic buildings, and structures.

## **CULTURAL LANDSCAPES, HISTORIC BUILDINGS, AND STRUCTURES - IMPACTS FROM ALTERNATIVE C**

### *Analysis*

In alternative C, the monument would continue to follow current management objectives, preserving and maintaining cultural resources associated with the Modoc War Historic District cultural landscape as well as Public Works Administration (PWA), Civilian Conservation Corps (CCC), and Mission 66 development within the monument. Actions in alternative C would be implemented to expand the range of visitor programs and recreation opportunities while developing a more visible identity for the monument. To appropriately preserve and protect historic structures and cultural landscapes that are listed or eligible for listing on the National Register of Historic Places, all stabilization, preservation, and rehabilitation efforts—as well as daily, cyclical, and seasonal maintenance—would be undertaken in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (1995). Stabilization, preservation, and rehabilitation would have no adverse effects upon historic structures or cultural landscapes.

In alternative C, the monument would analyze means of providing interpretative experiences that allow visitors a broader understanding of the Modoc War. Walking

tours highlighting Modoc War-era fortifications would be considered as long as these actions would not have an adverse effect on the resource. Also, the Modoc War Historic District cultural landscape would be restored to 19th century battlefield conditions and new research and battle forensics would enhance interpretation and knowledge of the Modoc War sites located within the boundaries of the monument. Monument managers would continue to follow the general guidance and stabilization measures provided in the Modoc War Historic District Cultural Landscape Inventory completed in 2005. Prescribed burns and other treatment would continue to be used to restore the historic landscape and control the spread of nonnative species.

The monument would identify new opportunities for visitors to access historic structures (e.g. explore opportunities for an overnight experience at the Schonchin Butte fire lookout, and/or tours to other historic sites). As a result of the potential for increased visitation, the historic buildings and structures could suffer from wear and tear. Unstaffed or minimally staffed structures could be more susceptible to vandalism, but continued ranger patrols and visitor education efforts would discourage vandalism. Few, if any, adverse impacts would be anticipated. Benefits from increased visitation and access to historic structures may include an enhanced awareness by the public of historic preservation and the stewardship of cultural resources. Overall, there would be long-term, minor to moderate, beneficial effects on the historic structures.

Removal of West Wildlife Overlook, which was developed during the Mission 66 period, could have an adverse effect if the overlooks are found to be determined eligible for the National Register of Historic Places as part of the larger Mission 66 circulation system. This could have long-term, minor to moderate, adverse impacts on the Mission 66 circulation system.

As in alternative B, alternative C proposes more opportunities for trails that are accessible, especially in locations such as Hospital Rock, the first quarter mile of Captain Jacks Stronghold, Gillems Camp and Petroglyph Point. All of these aforementioned sites are located within a National Register Archeological District as well as within the Modoc War Historic District cultural landscape. As a result, development may have a long-term, negligible to minor, adverse effect on the historic character and setting of the locale,

especially in locations such as Captain Jacks Stronghold where minimal development has occurred.

In alternative C, the campground would be improved to better accommodate large vehicles by adding a new RV loop. Initially developed by the CCC and supplemented with later Mission 66-era development, any redesign or addition may negatively affect the historic character of the campground. Additional analysis will be performed to be able assess potential impacts.

Despite the wear and tear from increased visitation, alternative C would have long-term, negligible to minor, adverse effects (no adverse effect) and moderate beneficial effects on cultural resources. It would not result in the loss or destruction of significant buildings, structures or cultural landscape features.

### *Cumulative Impacts*

As described under alternative A, past management practices and infrastructure improvements have altered the monument's historic buildings, structures, and cultural landscape features.

The implementation of alternative C would result in no adverse effects to historic buildings, structures, or cultural landscapes. This determination, in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a minor to moderate, adverse cumulative impact. However, alternative C would not contribute to the adverse cumulative impact.

### *Conclusion*

Implementation of alternative C would result in no adverse effects to historic buildings, structures, and cultural landscapes. However, proposed development may have a long-term, minor to negligible, adverse effect on the historic character and setting of the locale. Increased visitation and access to historic structures may include an enhanced awareness by the public of historic preservation and stewardship resulting in long-term, minor to moderate, beneficial effects on historic structures. Alternative C would not contribute to the adverse cumulative impact of other past, present, and reasonably foreseeable actions.

The monument would continue to preserve and maintain its historic structures and cultural landscapes. Any actions would follow the Secretary of the Interior's Standards for the Treatment of Archeology and Historic

Preservation, and the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes; this would result in no adverse effects to historic structures and cultural landscapes. The level of impact due to alternative C would not be expected to constitute an impairment of the national monument's cultural landscapes, historic buildings, and structures.

## Ethnographic Resources

The intensity of potential impacts on ethnographic resources that are not traditional cultural properties is described below:

*Negligible:* Impact(s) would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs.

*Minor:* Adverse impact — impact(s) would be slight but noticeable but would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs.

*Moderate:* Adverse impact — impact(s) would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's practices and beliefs, even though the group's practices and beliefs would survive.

*Major:* Adverse impact — impact(s) would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of practices and beliefs, to the extent that the survival of a group's practices and/or beliefs would be jeopardized.

Beneficial impact — would allow access to and/or accommodate a group's traditional practices or beliefs.

### ETHNOGRAPHIC RESOURCES - IMPACTS FROM ALTERNATIVE A (NO-ACTION)

#### *Analysis*

Since the establishment of the monument, there has been relatively little directed anthropological research

that discusses sites and resources viewed as significant to tribes associated with the Lava Beds. Recent research (Deur 2008) concentrated on particular uses of resources within the monument. This was completed primarily through interviews and research on historical records. This research has prompted the need for formal agreements between the monument and associated tribes to balance resource conservation and traditional use.

Alternative A concentrates on minor improvements to the existing management approach for ethnographic resources. It does not propose any significant changes to infrastructure or the organization of monument programs yet would continue to address some of the existing shortcomings concerning the documentation of cultural resources identified over the past several years. For the monument's properties significant to contemporary native tribes (The Klamath Tribes and the Modoc of Oklahoma), this alternative continues to encourage the resource program to improve identification and documentation of ethnographic resources within the monument.

Currently, the monument resource program relies on network or regional anthropology projects to obtain the oral history and significance of sites within the monument to tribes. Under alternative A, the monument would continue an open dialogue concerning the protection of sites and objects that are significant to the Tribes and would follow consultation guidelines outlined in legal documents like NAGPRA, as well, as the NPS Programmatic Agreement (2008). Other informal yet on-going consultation would continue between the monument and tribes to incorporate the tribes' perspective in interpretive programs and ensure their ceremonial activities, like the annual Modoc Gathering, are adequately supported.

Recently, documentation of land use patterns by contemporary Native groups as well as site and resource significance to The Klamath Tribes was published in the book, *In the Footprints of Gmukamps: A Traditional Use Study of Crater Lake National Park and Lava Beds National Monument* (Deur 2008). This publication is helpful in creating a formal agreement between tribes and the monument concerning ethnographic resources. While this study is important for the monument to understand tribal perspectives concerning resources and land use, this type of anthropological study is one of the few published pieces concerning ethnographic resources and the only ethnographic



research completed at Lava Beds within the past few decades.

Based on the actions proposed in alternative A, no impacts to ethnographic resources are anticipated.

### *Cumulative Impacts*

As ethnographic resources on surrounding lands have been lost over time to activities such as grazing, the monument has become more important to tribes. This may result in more collecting from the monument.

Monument development and administrative/maintenance operations, as well as increasing visitor use since its establishment have had and are continuing to have minor cumulative adverse impacts on ethnographic resources.

Alternative A's contribution to these minor impacts would be small. NPS staff would continue consultation with affiliated tribes to address matters of mutual concern.

### *Conclusion*

Progress, though limited, would be made in documenting sites and resources significant to tribes and formalizing agreements between the monument and tribes concerning preservation and use of resources identified through ethnographic research. The documentation would rely on specific project funding. No impacts to ethnographic resources are anticipated from actions in alternative A. Cumulative adverse impacts would be minor. The level of impact due to alternative A would not be expected to constitute an impairment of the national monument's ethnographic resources and values.

## **ETHNOGRAPHIC RESOURCES - IMPACTS FROM ALTERNATIVE B (PREFERRED)**

### *Analysis*

The overarching objectives of alternative B are to provide an array of educational opportunities and interpretive programs to monument visitors and the surrounding community. Collaboration with tribes would be necessary to meet compliance expectations associated with the increase in development in the monument.

The actions proposed for Petroglyph Point would need review by the Tribes Heritage Program to ensure the overall design for the area does not diminish the integrity of the site. Accumulated damage to the rock art at Petroglyph Point has altered the cliff face and obscured some of the images. The majority of the defacement has been caused by gunfire. However, erosion of the rock face may also be responsible for diminished visual clarity of the exposed images. Photo documentation and scaled drawings of the petroglyph panels have been completed but the determination of indirect impacts from wind erosion has been more difficult to record. Efforts in the near future would establish a measurable baseline to assess erosion rates and impacts. The proposed changes at Petroglyph Point may help to reduce incidences of direct and indirect damage to both the rock art and archeology sites in the area.

Alternative B proposes an increase in the number of hiking trails, removal, restoration of under-utilized wildlife overlooks, modification the campground, and small additions to the visitor and research centers. When all of the proposed construction activities are considered, the possibility of degradation to site and resources significant tribes exists. While the proposed changes have a relatively small footprint, several of the actions are adjacent to or in areas identified by tribes as important places. Because of this overlap, alternative B actions would require frequent and direct consultation with the tribes to ensure that no degradation would occur. Overall, new construction could have a long-term, minor, adverse impact on ethnographic resources in localized areas of the monument.

The vision described for the interpretative program in alternative B reflects a desire to expand Tribal representation for educational outreach and interpretation of monument resources. The broadening of educational themes would include the tribes' contemporary identity, views and application of traditional practices. This goal would require greater efforts by monument resource and interpretive staff to implement this type of program. This would have an overall long-term, minor, beneficial effect on ethnographic resources.

### *Cumulative Impacts*

The cumulative impacts are the same as alternative A. Most of the actions proposed in alternative B would not have an adverse effect on known sites or resources deemed significant to the heritage of tribes affiliated with the monument. This is due in large part to the

continued emphasis on cultural resource preservation and natural resource conservation. In addition, the overall the actions needed to meet alternative B objectives for education, interpretation, and research would enrich the cultural resource programs at Lava Beds.

The combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in minor, adverse cumulative impact. However, alternative B would not contribute to the adverse cumulative impact.

### ***Conclusion***

Alternative B would have beneficial effects on ethnographic resources from the increased emphasis on cultural resource research and preservation. Since site construction at places of significance to tribes has the potential for diminishing integrity causing localized, minor, adverse impacts, the proposed increase in collaboration with the tribes for interpretive programs and anthropological research would ensure that development design is sensitive to resources important to affiliated groups. Cumulative impacts would be minor and adverse. However, alternative B would not contribute to the adverse cumulative impact. The level of impact due to alternative B would not be expected to constitute an impairment of the national monument's ethnographic resources and values.

## **ETHNOGRAPHIC RESOURCES - IMPACTS FROM ALTERNATIVE C**

### ***Analysis***

Alternative C proposes an increase in development to address visitor recreation interests. Alternative C would require greater compliance consultation with tribes. Several of the proposed areas for new construction or improved visitor access are located at key monument areas that are also at or adjacent to sites that are significant to tribes. Petroglyph Point is identified as a place of particular significance to The Klamath Tribes that would undergo significant re-design under alternative C. While the monument would proceed with construction plans that meet visitor needs, there would be a corresponding need for design that is sensitive to preservation of the areas significance identified by The Klamath Tribes.

In alternative C, programming for resource management would continue with the existing approach for documentation and preservation. Many of the

improvements to the identification and recordation of sites and items important to tribes traditions would be conducted through minor changes in resource programming or through regional and network assistance. This is particularly important for formalizing agreements between the monument and tribes concerning the collection and use of resources within the monument.

None of the proposed changes in organizational structure or recreation development are likely to have a direct impact on known sites, items, or objects significant to tribes. While potential impacts to ethnographic resources exist under alternative C, particularly at Petroglyph Point, the effects would be diminished through tribal consultation during Section 106 (NHPA) compliance.

Alternative C proposes an increase in the number of hiking trails, removal, restoration of under-utilized wildlife overlooks, and expansion of the campground for RVs. When all of the proposed construction activities are considered, the possibility of degradation to site and resources significant to tribes exists. While the proposed changes have a relatively small footprint, several of the actions are adjacent to or in areas identified by tribes as important places. Because of this overlap, alternative C actions would require frequent and direct consultation with The Tribes. Potential localized adverse impacts at locations such as Petroglyph Point could be minor to moderate and long-term.

### ***Cumulative Impacts***

The cumulative impacts are the same as alternative A. Alternative C does not provide a direct avenue for improving knowledge concerning ethnographic resources within the monument. As described in the analysis section, proposed developments, particularly at Petroglyph Point, could be harmful to sites important to tribes. This determination, in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a minor to moderate, adverse cumulative impact. The contribution from alternative C would be small for most areas of the monument, but more substantial in the Petroglyph Point area.

### ***Conclusion***

Since there is a gap in available information concerning significant sites and resources to monument management and the monument's interpretive staff, all actions

proposed in alternative C should be undertaken in full consultation with tribes. This effort would ensure important sites retain integrity and would also improve the quality of ethnographic data available to the monument staff. Localized impacts from new facilities could cause long-term, minor to moderate impacts, particularly at Petroglyph Point. Cumulative impacts would be minor to moderate and adverse. However, alternative C's contribution would be small. The level of impact due to alternative C would not be expected to constitute an impairment of the national monument's ethnographic resources and values.

## Museum Collections

Museum collections (prehistoric and historic objects, artifacts, works of art, archival documents, and natural history specimens) are generally ineligible for listing in the national register, and are not subject to Section 106 of the National Historic Preservation Act. The intensity of impacts on museum collections is defined as follows:

*Negligible:* Impact is at the lowest levels of detection, barely measurable with no perceptible consequences, either adverse or beneficial, to museum collections.

*Minor:* Adverse impact — would affect the integrity of few items in the museum collection but would not degrade the usefulness of the collection for future research and interpretation. Beneficial impact — would stabilize the current condition of the collection or its constituent components to minimize degradation.

*Moderate:* Adverse impact — would affect the integrity of many items in the museum collection and diminish the usefulness of the collection for future research and interpretation. Beneficial impact — would improve the condition of the collection or protect its constituent parts from the threat of degradation.

*Major:* Adverse impact — would affect the integrity of most items in the museum collection and destroy the usefulness of the collection for future research and interpretation. Beneficial impact — would secure the condition of the collection as a whole or its constituent components from the threat of further degradation.

## MUSEUM COLLECTIONS - IMPACTS FROM ALTERNATIVE A (NO-ACTION)

### *Analysis*

In alternative A, the monument's museum management program would continue to improve the quality of object documentation for interpretive and research use, incorporating administrative records into the monument's archives (Lava Beds Museum Management Plan 2002), and updating the repository heating and cooling systems to meet facility expectations (Pacific West Region's Curation Facility Strategy 2006). Under this alternative there would continue to be inadequate qualified staff to direct improvements to the various assemblages.

Currently, Lava Beds National Monument relies on the expertise of the curator at Crater Lake National Park to meet annual collection management reporting requirements. This position also provides the monument with identifying needed assemblage improvement projects and reviewing the effectiveness of protocols concerning collection access and use. The existing arrangement between Lava Beds National Monument and Crater Lake National Park would continue to ensure basic coverage for collection care and reporting, but does not provide for direct, in-park oversight of the collection by a professional curator. Lack of an on-site curator could result in long-term, minor, adverse impacts on museum collections.

Although there are no proposed projects for the construction of monument facilities or infrastructure requiring archeological data recovery (projects that would generate large assemblages) for alternative A, there is the likelihood for moderate collection growth. Small-scale compliance projects and other work proposed in resource documents could result in collections that would have to be incorporated into the general collection. Ongoing inventory and monitoring projects for biological and geological resources would also produce reports that should be added to the monument archives. Another potential source for collection growth includes the addition of materials that have been stored at other repositories that can no longer afford to manage the assemblage.

The existing collection storage facilities would continue to be used to house monument archives and objects. Collection use for exhibit and interpretation is possible but would continue to be difficult due to the current status of staff and expertise. Incompliance with environmental control standards could result in long-term,

minor, adverse impacts on museum collections at the monument.

### *Cumulative Impacts*

New and potential additions to the collections offer the chance to improve the social and scientific value of assemblages. The improvements mentioned above, however, would require greater involvement by a curator and a high degree of input from biologists, geologists, archeologists, historians and tribal members. Should management of the collections proceed under the existing arrangement, the NPS mandates and required reporting would be completed but other improvements concerning use and directed collection growth detailed in the Lava Beds Museum Management Plan would be difficult to attain. The lack of an on-site professional curator over the course of time could result in processing and data gaps that could hinder future resource research efforts.

The available space for collection growth is limited. The lack of associated processing and dedicated laboratory space compounds the issue of completing a number of the collection improvement tasks proposed in the Lava Beds Museum Management Plan. This programmatic stasis over the next ten years could lessen the social and scientific value of the overall collection due to lack of information needed to promote research, limited time from a professional curator to oversee collection improvement projects, and continued disuse of the collection for exhibits or other appropriate interpretive programs.

Overall, cumulative impacts on museum collections would be long-term, minor and adverse. Alternative A's contribution to these minor impacts would be small.

### *Conclusion*

Some minor adverse impacts would result from environmental controls that do not meet current NPS standards for museum collections. The monument's ability to focus efforts toward current expectations for documentation, exhibit design, and use for interpretation is limited by both the level of staffing and the available expertise in the monument for addressing many of the issues discussed in the Museum Management Plan having an overall minor, cumulative adverse impact on museum collections. Alternative A's contribution to these impacts would be small. The level of impact due to alternative A would not be expected to

constitute an impairment of the national monument's collections and archives.

## **MUSEUM COLLECTIONS - IMPACTS FROM ALTERNATIVE B (PREFERRED)**

### *Analysis*

In alternative B, the monument would emphasize maintaining and preserving objects and specimens accessioned into the museum through directed actions toward improved documentation for research, interpretive programs, and educational outreach. These improvements include object photographs, professional descriptions of artifacts and specimens, and the creation of thematic education kits. Many of the identified efforts associated with the primary goal of alternative B would pursue preservation and educational outreach to increase learning opportunities for both monument visitors and the community through partnerships with other agencies and organizations.

The expected increase in the use of collections for public benefit would include collaboration with appropriate professional cultural resource staff within the NPS. The monument would support appropriate museum training for employees in existing positions while pursuing needed increases in professional cultural resource staffing. Balancing collection use with the conservation of museum objects and research would be accomplished while adhering to NPS servicewide laws and policies.

Alternative B proposes an organizational shift from a relatively loose assembly of monument programs to more integrated programs that share common goals in research and education. The monument would become a research and learning center for regional cultural topics, as well as history and anthropology themes deemed nationally important. An emphasis of the preferred alternative would be the development of educational materials for use at the monument and surrounding communities. Planning for exhibits and developing education kits (either through the use of objects from an interpretive collection or by producing replicas) would require increased collaboration with museum professionals and subject matter experts.

The potential effect to the monument's collections under alternative B would be driven by both increased compliance activity associated with trail and facility development and increased collection use for the interpretation division. The proposed development



at Petroglyph Point and the campground could result in the recovery of archeological materials to mitigate the impact of building. The construction of new trails, including the proposed accessibility improvements at Hospital Rock, Gillem's Camp, Petroglyph Point, and Captain Jacks Stronghold, would also involve cultural and natural resource surveys that could result in additional items added to the collection. Professional oversight is needed to ensure that materials uncovered would be properly assumed into the overall Lava Beds collection. Without this professional oversight, long-term, minor, adverse impacts on museum collections may result from unprocessed and unconsolidated assemblages.

Baseline data would be gathered to address information gaps identified by the different disciplines. These efforts would include analysis of archeological and biological specimens to gain a better understanding of topics associated with the history and ecology of the monument. Background research would be conducted to ensure the monument accurately portrays the composition of resources within its boundary. Resource management staff would also direct efforts toward collecting and transcribing oral histories from living people involved with important national trends (e.g., Civilian Conservation Corps crews, and land-use by affiliated tribes).

Museum repositories would continue to operate as single use facilities as they do now but other in-monument facilities would be assessed for expansion of collection storage if necessary. The research center would also be explored as a viable facility for additional processing and laboratory activities. As noted in alternative A, the needed updates to the visitor center facility would continue to be supported by Lava Beds management. Proposed development, though relatively small, would result in the generation of collections from compliance activities. This type of collection growth is expected to be minor since significant archeological, historical, biological and geological sites would be avoided. Extending collections management to research partners such as Chico State University would provide additional knowledge of collections items and monument history and pre-history.

### *Cumulative Impacts*

Cumulative impacts would be the same as alternative A. As described above, alternative B actions would result in overall beneficial effects on the monument's museum collection. The greatest challenge concerning impacts on the monument's natural and cultural assemblages

under alternative B is balancing the increased collection use with the total preservation of objects, specimens, and records that are important monument resources. Without professional oversight from staff with appropriate experience and training in collection care and experience in identifying research potential, alternative B could have adverse impacts to Lava Beds collections over time.

The beneficial impacts of alternative B, in combination with the impacts of other past, present and reasonably foreseeable future actions would result in negligible to minor, adverse cumulative impacts. Alternative B's beneficial effects would contribute a modest amount to the cumulative effects.

### *Conclusion*

Implementation of alternative B could greatly improve the accessibility and use of the monument collections through increased research and educational outreach. However, without proper professional oversight during construction activities, some long-term, minor, adverse impacts may result from unprocessed and unconsolidated assemblages. Other associated improvements may include the inclusion of more appropriate processing and analysis space at the monument. Overall, these actions would result in long-term, minor, beneficial effects on museum collections. The beneficial impacts of alternative B, in combination with the impacts of other past, present and reasonably foreseeable future actions would result in negligible to minor, adverse cumulative impacts. The level of impact due to alternative B would not be expected to constitute an impairment of the national monument's collections and archives.

## **MUSEUM COLLECTIONS - IMPACTS FROM ALTERNATIVE C**

### *Analysis*

In alternative C, the National Park Service would continue to follow current management objectives, preserving and maintaining existing museum collections while responsibly managing collection growth. Actions in alternative C would be implemented to expand the range of visitor programs and recreation opportunities while developing a more visible identity for the monument. Many of the actions identified involve increased interpretation of resources. Information from the museum collections would be used for interpretation and educational programs. The overall

intention of alternative C is to create a wider range of visitor experiences through field tours and self-guided trails. Management of the monument would continue to rely on formalized partnerships with other parks for collection care and reporting. Policy standards and NPS mandates would be addressed by subject matter experts regionally.

The potential effect to the monument's collections under alternative C would be driven by both increased compliance activity associated with trail and facility development and increased collection use for interpretation. The proposed development at Petroglyph Point and the campground could result in the recovery of archeological materials to mitigate the impact of building. The construction of new trails, including the accessibility improvements to trails at Hospital Rock, Gillem's Camp, Petroglyph Point, and Captain Jacks Stronghold, would also involve cultural and natural resource surveys that could result in collected items. Professional oversight is needed to ensure that materials uncovered would be properly assumed into the overall Lava Beds collection. Without this professional oversight, long-term, minor to moderate, adverse impacts on museum collections may result from unprocessed and unconsolidated assemblages.

While alternative C would have an impact on the volume and composition of the monument's museum collection, the anticipated effects are minor and no adverse effects are expected if policies and collection care practices are adhered to by monument staff. The potential for collections improvement is possible with the increased use of collection materials for exhibit and educational programs. These uses would require adequate background research, which would fill existing data gaps. Overall, the museum collections would not be adversely affected by alternative C.

### *Cumulative Impacts*

Cumulative impacts would be the same as alternative A. Implementation of alternative C would result in no adverse effects to the integrity of the museum collection. Improvements to the documentation of museum items would continue to be incremental, though adequate oversight for servicewide reporting would be maintained.

Overall adverse cumulative impacts on monument collections would be long-term, minor and adverse. Alternative C's contribution to these impacts would be small.

### *Conclusion*

Actions that detract from planned improvements to the museum program, like unchecked collection growth through compliance efforts, may be balanced by the need for some background research for the use of collection items in exhibits or educational programs. The lack of an on-site professional curator over the course of time could result in processing and data gaps that could hinder future resource research efforts resulting in long-term, minor to moderate, adverse impacts. Adverse cumulative impacts on monument collections would be long-term, minor and adverse. However, alternative C's contribution to these impacts would be small. The level of impact due to alternative C would not be expected to constitute an impairment of the national monument's collections and archives.

## **Wilderness**

Working from definitions included in the Wilderness Act, and included in NPS Management Policies 2006, and the tradition of wilderness preservation and management at the monument, the following wilderness characteristics have been identified for consideration in this analysis:

- The earth and its community of life are untrammeled by humans, where humans are visitors and do not remain.
- The area is undeveloped and retains its primeval character and influence without permanent improvements or human habitation.
- The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable.
- The area is protected and managed so as to preserve its natural conditions.
- The area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Impacts on natural and cultural resources, visitor access, soundscape, night sky, and other resources are evaluated elsewhere in the environmental consequences section. The analysis for this topic focuses on wilderness character and wilderness experience, which are integrally related because much of wilderness

character can only be subjectively determined by the visitor's experience (for example, solitude or freedom of movement).

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

*Negligible:* Impacts would not be detectable to most visitors and would have no discernible effect on wilderness character or experience.

*Minor:* Impacts would be slightly detectable to some visitors but would not be expected to have an overall effect on wilderness character or experience.

*Moderate:* Impacts would be clearly detectable by many visitors and could have an appreciable effect on wilderness character or experience.

*Major:* Impacts would have a substantial and noticeable effect for most visitors on wilderness character or experience and could permanently alter various aspects of the visitor experience.

## **WILDERNESS CHARACTER – IMPACTS FROM ALTERNATIVE A (NO ACTION)**

### ***Analysis***

In this alternative, no new developments would occur within the two legislated wilderness areas of the monument. As discussed in soundscape, the wilderness areas would continue to experience long-term, negligible to minor, adverse impacts from inside and outside influences associated with agriculture on Tule Lake National Wildlife Refuge and private lands, airplane flyovers, visitor use, recreational vehicles, snowmobiles, and railroads. No new trails would be developed under this alternative, limiting human impacts on wilderness. Visitor use levels are not expected to increase significantly in the next 20 years, limiting additional impacts associated with wilderness use.

### ***Cumulative Impacts***

Impacts on wilderness resources associated with human activities vary depending on location within the monument. The wilderness is considered one of the most serene areas visitors can experience natural quiet. Impacts increase around the borders of the wilderness and at trailheads.

The main impacts on wilderness are from the combined potential increases in overhead airplane traffic, agricultural activities on Tule Lake National Wildlife Refuge lands and private lands, recreational vehicle noise associated with snowmobiles on national forest lands, and vehicle use in general. Visitor use and park operations in the monument would contribute a relatively small part of the cumulative impacts on the monument's wilderness.

When the likely effects of continued public use of the monument under this alternative are added to the effects of actions outside the monument, there could be a long-term, negligible to minor, adverse cumulative impact on wilderness values (natural quiet, dark skies, solitude, wildlife viewing).

### ***Conclusion***

Alternative A would be expected to have a negligible to minor, long-term, adverse impact on the monument's wilderness resources from monument operations and visitor use. There could be a long-term, negligible to minor, adverse cumulative impact on certain wilderness values that center on natural quiet. The level of impact due to alternative A would not be expected to constitute an impairment of the monument's resources or values.

## **WILDERNESS CHARACTER – IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)**

### ***Analysis***

Under this alternative, the only new developments proposed within legislated wilderness would be the expansion of new trails in the backcountry zone and the development of backcountry campsites. These two proposed developments would have low to moderate short-term impact on natural quiet during installation. Visitor use in these new trail areas would follow use level guidelines set to limit impacts in the wilderness setting. The formalization of permanent new trails in backcountry areas would result in minimal wilderness disturbance. Thus, the construction of new trails and campsites in alternative B would be expected to have a negligible to minor, long-term, adverse impact on the monument's wilderness values.

As in alternative A, in alternative B the wilderness would continue to be impacted at minor to moderate levels from outside influences associated with agriculture on Tule Lake National Wildlife Refuge and private

lands, airplanes, recreational vehicles and railroad impacts. Visitor use levels are not expected to significantly increase to levels where wilderness resources would be impacted from visitor use in the backcountry zone.

Alternative B would have several beneficial impacts on wilderness resources. The establishment of user capacity indicators and standards would help protect wilderness resources. A larger emphasis on interpretative efforts to educate the public would have an effect on reducing impacts to wilderness. The monument would reduce the visibility of monument facilities as seen from wilderness, take additional efforts to promote bicycle use along roads, and trail access would be promoted to a number of the main visitor destinations. The creation of new trails and trail connections would likely result in more people walking in areas that currently have wilderness impacts associated with vehicle noise. Thus, compared to alternative A, reduction in vehicle use due to improved trail systems would have the potential for long-term beneficial impact of unknown magnitude on wilderness resources. The likely result of more hiking in the monument would reduce negative impacts on wilderness and allow visitor more opportunity to experience the wilderness of Lava Beds. Taken together, these actions would have a minor to moderate, long-term, beneficial impact on the wilderness.

### *Cumulative Impacts*

Cumulative impacts on wilderness would be the same as in alternative A. When the likely adverse impacts of public use in alternative B and the beneficial effects of promoting bicycle use and more efficient trail route patterns are added to the effects outside of the monument, there could be a long-term, negligible to minor, adverse cumulative impact on the two wilderness units. However, the beneficial and adverse effects of alternative B in the monument would likely be a very small part of the cumulative impacts on the area's wilderness resources.

### *Conclusion*

Compared to alternative A, alternative B would be expected to have beneficial effects of unknown intensity on wilderness resources, primarily due to the improved trail system that connects primary visitor use destinations, as well as the promotion of bicycle use and reduced visibility of monument facilities. There also would be a long-term, minor to moderate, adverse

impact on the monument's wilderness resources due to the increased potential for noise associated with activities outside the monument. There could be a long-term, negligible to minor, adverse cumulative impact on wilderness, although alternative B would add small beneficial and adverse increments to the overall area cumulative impact. The level of impact due to alternative B would not be expected to constitute an impairment of the monument's wilderness resources or values.

## **WILDERNESS CHARACTER – IMPACTS FROM ALTERNATIVE C**

### *Analysis*

Under this alternative, the monument would increase outreach efforts to promote more visitation and would collaborate with the Modoc National Forest on new recreational opportunities. The monument would also explore regional trail connections to national forest trails and sites, including shared trail systems. Alternative C would also make changes to the Indian Well campground to accommodate larger recreational vehicles and visitor use groups. Medicine Lake road would be paved under this alternative, allowing for increased traffic loads and speeds. The Monument would also promote more winter use and additional specialized tour opportunities. Additionally, up to 15 miles of new trail expansion and vehicle pullouts along the main monument road would be constructed under this alternative. The potential impacts from this alternative would center on degradation of wilderness values associated with trail development in the backcountry and facility development in the frontcountry. As in the other alternatives, wilderness in many areas of the monument would not be directly affected in alternative C. The short-term impacts on wilderness associated with the projects listed above would be negligible. The long-term effects from trail expansion on wilderness resources would likely have a minor adverse, long-term, localized impact on the monument's wilderness.

With visitor use levels expected to stay constant or increase over the life of this plan, wilderness resources could have negligible to minor, adverse, long-term, localized impacts in the backcountry zone. New trails in the backcountry zone would provide access for visitors, which would directly contribute to changes over time with wilderness resources (natural quiet, solitude, wildlife viewing).



Alternative C would have several beneficial impacts on wilderness. The establishment of user capacity indicators and standards would help protect wilderness resources. Encouraging bicycle use and the creation of new trails and connecting current trails would likely result in more people walking in areas that currently have wilderness impacts associated with vehicle noise. Taken together, these actions would have a minor, long-term, beneficial impact on the wilderness.

### *Cumulative Impacts*

Cumulative impacts on wilderness would be the same as in alternative A. In alternative C, wilderness is primarily impacted by activities outside of the boundaries of the monument as well as monument administrative activities and visitor use in the frontcountry zones. When the likely effects of monument developments and public use in alternative C and the beneficial impacts more efficient trail route patterns are added to the effects outside the monument, there could be a long-term, negligible to minor, adverse cumulative impact on the area's wilderness resources. However, the beneficial and adverse effects of alternative C in the monument would likely be a very small part of the cumulative impacts on the area's wilderness resources.

### *Conclusion*

Compared to alternative A, alternative C would be expected to have beneficial impacts of unknown intensity on wilderness resources, primarily due to the promotion of walking and bicycle use. There would also be a long-term, minor adverse impact on the monument's wilderness resources due to the increased trail developments proposed for the wilderness and the potential impacts associated with activities outside the monument. There could be a long-term, negligible to minor, adverse cumulative impact, although alternative C would add small beneficial and adverse increments to the overall cumulative impact. The level of impact due to alternative C would not be expected to constitute an impairment of the monument's wilderness resource or values.

## Visitor Opportunities

### Visitor Experience

The impact analysis evaluates how visitor opportunities might vary between alternatives as a result of applying proposed actions and different management zones in the alternatives. The analysis is qualitative rather than quantitative because of the conceptual nature of the alternatives. Professional judgment was used to reach reasonable conclusions as to the intensity, duration, and type of potential impact. Impacts could be temporary or short-term (for example, delays and inconvenience caused by the construction of facilities).

The following areas have been analyzed in this section:

- **Recreation Opportunities:** this section analyzes the recreational opportunities for visitors in each alternative, such as hiking, caving, camping, picnicking, and opportunities for solitude.
- **Visitor Services:** this section analyzes the commercial services available to visitors in each alternative.
- **Visitor Facilities:** this section analyzes the different facilities available to visitors in each alternative, including visitor centers, campgrounds, trails, and other day use facilities.
- **Opportunities for People with Disabilities:** this section analyzes opportunities for people with disabilities under each alternative.

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

*Negligible:* Impacts would be barely detectable to the visitor and expected to have no discernable effect related to recreation opportunities, visitor facilities and services.

*Minor:* Impacts would be slightly detectable to the visitor, though not expected to have an overall effect on the visitor experience related to recreation opportunities, visitor facilities and services.

*Moderate:* Impacts would be clearly detectable to the visitor and could have an appreciable effect on the visitor experience related to recreation opportunities, visitor facilities and services.

*Major:* Impacts would be have substantial, highly noticeable influence on the visitor experience and could permanently alter access to and availability of various aspects of the visitor experience related to recreation opportunities, visitor facilities and services.

## **VISITOR USE AND EXPERIENCE- IMPACTS FROM ALTERNATIVE A (NO ACTION)**

### *Analysis*

#### *Recreational Opportunities*

While some recreational activities would remain the hallmark of a high-quality monument experience, such as the relatively unhampered exploration of developed caves and high desert hiking, other recreational opportunities would continue to be rarely pursued by most visitors. Caving, sightseeing (by car and on foot), camping in the drive-in campground, and short distance hiking or self-guided walks are common recreational activities. However, activities such as equestrian travel, bicycling, and wilderness camping and hiking are not actively promoted nor accommodated by park facilities or programs in a significant manner. Large group day use is also not facilitated by the current park infrastructure that features few optimal sites for group picnicking. Therefore, under the No Action alternative, these recreational opportunities would continue to be underutilized by, or unavailable to, the visiting public. Overall, these deficiencies would have long-term, negligible to minor, adverse impacts on the visitor experience.

#### *Visitor Services*

The Lava Beds Natural History Association would continue to supply limited health, safety and educational sales items, as well as concessions items such as pre-packed snacks, souvenirs, and cold drinks at the visitor center. Additional services, such as firewood, prepared food and/or drinks, and wireless internet in the campground would not be available. In the long-term, this could have a negligible to minor impact on the visitor experience.

#### *Visitor Facilities*

Alternative A would not address deficiencies that have been identified with the trail system, campground, and the Petroglyph Point facilities. Such deficiencies hinder some aspects of visitor access to, or enjoyment and understanding of, monument resources.

Many monument trails are former roads that are short and frequently used to access caves or points of historic interest. Longer trails are relatively underused by comparison. Only one longer trail loop exists, and at ten miles in length, excludes many visitors. Some visitors may be dissuaded from using non-looping trails if they are reluctant to take hikes that involve retracing their steps. Other longer trails have no specific destinations mapped or designated, and may have little value to visitors unless monument staff specifically direct them to sites or activities along the trail.

The drive-in campground, originally constructed by the Civilian Conservation Corps in the 1930s, and later modified under the Mission-66 program, no longer meets the needs of some modern visitors. The increasing use of RVs has shown that campground roads and parking places are too small to accommodate them. Furthermore, many visitors have requested shower facilities, and several campsites have lost the aesthetic, privacy, and shade value as trees have been killed by pathogens and root damage.

Major deficiencies in the facilities at Petroglyph Point would have a long-term, moderate, adverse impact on the visitor experience. While a restroom was recently constructed, there are no other facilities at this location. Alternative A would not provide any other visitor opportunities in an area that is a significant natural and cultural resource.

As the demographics of the region and monument visitors change, the outdoor recreational needs of an increasingly diverse local ethnic community have shown a growing desire for areas suitable for large group picnicking. Group day-use facilities are limited and are insufficient to meet these needs.

Without addressing current deficiencies in existing visitor facilities, there would be long-term, minor to moderate, adverse impacts on the visitor experience at the monument.

### *Opportunities for People with Disabilities*

Incorporating ADA-compliant access to campsites, the visitor center, scenic overlooks and associated wayside exhibits, and monument restrooms has already been accomplished in some areas. ADA access into the monument's caves would continue to be unavailable as the required modifications would greatly impact cave resources.

Some mitigation in the form of visitor center displays and computer-based virtual cave tours would continue to be available. Access to major Modoc War sites such as Captain Jacks Stronghold would remain unavailable for persons with disabilities. Access is also unavailable or very difficult to the petroglyphs and is further impeded by the existing cyclone fence.

Alternative A would do little to address the existing facility deficiencies and would have a minor to moderate, long-term, adverse impact on the visitor experience.

### *Cumulative Impacts*

Under alternative A, past, future, and ongoing actions in the monument that would affect visitor experiences include the deficiencies described in the above section, which include a lack of high quality visitor facilities at Petroglyph Point, changing needs at the campground, and limited trail opportunities for visitors. Limited staffing would challenge the monument in its ability to meet the changing visitor demographics.

Regional population growth is not expected to significantly increase and visitation to the monument would likely remain stable with modest increases over time. The establishment of the World War II Valor in the Pacific National Monument, Tule Lake Unit, would provide a new visitor opportunity in the region, but is not expected to have a major effect on regional or monument visitation.

Plans and projects on the adjacent Modoc National Forest are not expected to have an effect on visitor experiences in the monument. Several U.S. Fish and Wildlife Service projects on the northern boundary such as increasing the size of the wetlands, and working to increase duck and geese populations could bring additional opportunities for watching wildlife along the northern boundary, providing some benefit to the visitor experience.

The above actions, in combination with the adverse impacts of alternative A as described in the analysis section, would result in minor to moderate adverse cumulative impacts. Alternative A's contribution to these cumulative impacts would be relatively small.

### *Conclusion*

Alternative A would perpetuate some positive aspects of the visitor experience at the monument, but would fail to address deficiencies in current visitor facilities such as the trail system, campground, and Petroglyph Point. Nor would it address changing visitor demographics as needs continue to evolve and change. Increases in visitation at certain locations, or by certain types of visitors such as large groups, RV users, or the disabled, would result in a decrease in the quality of the visitor experience. Overall, alternative A would have a long-term, negligible to minor, adverse impact on the visitor experience. Continued deficiencies in visitor facilities at Petroglyph Point would result in long-term, moderate, adverse impacts. There would be minor to moderate adverse cumulative impacts, primarily from deficiencies in visitor facilities, changing visitor needs, and limited staffing. Alternative A's contribution to these cumulative impacts would be relatively small.

## **VISITOR USE AND EXPERIENCE- IMPACTS FROM ALTERNATIVE B (PREFERRED)**

### *Analysis*

#### *Recreation Opportunities*

Alternative B proposes the addition of new hiking trails and the promotion of underutilized recreation activities such as overnight primitive camping in wilderness areas, and winter activities such as snowshoeing and cross-country skiing. The trail system would be improved where needed to provide better routes (primarily loop opportunities) and connections with adjacent U.S. Forest Service lands to the south. These include areas appropriate for non-motorized winter recreation.

Under alternative B, bicycle and foot travel within the monument would be promoted. Trails would be improved or added to ensure pedestrians easily access visitor center and Cave Loop destinations. Additional minor improvements such as trailhead bike racks would make bike use more pleasant.

Monument staff and volunteers would spend more time patrolling the Cave Loop area and educating visitors

about responsible ways to recreate in caves. These visitor contacts could result in more visitor knowledge about their caving recreation options. Self-guided cave tour brochures would improve the quality of visitor caving experiences.

With the addition of new recreational facilities and the promotion of new activities, alternative B would have a long term, minor to moderate, beneficial effect on recreational opportunities at the monument.

#### *Visitor Services*

If feasible, alternative B would offer expanded concessions at the visitor center, primarily small food items and/or drinks. Expanded concessions at the visitor center would address some current deficiencies in existing visitor needs, having a long-term, negligible to minor, beneficial effect on visitor services.

#### *Visitor Facilities*

Alternative B proposes the construction of comprehensive new visitor facilities at Petroglyph Point including new trails, shade structures, associated group and outdoor educational facilities, and improved vehicle access by relocating the existing access road. Such changes would improve visitor comfort and safety, as well as visitors' ability to view the petroglyphs and wildlife.

The campground would also be redesigned to better accommodate visitors, possibly including new sites for larger RVs. Overall, the campground would be improved to better accommodate the needs of both tent campers (valuing quiet and privacy) and RV users (valuing appropriate ease of access and parking of larger vehicles) while preserving the historic and rustic nature of the facility. The addition of shower facilities would also be considered.

New toilets are proposed in the Cave Loop area under this alternative, correcting a deficiency often noticed too late by many visitors and causing discomfort for all.

The addition of a classroom to the visitor center would expand the visitor experience by providing opportunities for new visitor programs. The classroom would also function as an auditorium.

Removal of the East Wildlife Overlook spur road, which is very lightly used (often zero visitors per day) would have negligible, long-term, adverse impacts

on visitor experiences. Removal of the West Wildlife Overlook spur road and parking would have a similar impact. However, the conversion of a portion of the former roadbed into an educational area for use during special events would have long-term, moderate, beneficial effects on the visitor experience.

Overall, visitor facility improvements proposed in alternative B would have long-term, moderate to major, beneficial effects on the visitor experience at the monument.

#### *Opportunities for People with Disabilities*

Accessible trails would be provided at the Petroglyph Point area, Hospital Rock, Gillems Camp, and to the edge of Captain Jacks Stronghold enabling all visitors to view and enjoy these sites and attractions. These new opportunities would have a long-term, minor to moderate, beneficial effect on the visitor experience.

#### *Cumulative Impacts*

Cumulative impacts are similar to those described in alternative A. Greater cooperation with adjoining public lands is proposed in this alternative, and would improve the visitor's experience and recreational opportunities. These include the integration of roads and trails on adjacent lands into hiking, biking, or winter sports routes, and creating a more seamless visitor experience when travelers transition to or from the monument to adjacent lands. The beneficial effects of alternative B would contribute moderate benefits to cumulative impacts on the visitor experience.

#### *Conclusion*

Overall, changes under alternative B would improve the visitor experience at the monument by providing new facilities, enhancing visitor access, and offering new recreational opportunities, resulting in long-term, moderate to major, beneficial effects on the visitor experience. The beneficial effects of alternative B would contribute moderate benefits to cumulative impacts on the visitor experience.



## VISITOR USE AND EXPERIENCE- IMPACTS FROM ALTERNATIVE C

### *Analysis*

#### *Recreation Opportunities*

Under alternative C, a wider variety of visitors would have the opportunity to learn more about recreational opportunities before and during a visit through expanded outreach efforts to tourism groups and a greater focus on providing recreational information within the monument. New recreational opportunities would provide for a much wider variety of moderately challenging activities.

Like the preferred alternative, alternative C proposes the promotion of winter activities such as snowshoeing and cross-country skiing. In addition, other types of recreational tours (including bicycling, caving seminars, and adventure tours) would be offered by monument staff and/or partners. The addition of designated primitive backcountry campsites could also encourage a larger population of visitors to venture into the monument's backcountry and experience solitude.

The experience of visitors to Cave Loop Road would be diversified with the addition of a formal trail system. Like in alternative B, monument staff and volunteers would spend more time patrolling the Cave Loop Road area educating visitors about responsible ways to recreate in caves. These visitor contacts might result in more visitor knowledge about their caving recreation options. The addition of vault toilets along Cave Loop Road would also meet critical visitor needs.

The trail system would be improved, where needed, to provide better routes and connections with adjacent Forest Service lands to the south. New mid-length loop trails (between one and three miles in length) would also extend hiking as a viable recreational activity to a wider variety of visitors that might not utilize the longer, one-way trails that currently exist. Additional pullouts along the main road would also increase recreational opportunities by allowing for more informal, dispersed recreation and wildlife viewing.

The new recreational opportunities and outreach efforts proposed in alternative C would result in long-term, moderate, beneficial effects on recreational opportunities at the monument.

### *Visitor Services*

Concessions provided by the Lava Beds Natural History Association would be focused on recreational activities and could include limited food service. The monument would encourage more private tour companies to provide additional tour and recreational opportunities. Increasing the amount of tours available would have a long-term, moderate, beneficial effect on visitor services.

### *Visitor Facilities*

Alternative C would improve the visitor experience through the addition of mid-length loop trails and through the development of new facilities at Petroglyph Point, including a picnic area, trails, shade structures, and a group day-use area. These would have a long-term, major, beneficial effect on the visitor experience.

Additional day-use areas large enough to accommodate bigger groups of visitors would begin to address the current deficiency in the monument's ability to meet the needs of increasingly diverse groups seeking those facilities.

Similar to alternative B, the campground would be improved to better accommodate large recreational vehicles, potentially greatly enhancing the visitor experience for this population of visitors. Under this alternative, an additional loop would be added to the campground specifically designed for RVs. The existing campground areas would have larger tent camping sites increasing the quality of the quality of the experience for tent campers. The addition of shower facilities would also be considered.

Overall, visitor facility improvements proposed in alternative C would have long-term, moderate to major, beneficial effects on the visitor experience at the monument. Noise and use conflicts (large day use v. visitors seeking solitude) may occur during peak seasons having a short-term, minor, adverse impact on the visitor experience.

### *Opportunities for people with disabilities.*

The opportunities offered people with disabilities in this alternative are similar to those of alternative B.

### *Cumulative Impacts*

Cumulative impacts are similar to those described in alternative A. When combined with the wider range of

recreational opportunities and the increased coordination with schools, and community organizations in alternative C, there would be cumulative negligible to moderate, beneficial effects on the visitor experience.

### *Conclusion*

The range of new facilities and recreational opportunities offered under alternative C would have long-term, moderate to major, beneficial effects on the visitor experience. In the short term, this alternative may result in minor, adverse impacts such as noise and increased conflict between visitors. There would be cumulative negligible to moderate, beneficial effects on the visitor experience.

## Interpretation and Education

This section analyzes two aspects of the visitor experience: interpretation (which includes the elements of visitor information and orientation) and education. These two visitor experience components evaluate opportunities for and the quality of visitor information and orientation, as well as interpretive and educational experiences. Impact analysis was based on whether there would be a change in the access to high quality, diverse media and programs throughout the monument in order to achieve the desired conditions called for by the alternatives.

This assessment focused on the intensity and duration of impacts that would result from the proposed actions in the plan relative to the aspects of the visitor experience related to interpretation and education, and whether those impacts were considered beneficial or adverse. The assessment specifically evaluated whether there were changes in the characteristics or quality of the experience.

The following areas have been analyzed in this section:

- Opportunities for Monument Visitors
- Opportunities for Educational Groups and Members of the Education Community
- Opportunities for Local Communities, Park Partners, and Neighboring Agencies

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

*Negligible:* Impacts would be barely detectable to the visitor and expected to have no discernable effect related to interpretation and education opportunities.

*Minor:* Impacts would be slightly detectable to the visitor, though not expected to have an overall effect on the visitor experience related to interpretation and education opportunities.

*Moderate:* Impacts would be clearly detectable to the visitor and could have an appreciable effect on the visitor experience related to interpretation and education opportunities.

*Major:* Impacts would be have substantial, highly noticeable influence on the visitor experience and could permanently alter access to and availability of various aspects of the visitor experience related to interpretation and education opportunities.

### **INTERPRETATION AND EDUCATION - IMPACTS FROM ALTERNATIVE A (NO-ACTION)**

#### *Analysis*

##### *Opportunities for Monument Visitors.*

High-quality interpretive programs would continue to be offered, and all interpretive opportunities for visitors would be comprehensively planned in the long-term. Interpretive topics would expand slightly to include more material about traditional culture and 20th century history of the area. However, since no new employees would be added, monument interpretive staff would not be able to meet visitor demand during the spring and fall seasons and during summer holidays, or on a wider variety of topics. Occasional ranger led programs at Captain Jacks Stronghold and Petroglyph Point would likely continue to be the only personal interpretation available in the northern portion of the monument. The number of guided cave tours offered would likely remain the same (once or twice daily in the summer season), as would evening campfire programs in the campground (four to five nights per week in summer only). Limited Junior Ranger programming would be offered via activities that children complete on their own. Ranger-guided activities such as plant walks and bird watching would be offered sporadically.

An adequate number of non-personal interpretive services would continue to be available to visitors and potential visitors, such as museum exhibits, an introductory monument film, in-depth brochures on many

subjects, an in-depth monument website, and bulletin board displays throughout the monument. Information delivery formats such as podcasts could be introduced on a limited scale. More information media on caves and geologic resources would be beneficial to minimize visitor impacts on the resources, improve safety, and increase visitor appreciation of the resource. Without additional staffing, the replacement of waysides over time would be intermittent, having a negative effect on the ability of the monument to use this medium for interpretive messages. The monument would continue to offer a number of high quality interpretive programs. However, staffing constraints would continue to limit the amount of interpretive and educational programs provided over time having a long-term, minor to moderate, adverse impact on interpretive and educational opportunities.

#### *Opportunities for Educational Groups and Members of the Education Community.*

Under this alternative, teachers and students would notice more cultural history education options, as well as the incorporation of information collected from oral history interviews in the local area. These topics would be integrated into new and current education materials and programs. Staff would continue to be limited in their availability to present these programs both on-site and in the classroom on a limited variety of topics. Although the monument currently loans “traveling trunks” of educational materials on many topics, few classes would be able to meet the National Park Service standard for a pre-visit, on-site, and post-visit continuum of learning have overall long-term, minor, adverse impact on educational opportunities for school children.

#### *Opportunities for Local Communities, Park Partners, and Neighboring Agencies.*

Community outreach efforts would continue under alternative A. Lava Beds staff would continue to engage in a limited number of community outreach activities including attending local meetings and special events such as the Tulelake-Butte Valley Fair. More cultural history topics could be incorporated into community programs, and the collection of oral histories from the community would enhance community ties to the monument. The popular Timeline living history/cultural demonstration program would continue to be presented once annually.

Interpretive staff coordination between the National Park Service, U.S. Fish and Wildlife Service, and the U.S. Forest Service would continue to be limited by the staffing levels, time constraints, and funding potentials within all three agencies. Some interpretive programming may be provided at and/or about Modoc War sites outside the monument. Limited coordination with the Klamath Tribes for staff training and special events would continue. Current community outreach efforts would have a long-term, negligible to minor, beneficial effect on regional interpretive and educational opportunities.

#### *Cumulative Impacts*

Under alternative A, regional population growth is not expected to significantly increase. However, demand for interpretive and educational services, such as in-classroom programs and participation in the Timeline living history event, would exceed the monument’s capacity. Interpretive programming available to off-season visitors would continue to be limited and the monument would have difficulty keeping pace with changing technologies that would allow visitors to receive information and interpretation in new ways.

Outside of the monument there are limited opportunities to obtain interpretive materials through a variety of local, state, federal, and tribal information resources in the region. Visitor surveys indicate that the public desires more information about the monument in the greater region.

Monument staff would continue to work with regional partners to implement projects like the National Scenic Byways program, and to coordinate, assist with, or participate in local events such as the Tulelake-Butte Valley Fair or the Winter Wings Festival. These events provide a regional context to the recreational or educational experience enjoyed by monument visitors. However, there is currently no major coordination of educational or recreational planning with the adjoining Wildlife Refuge or National Forest.

Future plans and projects on the adjacent Modoc National Forest are not expected to have an effect on interpretation and education in the monument. Several Fish and Wildlife Service projects on the northern boundary such as increasing the size of the wetlands and working to increase duck and geese populations could bring additional opportunities for interpretation and education. However, these opportunities would be limited by current staffing constraints.

The above actions, in combination with the adverse and beneficial impacts of alternative A as described in the analysis section, would result in minor to moderate, adverse cumulative impacts on educational and interpretive opportunities. Alternative A's contribution to these cumulative impacts would be relatively small.

### **Conclusion**

Education and interpretive programs under alternative A would provide negligible to minor beneficial effects on the monument visitors, school groups and teachers, local communities, and organizations. However, in the long-term, staffing and programmatic constraints would result in fewer interpretive and educational opportunities resulting in minor to moderate, adverse cumulative impacts on education and interpretation.

## **INTERPRETATION AND EDUCATION - IMPACTS FROM ALTERNATIVE B (PREFERRED)**

### **Analysis**

#### ***Opportunities for Monument Visitors.***

The monument's interpretive services would expand significantly under this alternative. One full-time and four seasonal interpretive employee positions would be added, allowing additional high-quality interpretive programming and services to be offered at more locations throughout the monument.

A greater number of guided cave tours would also be offered in the spring and summer shoulder seasons, and more than once daily in summer. New media and written materials would be produced for self-guided caving, and a greater ranger and docent presence in the Cave Loop Road area would exist, especially during the summer season. Additional campfire programs and other ranger-guided activities, such as plant walks and bird watching, would be offered.

A new day use area at Petroglyph Point would be staffed seasonally, achieving two goals: visitors entering from the north could pick up brochures, information, and orientation from a staff member; and more interpretive programming would be offered about rock art, traditional culture, birds, and other wildlife, geology, homesteading, and other topics.

Under this alternative, there would be more collaboration between interpreters and monument scientists to accomplish two goals: expanding visitor understanding

about scientific research at Lava Beds, and involving the public directly in research and restoration efforts. The expanded visitor center would be utilized as a site for in-depth interpretive programs and workshops. Cultural history topics could include the monument's archeological history and human issues in the area such as the Modoc War, and water resource development.

A more comprehensive replacement of wayside exhibits throughout the monument would occur, as well as an expansion of the Junior Ranger and other children's programs for visiting families. Additional surface trails would facilitate interpretive services such as guided walks, trail guides, and/or wayside exhibits. Replicas of historical artifacts would be made available for interpretive programming, and increased interpretive efforts would enhance visitor understanding of the area's cultural landscape. The visitor center museum would incorporate new exhibits, new classrooms/auditorium space, and a virtual tour of monument caves. New media would also be used to interpret monument resources to visitors without the presence of a ranger, such as podcasts, audio driving tours, or interactive media in the visitor center. These services would be added to the wide variety of non-personal interpretive services currently available, such as museum exhibits, an introductory monument film, in-depth brochures on many subjects, an in-depth monument website, and bulletin board displays throughout the monument.

Expanded interpreted topics and visitor facilities that better accommodate educational programming would have long-term, moderate to major, beneficial effects on the ability of visitors to learn about and understand monument resources.

#### ***Opportunities for Educational Groups and Members of the Education Community.***

Alternative B proposes a dedicated full-time Education Specialist, expansion of the visitor center to provide classrooms, and possible cooperation with Crater Lake National Park. Teacher workshops would formalize and build upon the monument's relationships with local teachers and schools. Programs and materials would be expanded to serve a wider range of grade levels and subjects. As changes were implemented from comprehensive education planning, teachers and students would have new learning opportunities through an increase in the number of high-quality, curriculum-based programs offered both in the monument and in classrooms, and well as through loan materials such as traveling trunks.



Many more classes would be able to meet National Park Service standard for a continuum of learning. Teachers and students would notice more cultural history education options and the incorporation of information collected from oral history interviews in the local area. High school and college-level students would participate directly in scientific research at the Lava Beds Research Center, and younger students would also study or participate in research. These actions would have long-term, major, beneficial effects on educational opportunities for school groups and researchers.

#### *Opportunities for Local Communities, Park Partners, and Neighboring Agencies.*

An expansion of partnerships with regional parks, community groups, neighboring agencies, and tribes would occur under this alternative resulting in long-term, moderate, beneficial effects on communities and partners ability to engage in monument research and education. Monument staff would actively engage in a higher number of community outreach activities, including attending local meetings and a greater number of special events. Community education efforts would take place regarding dark night skies.

A greater number of oral histories would be collected from community members, enhancing personal ties to the monument and establishing a significant repository of knowledge about local history. More cultural history would be incorporated into community programs. The popular Timeline living history/cultural demonstration program would continue to be presented at least once annually, expanding to include a new special event area at the current West Wildlife Overlook location. This area would also be available for other special events, demonstrations, or large group use. Access for persons with disabilities would be improved to sites related to the purposes for which the monument was created (preservation of geologic & Modoc War sites).

Interpretive programming would be provided at and/or about Modoc War and Civilian Conservation Corps sites outside the monument, and collaboration with the Klamath Tribes would increase to better interpret tribal history and pre-history. Increased coordinated interpretive efforts would take place with the Klamath Basin Wildlife Refuges to provide services such as guided birding tours, and the monument would collaborate with the Modoc National Forest to interpret the geology of the larger Medicine Lake volcano. Overall, the expansion of local and regional programs and interpretation of sites outside of the monument related

to park purpose, would have a long-term, moderate, beneficial effect on understand and learning about the monument's significance.

#### *Cumulative Impacts*

Cumulative impacts are similar to those described in alternative A. The increased coordination of educational programming and interpretive planning with the adjoining land management agencies, schools, and community organizations proposed in alternative B would contribute moderate to major, beneficial cumulative effects on educational and interpretive opportunities.

#### *Conclusion*

Alternative B would permanently expand available interpretive opportunities, education opportunities for students at all grade levels, and the scope of relationships with local entities resulting in long-term, moderate to major, beneficial effects on the interpretive and educational opportunities of the monument's visitors, teachers and students, and on local communities and organizations. Alternative B would contribute moderate to major beneficial cumulative effects on educational and interpretive opportunities.

### **INTERPRETATION AND EDUCATION - IMPACTS FROM ALTERNATIVE C**

#### *Analysis*

##### *Opportunities for Monument Visitors.*

Four seasonal interpretive employee positions would be added, allowing the monument to increase its services to visitors with a focus on expanded recreation opportunities. The current level of high-quality interpretive programming would continue (daily guided cave tours and evening campfire programs in summer). Topics would expand slightly to include more material about traditional culture and 20th century history of the area (including monument infrastructure constructed by the Civilian Conservation Corps). The monument would also investigate providing interpretive experiences to give visitors a broader understanding of the Modoc War (e.g. specialized tours of fortifications, or tours that include sites outside the monument).

Under alternative C, a cave docent program would be expanded to establish a greater staff presence in the Cave Loop area during the summer season. These volunteers would provide wayfinding information and

limited informal interpretation. More guided hikes on the surface would be offered, and winter use and adventure tours would be encouraged. The Lava Beds Research Center would be expanded to accommodate recreational activity seminars (such as caving and winter sports), an Artist-in-Park program, and public archeology programs and workshops. The number of guided cave tours offered could increase, and limited Junior Ranger programming would continue to be offered.

New interpretive products would be created to serve visiting groups and commercial tours. New media would also be used to interpret monument resources to visitors without the presence of a ranger, such as podcasts, audio driving tours, or interactive media in the visitor center. These products would focus on self-guided recreational pursuits. New wayside exhibits could be designed to provide interpretation at new pullouts along monument roads, and new trail guides or waysides could be established on up to 15 miles of new trails. A sufficient number of other non-personal interpretive services would continue to be offered, such as museum exhibits, an introductory monument film, in-depth brochures on many subjects, a detailed monument website, and bulletin board displays throughout the monument.

Overall, alternative C would provide a wider range of interpretive opportunities primarily focused on recreational pursuits, having a long-term, minor to moderate, beneficial impact on visitor interpretive and educational opportunities.

#### *Opportunities for Educational Groups and Members of the Education Community.*

As changes are implemented from comprehensive education planning, teachers and students would notice slightly more cultural history education options, as well as the incorporation of information collected from oral history interviews in the local area. These topics would be gradually integrated into new and current education kits and programs. If a new community outreach staff member were located in Tulelake, they might have more direct contact with local teachers. School groups may also have opportunities to attend new archeology programs and workshops, and to participate in new guided bird watching tours along Tule Lake. Additional space available for groups, as well as showers, in the Indian Well Campground may encourage school groups to stay in the monument for multi-day visits.

Staff will continue to provide high quality curriculum-based programs and services, but would be limited in the range of grades and subjects covered by staffing levels. A few additional classes could be expected to meet the NPS standard for a pre-visit, on-site, and post-visit continuum of learning having a long-term, negligible to minor, beneficial effect on educational opportunities for schools.

#### *Opportunities for Local Communities, Park Partners, and Neighboring Agencies.*

Participation in community events could increase under alternative C, especially those focused on recreational activities. The popular Timeline living history/cultural demonstration program would continue to be presented once annually. More cultural history would be incorporated into community programs, and the collection of oral histories from the community would enhance ties to the monument.

A moderate level of collaboration with local agencies and community groups could be expected, especially if a new outreach staff member were located in Tulelake. Interpretive programming would be provided at and/or about Modoc War sites outside the monument. The monument would collaborate with the Modoc National Forest to interpret significant geological features in and on the forest. Interpretive assistance with the Fish & Wildlife Service would include collaborative bird watching tours along Tule Lake. Coordination with the Klamath Tribes would continue. Collaboration with local agencies and community groups would result in long-term, negligible to minor, beneficial effects on interpretation and education at the monument.

#### *Cumulative Impacts*

Cumulative impacts are similar to those described in alternative A. Alternative C would greatly enhance relationships with local communities, recreational groups, and neighboring agencies with a focus on recreational tourism. When the beneficial and adverse impacts of alternative C are added to the impacts of exceeding demand for educational and interpretive programs over time, the increased coordination with schools, and community organizations would contribute negligible to moderate, beneficial effects to cumulative impacts on educational and interpretive opportunities.

### *Conclusion*

Alternative C would have long-term, minor to moderate, beneficial effects on visitor education and interpretation opportunities for visitors, local communities, and organizations. The beneficial effects of alternative C on school groups and teachers would be negligible to minor, and long-term. The monument's increased coordination with schools, and community organizations would contribute negligible to moderate, beneficial effects to cumulative impacts on educational and interpretive opportunities.

## **Access and Transportation**

This impact analysis evaluates how each alternative would change access and visitation and the capacity of roads and facilities in the monument to accommodate that change. Access addresses the distribution of visitors in the monument as well as access points and access options (motorized and non-motorized) to areas in the monument. Beneficial impacts would be associated with an increase in the level of visitor congestion. Adverse impacts would be associated with the actions that reduce access to an area or increase the level of congestion.

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

*Negligible:* The effects would not be detectable and would have no discernable effect on the condition of roads and trails and/or traffic flow.

*Minor:* The effect would be slightly detectable, but there would not be an overall effect on the condition of roads and trails and/or traffic flow.

*Moderate:* Impacts would be clearly detectable, and the action could have an appreciable effect on the condition of roads and trails and/or traffic flow.

*Major:* Impacts would be substantial, with a highly noticeable influence, and the condition of roads and trails and/or traffic flow could be permanently altered.

## **ACCESS AND TRANSPORTATION - IMPACTS FROM ALTERNATIVE A (NO-ACTION)**

### *Analysis*

In alternative A, no new developments are proposed that would impact roads and trail access within the monument. Most visitors (75%) would continue to access the monument from the northern access roads, with well-maintained pavement, while one quarter of visitors would continue to access the monument from the south. Access from the south is via the partially unpaved Forest Service road 49 (Medicine Lake Road) and Forest Service Route 10, a paved road in poor condition.

The monument would maintain paved monument roads and improve adjacent sidewalks and parking areas to fully meet federal and state accessibility standards. Maintenance and improvement of monument roads, sidewalks, and parking areas would have a long-term, minor, beneficial effect on monument roads and parking areas.

### *Cumulative Impacts*

Over time, lack of funding for U.S. Forest Service maintenance of Forest Service Route 10 and Medicine Lake Roads would result in the deterioration of southern access routes. The lack of long-term funding to improve road maintenance and access outside the monument would result in cumulative, moderate, adverse impacts on monument access from the south.

### *Conclusion*

The effects of proposed actions under alternative A would have minor long-term benefits on access and circulation within the monument. Visitor access from the south may decline over time due to deteriorating road conditions. The beneficial effects from the actions of alternative A, the cumulative adverse impacts from inadequate maintenance on Route 10 would result in long-term, minor to moderate, adverse impacts on access to the monument from the south.

## **ACCESS AND TRANSPORTATION- IMPACTS FROM ALTERNATIVE B (PREFERRED)**

### *Analysis*

In alternative B, the monument would undertake new actions to directly expand trail systems and address access routes to the monument. Access and circulation to Petroglyph Point would also be improved.

The monument would provide more loop trail opportunities with an emphasis on traditional interpretive methods or new technologies as appropriate. Additional trail opportunities would also be provided in wilderness areas. Connections to national forest lands and to the wildlife refuges would also be explored under alternative B. Accessible trails would be provided to the summit of Hospital Rock, portions of Captain Jacks Stronghold, Gillems Camp, and at Petroglyph Point. Expansion of the trail system within the monument to include new interpretive trails and more accessible trails to existing monument sites would result in long-term, moderate, beneficial impacts on trail access within the monument.

Within the main monument unit, the NPS would maintain paved monument roads and improve adjacent sidewalks and parking areas to fully meet federal and state accessibility standards. Visitors would be encouraged to access the monument from the better-maintained and paved roads on the north if Route 10 remains in poor condition. Although this would have a short-term, minor to moderate, impact on some visitors that would arrive from the southeast, in the long-term, visitor access from the north would be greatly improved by the new seasonal contact station at Petroglyph Point. Visitors would have better orientation as they would enter the monument from the north. The segment of the Medicine Lake Road within the monument, would receive improved maintenance and reduced wash boarding improving access from the Modoc National Forest.

Petroglyph Point would have a newly routed access road and new parking areas. The new road would improve the visitor experience by shifting through traffic farther from the visitor use and sensitive resource areas. With a new ADA accessible trail from the parking area to the Petroglyphs, pedestrian access at this site would be considerably improved.

Overall, road and parking improvements recommended under alternative B have a long-term, moderate, beneficial effect on monument access, circulation, and road capacity.

### ***Cumulative Impacts***

Cumulative impacts would be the same as in alternative A. However, the beneficial effects of improvements to Medicine Lake Road and the location of a new contact station at Petroglyph Point would improve overall visitor access.

The beneficial effects from the actions of alternative B, plus the impacts from regional roads to the south, would result in, minor, cumulative beneficial effects on overall access to the monument.

### ***Conclusion***

The effects of proposed actions under alternative B would have long-term, moderate benefits on access and circulation at the monument. The monument would take direct actions to improve trail systems, accessibility, and road access. New facilities at Petroglyph Point would improve access, parking, and trail accessibility to this site and to the main monument by providing better orientation for visitors arriving from the northeast. The beneficial effects from the actions of alternative B would result in minor cumulative beneficial effects on overall access to the monument.

## **ACCESS AND TRANSPORTATION- IMPACTS FROM ALTERNATIVE C**

### ***Analysis***

In alternative C, the monument would undertake new actions to directly expand trail systems and improve road access to the monument. Access and circulation to Petroglyph Point would also be improved.

Alternative C provides the greatest amount of new trail opportunities and experiences at the monument. The monument would provide more loop trail opportunities with an emphasis on traditional interpretive methods or new technologies as appropriate. Diversified recreation trails would also be provided (e.g. bike, horse, and cross-country skiing). Connections to Forest Service trails would be explored for the diversified recreation trails. Accessible trails would be provided for access to the summit of Hospital Rock, portions of Captain Jacks Stronghold, Gillems Camp, and at Petroglyph Point. Expansion of the trail system within the monument to include new interpretive trails and more accessible trails to existing monument sites would result in long-term, moderate, beneficial effects on trail access and circulation.

Within the monument, the NPS would maintain paved monument roads and improve adjacent sidewalks and parking areas to fully meet federal and state accessibility



standards. Additionally, the monument would provide more pullouts to provide visitors with more opportunities to experience resources from the main road. As in alternative B, the monument would encourage visitors to enter from the better-maintained, paved northern routes in Route 10 remains in poor condition. This would have an impact on visitors arriving from the southeast by increasing the time it takes to access the monument. Medicine Lake Road would be realigned and paved within the monument, improving visitor access from the southwest.

Alternative C proposes changes to the campground to improve access and circulation. The addition of a new loop to accommodate RVs would improve access for visitors using these vehicles. Petroglyph Point would have a relocated access road and new parking area. The new road would improve the visitor experience by relocating through traffic from visitor use and sensitive resource areas. With a new accessible trail from the parking area to the Petroglyphs, access at this site would be considerably improved.

Road and parking improvements recommended under alternative C would have long-term, moderate, beneficial effects on monument access, circulation, and road conditions.

### *Cumulative Impacts*

Cumulative impacts would be the same as alternative A. Overall, the beneficial effects from the actions of alternative C, plus the impacts from regional access roads, would result in cumulative, minor to moderate, beneficial impacts on access to the monument.

### *Conclusion*

The effects of proposed actions under alternative C would have moderate long-term benefits on access and transportation at the monument. The monument would take direct actions to improve trail systems, accessibility, and road access to the monument. New facilities at Petroglyph Point would improve access, parking, and trail accessibility at this site. Medicine Lake Road realignment and paving would improve access from the south. The beneficial effects from the actions of alternative C, plus the impacts from regional or neighboring sources, would result in cumulative, minor to moderate, beneficial effects on access to the monument.

## Monument Management

### Monument Operations

Monument operations refers to the current management structure of the park to provide policy direction for the protection, public use, and appreciation of the monument, and the ability of the current staff to adequately protect and preserve vital resources and provide for an effective visitor experience. The discussion of impacts on management, operations, and staffing focuses on the type of management structure, the amount of staff available to ensure public safety, and the ability of the staff to protect and preserve resources given current funding and staffing levels.

Staff knowledgeable about the management of the monument were consulted to evaluate the impacts of implementing each alternative.

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

*Negligible:* The effect would be at or below the lower levels of detection, and would not have an appreciable effect on park management and operations.

*Minor:* The effects would be detectable, but would be of a magnitude that would not have an appreciable adverse or beneficial effect on park management and operations.

*Moderate:* The effects would be readily apparent and would result in substantial adverse or beneficial change in park management and operations in a manner noticeable to staff and the public.

*Major:* The effects would be readily apparent and would result in substantial adverse or beneficial change in park management and operations in a manner noticeable to staff and the public, and would be markedly different from existing operation.

## **MONUMENT OPERATIONS - IMPACTS FROM ALTERNATIVE A (NO-ACTION)**

### *Analysis*

In alternative A, the majority of administrative offices would remain in the monument. Some positions would be located outside of the monument. Cooperative efforts with partners and universities would continue on an as-needed basis as staffing and funding allows. The current organizational structure, with limited staffing and operations generally centralized, would continue to function with some deficiencies. Funding for staffing levels would continue to be inadequate to meet public demands for increased interpretation and education as well as meeting the resource management needs of the monument.

The physical separation of the monument's two units poses operational challenges. Monument operations would continue to be based out of Indian Well. The monument headquarters at Indian Well and the Petroglyph Point unit are approximately 15 miles apart. This physical separation of the units results in inefficiencies for management, including staff and equipment mobilization and travel. Lack of apparent NPS presence at Petroglyph Point makes this area vulnerable to vandalism. In addition, without staff presence on site, the monument misses an important opportunity to provide orientation for monument visitors that begin their visit at Petroglyph Point. Approximately twenty-five percent of visitors enter the monument from the Petroglyph Point area.

Overall, the actions proposed in alternative A would have long term, moderate, adverse impacts on monument operations.

### *Cumulative Impacts*

Past and ongoing projects, including road and facility maintenance and repairs, have had long-term, moderate, beneficial effects on monument operations by maintaining the inventory of monument structures. Aging facilities and utilities would continue to be replaced or modified as needed when funds are available.

Eventually, more sustainable and efficient facilities and utility systems would replace existing, less sustainable systems, resulting in minor, cumulative beneficial effects over the long-term.

### *Conclusion*

Alternative A would result in no immediate change to monument infrastructure or operations and would continue a level of inadequate funding and staffing, resulting in long-term, moderate adverse impacts on monument operations. Ongoing maintenance and replacement of existing facilities would result in cumulative minor beneficial impacts over time.

## **MONUMENT OPERATIONS - IMPACTS FROM ALTERNATIVE B (PREFERRED)**

### *Analysis*

Alternative B includes proposals for a number of infrastructure improvements that would add to operational costs, including expansion of the visitor center and research center and redevelopment of the Petroglyph Point unit. Additional space at visitor center and research center would both add maintenance costs and benefit operations by providing facilities that can more appropriately accommodate groups and educational programming. The visitor center expansion would also include space for approximately three-to-five new offices that would accommodate a management education liaison, education specialist, interpreter, and a cultural resource specialist. Co-locating these positions creates an atmosphere that emphasizes incorporating science/research in learning and interpretation.

New office space located off-site, perhaps with partner agencies, would increase interagency cooperation and collaboration. However, the distance from the monument headquarters may cause some inefficiency in coordination with staff working out of Indian Well.

Staffing a seasonal contact station at the Petroglyph Point unit would create an NPS presence on this currently neglected site. Monument staff would be able to provide visitor orientation, educational programming and better security for the fragile petroglyphs.

The monument would actively strive to offset the monument's total electrical energy use. This would be accomplished through changes in monument operations, by use of new technologies, and onsite generation of renewable electricity, resulting in a long-term, major beneficial effect on monument operations.

Removal of the 0.7 miles of East and West Wildlife Overlook spur roads would slightly reduce the amount of road infrastructure to be maintained and eventually

reconstructed. Due to these roads being infrequently used by visitors they also tend to attract undesirable activities thus their removal may slightly reduce law enforcement contacts and issues.

Overall, the actions proposed under alternative B would have a long-term, moderate, beneficial impact on monument operations.

### *Cumulative Impacts*

Cumulative impacts would be the same as alternative A. When the beneficial effects of monument operations in alternative B are combined with the existing beneficial effects of maintenance activities in the monument, there would be a moderate, cumulative beneficial effect over time.

### *Conclusion*

The effects of proposed actions under alternative B would have moderate, long-term beneficial effects on monument operations. The monument would take direct actions to expand staff, provide new offices that encourage interagency cooperation, improve operations and security at Petroglyph Point, and offset electrical energy use through the use of new technologies. The beneficial effects from the actions of alternative B, plus the effects of other past, present, and reasonably foreseeable future actions would result in cumulative, moderate to major, beneficial effects on monument operations.

## **MONUMENT OPERATIONS - IMPACTS FROM ALTERNATIVE C**

### *Analysis*

In alternative C, the monument would use new office space located off-site with partner agencies thereby increasing interagency cooperation and collaboration. However, the distance from the monument headquarters may cause some inefficiency in coordination with staff located at monument headquarters.

More services provided with the new day use area at the Petroglyph Point unit would create an NPS presence on this site. Monument staff would be able to provide visitor orientation and educational programming at this site.

The monument would actively strive to offset the monument's total electrical energy use. This would be accomplished through changes in monument opera-

tions, by use of new technologies, and onsite generation of renewable electricity, resulting in a long-term, minor, beneficial effect on monument operations.

Alternative B proposes restoration of the Powerline administrative road and portions of the Lyons Trail which is also used for administrative access. There are few if any visitor activities on either road (Fern Cave is the exception and access to this site is maintained) thus, removal of these roads should not affect visitor protection.

Overall, the actions proposed under alternative C would have a long-term, minor to moderate, beneficial impacts on monument operations.

### *Cumulative Impacts*

Cumulative impacts would be same as alternative A. When the beneficial effects of monument operations in alternative C are combined with the existing beneficial effects of maintenance activities in the monument, there would be a minor to moderate, cumulative beneficial effect over time.

### *Conclusion*

The effects of proposed actions under alternative C would have minor to moderate, long-term beneficial effects on monument operations. The monument would take direct actions to expand staff, provide new offices that encourage interagency cooperation, improve operations at Petroglyph Point, and offset electrical energy use through the use of new technologies. The beneficial effects from the actions of alternative C, plus the effects of other past, present, and reasonably foreseeable future actions, would result in cumulative, minor to moderate, beneficial effects on monument operations.

## **Carbon Footprint**

The area for consideration for this impact topic is the monument. Although the monument's share of carbon emissions may be negligible when compared to state and regional emissions, the cumulative nature of countless small carbon sources and the expectation of National Park Service leadership on environmental issues justify significant actions to mitigate emissions from monument activities. While most topics in this chapter address resources directly or indirectly impacted by the actions within the alternatives, the

unique global nature of this impact requires an examination of the effect of actions on a value. Reducing the park's carbon footprint has been expressed as a value by the public, the monument staff, and the NPS. Accordingly, the threshold criteria are based on potential deviation from the monument's current carbon footprint, as well as the monument's ability to achieve operational carbon neutrality by 2016 – a goal for all parks in the Pacific West Region. Cumulative impacts are analyzed against the public value of global carbon emissions reduction.

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

*Negligible:* The effects on the monument's carbon footprint would be at or below the level of detection.

*Minor:* The effects on the monument's carbon footprint could result in up to a 10% change from the current carbon footprint.

*Moderate:* The effects on the monument's carbon footprint would result in between a 10% and 20% change from the current carbon footprint or increase the difficulty of achieving carbon neutrality by 2016.

*Major:* The effects on the monument's carbon footprint would result in over a 20% change from the current carbon footprint or make carbon neutrality by 2016 unattainable.

## **CARBON FOOTPRINT – IMPACTS FROM ALTERNATIVE A (NO ACTION)**

### *Analysis*

Under alternative A, no significant changes to the monument's carbon footprint would be made. Incremental improvements in energy conservation and sustainability would be accomplished as funding became available.

Changes in the carbon footprint resulting from natural resource management activities under alternative A would be negligible to minor, as the management of ecological communities, fire, and air quality would not change significantly.

Existing facilities and roads would be maintained, resulting in negligible to minor impacts. Some impacts could be beneficial, as conservation and alternative energy projects are implemented over time.

Visitor experiences would not change significantly under this alternative, resulting in negligible to minor impacts due to recreation, transportation, and energy use by visitors.

### *Cumulative Impacts*

Past reliance and current dependence on traditional non-renewable sources of energy and the region's minimal renewable energy infrastructure and services make the reduction of carbon emissions difficult, but not unattainable. These cumulative actions, along with the incremental beneficial actions under this alternative, result in a moderate adverse impact.

### *Conclusion*

Under alternative A, the monument would continue to make incremental improvements in energy conservation and sustainability by implementing energy conservation and alternative energy generation projects and programs as funding becomes available. The beneficial effects on the monument's current carbon footprint would likely be minor, as reduction of the carbon footprint would continue to compete with other management priorities. Because the region's goal of operational neutrality requires early and significant action, the incremental and ad hoc action proposed under alternative A would result in an adverse moderate impact by delaying actions adequate to achieve the region's goal.

## **CARBON FOOTPRINT – IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)**

### *Analysis*

Under alternative B, the monument would strive to offset its operational carbon emissions due to energy use through changes in park operations and the use of alternative energy generation and fuels. When fully implemented, the monument's operational carbon output would be significantly reduced, resulting in a major beneficial effect on its overall carbon footprint.

Both the visitor center and research center would be expanded in alternative B, and new facilities would be built at Petroglyph Point, but any resulting increased energy use related to expansion of the facilities would be offset by conservation measures in existing facilities and operations, as previously mentioned. Short-term, minor adverse impacts to the monument's current carbon footprint would occur due to construction activities.



A possible increase in visitation due to expanded visitor programs and opportunities could result in negligible to minor, adverse impacts on the monument's overall carbon footprint through increased visitor vehicle use. A small amount of visitor travel would be reduced through additional opportunities for foot and bicycle travel between Cave Loop, the visitor center, and the campground.

Attaining Climate Friendly Park status would lead the monument through an intensive carbon management planning process which would allow them to identify and analyze methods to accomplish the goal of operational carbon neutrality.

### *Cumulative Impacts*

As with the other alternatives, existing energy availability and infrastructure make reduction of the monument's operational carbon footprint difficult. The actions in alternative B, however, will circumvent these barriers by establishing new renewable energy infrastructure and systems, creating a major beneficial effect on the monument's ability to reduce carbon emissions.

### *Conclusion*

Under alternative B, mitigation, and offsetting of the monument's operational carbon emissions would constitute a major beneficial effect on its operational carbon footprint as well as the region's stated goal of operational carbon neutrality.

## **CARBON FOOTPRINT – IMPACTS FROM ALTERNATIVE C (NO ACTION)**

### *Analysis*

Under alternative C, Lava Beds would strive to offset its carbon emissions due to use of electricity through changes in monument operations, including the use of alternative energy technologies and onsite generation of renewable electricity. When fully implemented, the monument's overall carbon output would be significantly reduced (~22%), resulting in a major beneficial impact on its carbon footprint.

The focus on electrical usage may make it more difficult for the monument to reach the region's goal of operational carbon neutrality, resulting in a moderate adverse impact to that value.

Short-term minor adverse impacts to the monument's current carbon footprint would occur due to construc-

tion activities related to the Petroglyph Point day use facility, improvements at Cave Loop, and possible construction of office space.

As with alternative B, a possible increase in visitation due to expanded visitor programs and opportunities could result in negligible to minor, adverse impacts on the monument's overall carbon footprint through increased vehicle use.

### *Cumulative Impacts*

Same as alternative B.

### *Conclusion*

Under alternative C, the elimination of carbon emissions due to electricity use would constitute a major beneficial impact on the monument's operational carbon output. The region's goal of operational carbon neutrality would incur a moderate, adverse impact, as carbon emissions from monument vehicles would continue unabated.

## **Socioeconomics**

Economic effects are commonly expressed in terms of the number and types of jobs supported, changes in income, the number of visitors to the recreation area, and the resulting changes in local tourism spending. Less well-defined economic effects include the indirect effects from ongoing NPS operations and the effects on local government fiscal conditions. Examples of social impacts include effects on regional population growth and land use.

Socioeconomic impacts were determined based on applied logic, professional expertise, and professional judgment. The approach to these issues was based on the following factors directly related to implementation of the general management plan:

- estimated costs of building new facilities and infrastructure
- changes in the number of NPS staff and federal spending to operate the recreation area
- changes in the number of visitors to the recreation area

Projected visitor use was generally estimated as increasing or decreasing based on proposed visitor opportunities for each alternative.

This analysis relies on qualitative analysis of the impacts of each alternative, as actual visitor numbers are not estimated, spending values are for comparison only, and influence area data was mainly available at the broad county and regional district level.

Beneficial impacts result in generally recognized improvements to established social and economic environment, or can be recognized as improvements to specific sectors and stated as such. Adverse impacts are those effects that are generally recognized to diminish the established social and economic environment, or diminish the environment for particular sectors and stated as such.

Short-term effects are those that occur during and in response to the planning, design, construction, and major maintenance of buildings, trails, parking lots, and other improvements associated with federal spending. These effects diminish or disappear after the project is completed. “Short-term” may also describe the first or early response in social or economic conditions to more fundamental changes in recreation area management and operations and to changes in visitor use, but which give way to broader changes over time. Generally, “short-term” describes those effects that may last up to 5 years.

Long-term effects are those that last longer than 5 years, including some that may not begin until after completion of direct activities associated with the initial federal government spending or changes in management.

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

*Negligible:* No effects occur or the effects on socioeconomic conditions are below or at the level of detection.

*Minor:* The effects on socioeconomic conditions are small but detectable, and only affect a small number of businesses and/or a small portion of the population. The impact is slight and not detectable outside the affected area.

*Moderate:* The effects on socioeconomic conditions are readily apparent. Any effects result in changes to socio-

economic conditions on a local scale (e.g. a gateway community) within the affected area.

*Major:* The effects on socioeconomic conditions are readily apparent. Measurable changes in social or economic conditions at the county or regional level occur. The impact is severely adverse or exceptionally beneficial within the affected area.

## **SOCIOECONOMICS – IMPACTS FROM ALTERNATIVE A (NO ACTION)**

### *Analysis*

The socioeconomic impact of Lava Beds National Monument on local and regional economies is substantial. The National Park Service uses a Money Generation Model (MGM) to estimate the contribution of visitor and park payroll spending to gateway communities within a 50 mile radius of a national park unit. A 2007 analysis shows that national parks and other units within the U.S. National Park System generate an average of four dollars for state and local economies in return for every one tax dollar invested in each of the national park unit’s annual budget. Using this estimate, the monument generates around \$6,200,000 manifest in local and state tax revenue, jobs, and direct purchases by visitors on lodging, food, transportation, souvenirs, etc. in the areas around the monument.

Under alternative A, no new major changes would be made that would affect the current, short-term local or regional economic impacts of the monument. Road access, recreational opportunities, and facilities would remain relatively unchanged, and would therefore provide a continuation of economic opportunities, tax revenues, and jobs. However, current management plans and existing facilities do not sufficiently take into consideration expected long-term changes in the demographics of monument visitors, which may result in a drop in monument visitation. If monument facilities and visitor services are not managed to anticipate these changes, such as older or ethnically more diverse visitor groups, the monument may become a less desirable destination to these groups. The resulting lower visitation would directly impact socioeconomic factors and may lead to a reduction in local and regional (areas beyond 50 miles from the monument) economic opportunities, revenues, and jobs.

### *Effects on local economy*

Continuation of current management of the monument's section of the Medicine Lake Road would maintain it as an unpaved gravel road with reduced speeds and seasonally variable surface condition. This road condition is perceived as an impediment to further development of the Medicine Lake Area by reducing the accessibility of the area due to the longer drive time and greater discomfort of travelling over the unpaved road. Similarly, no changes to Forest Service Route 10 at the southeast entrance to the monument may also deter visitors from using the services and private lodging or other facilities in the small town of Tionesta, 12 miles east of the monument. This could have long-term, moderate adverse impacts on local business in Tionesta.

### *Effects on regional economy*

Alternative A should not affect the monument's regional status as a destination for travelers on both single and multiple day excursions. It often serves as a stopover for travelers intent on visiting both Lassen Volcanic National Park and Crater Lake National Park, both within about a two or three hours drive of the monument. The monument is also a destination for commercial bus tours, often from as far as the San Francisco area. The economic benefits of these activities are felt both regionally and locally. Regionally, tour bus and rental car companies benefit at the points of departure for these visitors, while travel and tourism related revenues benefit locally.

### *Cumulative Impacts*

When considered in concert with the socioeconomic affects of other recreation and tourism sites in the area, the continuation of current management practices would have little to no cumulative effects. Local attractions, including the Tule Lake National Wildlife Refuge and the Medicine Lake Campground and associated recreation in the Modoc National Forest, are expected to continue attracting tourists and providing activities such as hunting, firewood gathering, timber harvest, and mushroom collection.

### *Conclusion*

The continuation of current management through alternative A would have long-term, negligible to minor adverse impacts on the local and regional socioeconomic impact of the monument. Adverse effects would be generally local in extent, and stem from the possible reduction in monument visitation associated with a

lack of appropriate facilities or activities available to older or ethnically more diverse potential visitors. If the monument does not implement changes in facilities and services in anticipation of these expected demographic shifts, it will become a less desirable destination for a greater proportion of possible visitors.

## **SOCIOECONOMICS – IMPACTS FROM ALTERNATIVE B (PREFERRED ALTERNATIVE)**

### *Analysis*

Alternative B stresses resource protection and preservation, research and education and as such would modify the monument's current management of visitor services, the natural environment, interpretive, and recreational activities accordingly. Relevant changes include new visitor facilities at Petroglyph Point, increased natural and cultural resource restoration, interpretation, and new recreational opportunities.

Alternative B provides for new visitor facilities and services at the Petroglyph Point area. These would include a visitor contact station, an outdoor education area, and a visitor day-use area that accommodates families and school groups, picnic tables, shade structures, and toilets. Changes are also planned for the Indian Well campground, where improvements in tent site privacy, shower facilities, and RV use would be considered. Changes in these facilities are planned in consideration of both current deficiencies and expected changes in visitor demographics and use patterns. Facility construction, including those at the Petroglyph Point area, may provide new but temporary employment opportunities.

Increased interpretive outreach may also attract greater visitation. Anecdotally, visitor center staff report that many visitors come to the monument at the behest of their children, whose interest in the monument is piqued by interpretive rangers that visit their schools. Planned improvements in interpretive media and displays should all serve to increase visitation though providing a more enjoyable experience to visitors interested in the monuments historic and scientific importance.

Proposed changes in management of natural and cultural resources, including more emphasis on resource protection and ecological restoration, should lead to an improved visitor experience. This includes active restoration of habitats crucial to wildlife, protection of historic structures and landscapes, and

perpetuation of wilderness values including the natural soundscape and dark night skies. These goals serve to improve the visitor's experience, possibly leading to longer stays and greater economic contribution.

Under current management, the monument is not a destination for overnight backpacking. Under alternative B, improvements are planned in recreational opportunities including the designation of primitive campsites and an improved trail system with connections to adjacent national forest trails. This should attract a new user group interested in overnight wilderness camping, increasing visitation and use by a more diverse visitor base.

#### *Effects on local economy*

Planned management changes in alternative B would affect improvements in the local socioeconomic impacts of the monument. They provide for a better overall visitor experience, anticipate demographic changes in the population of potential visitors, and attract new kinds of visitors through development of new recreational opportunities. Increased visitation leads directly to increased local revenue for tourism-based goods and services, and helps perpetuate jobs provided by the monument. No longer designating Forest Service Route 10 as a primary entrance to the monument may also hamper development of services and private lodging or other facilities in the small town of Tionesta, 12 miles east of the monument. This could have long-term, moderate, adverse impacts on local businesses in Tionesta.

#### *Effects on regional economy*

Impacts on the regional socioeconomic impact of the monument should be positive as well. Planned improvements in facilities, services, recreational and interpretive opportunities could draw greater visitation at the regional scale as well, with similar benefits.

#### *Cumulative Impacts*

Greater visitation and enjoyment of the monument should increase visitation to neighboring areas such as the Tule Lake National Wildlife Refuge, Modoc National Forest, and Klamath National Forest, as well as other tourist destinations in the Klamath and Tulelake Basins. There would be a minor to moderate, beneficial cumulative effect on the local and regional economy.

#### *Conclusion*

Changes proposed by the alternative B would increase visitation and enjoyment of the monument, having a long-term, moderate, beneficial impact on local and regional economies. Some minor to moderate adverse impact on local businesses in Tionesta may occur as visitors are encouraged to access the monument from the north. Overall, improvements to visitor services, facilities, and experiences would make the monument a more desirable destination and improve revenues from the tourism sector of the local and regional economy.

### **SOCIOECONOMICS – IMPACTS FROM ALTERNATIVE C**

#### *Analysis*

Alternative C does less to address needed changes in resource protection and education required to improve the visitor experience, and therefore increase monument visitation. While emphasizing recreational opportunities, it does provide for improvements to facilities such as paving the Medicine Lake Road. It also calls for some improvements to the Petroglyph Point area, and expanded use of the Research Center for educational activities open to the public. More diverse recreational activities would be promoted, including mountain biking and equestrian access to some monument and adjoining Forest Service roads and trails. Some new but temporary jobs would be created by the aforementioned facilities improvements.

#### *Effects on local economy*

The socioeconomic benefits would be similar to the alternative A, but with some increases in those benefits associated with higher visitation to the Petroglyph Point area when new facilities are constructed. However, these facilities are not planned to be as substantial as those called for in alternative B and would therefore have less of a beneficial effect. Similarly, some visitation may increase if the monument portion of Medicine Lake Road was paved and classes were held in the research center. As in alternative B, no longer designating Forest Service Route 10 as a primary entrance to the monument may also hamper development of services and private lodging or other facilities in the small town of Tionesta, 12 miles east of the monument. This could have long-term, moderate, adverse impacts on local businesses in Tionesta.



### *Effects on Regional economy*

Regional socioeconomic effects would be similar to alternative A, with marginal increases in visitation due to the facility and recreational or educational programs mentioned above. The cumulative beneficial effects to the local and regional economy would be negligible to minor.

### *Cumulative Impacts*

The cumulative impacts of alternative C would be negligible to minor and beneficial. New recreational activities would attract some new visitation, including users interested in activities such as equestrian travel and mountain biking. These activities would also occur on neighboring national forest lands, and possibly increase the environmental impacts of these activities (including increased trail erosion and exotic weed introduction). The deleterious effects of these activities may have a minor, long-term, adverse effect on socioeconomic resources in and around the monument if other land uses such as livestock grazing are impacted.

### *Conclusion*

Overall, the beneficial socioeconomic effect of alternative C would be long-term and negligible to minor. Overall improvements in the visitor experience and correlated visitation totals, and increased spending and job creation for facility improvements, are all of a lesser degree than alternative B.



## Chapter Six: Consultation and Coordination







# Chapter Six: Consultation and Coordination

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## Introduction

Public involvement and consultation efforts were ongoing throughout the process of preparing the General Management Plan/Environmental Assessment. Public involvement methods included published Federal Register notices, sending press releases, conducting public meetings and workshops, holding stakeholder meetings, distributing newsletters, and posting to appropriate websites. Public involvement is a necessary and important part of the planning process that provides valuable information. Consultation and coordination among the agencies and the public were vitally important throughout the planning process. The public had three primary avenues for participation in the development of the plan: participate in public meetings, respond to newsletters, and review and comment on the draft plan.

## Public Scoping

The Lava Beds National Monument GMP planning team launched the start of the GMP planning process in spring of 2006. In May 2006 the planning team produced and mailed newsletters to 145 organizations and individuals on the park mailing list. In addition, over 1,000 newsletter copies were printed for distribution at the park visitor center, local communities and at public meetings. The purpose of the May 2006 newsletter (Newsletter 1) was to: 1) announce the start of the planning process; 2) inform the public on how they can participate; 3) present and obtain comment on park purpose and significance statements developed through foundation planning; and 4) to solicit comments on issues that the GMP should address. The newsletter also contained information on the date, time and location of public scoping meetings.

The newsletter was published and made available for comment on the National Park Service's Planning, Environment and Public Comment (PEPC) website. September 2, 2006 was established as the close of the public comment period. Comments received after this date were also accepted.

Press releases announcing the GMP were also distributed to local newspapers. Several newspapers carried feature stories on the need for new GMP at Lava Beds National Monument and announced the upcoming public meetings.

On July 10, 2006 a Notice of Intent to prepare a general management plan and environmental impact statement was published in the Federal Register. The notice that the project had received a waiver for preparing an environmental impact assessment and approval to prepare an environmental assessment was published in the Federal Register on October 16, 2008 (Vol. 71, No. 131, pp. 38898-38899).

### PUBLIC MEETINGS

In June 2006, the planning team held a series of public scoping meetings in California and Oregon. Included in the agenda was an introduction from the Park Superintendent and a presentation on the GMP process and initial park purpose and park significance statements from the GMP Project Manager. Displays and stations were set up at the start of the meetings so that attendees could have one-on-one conversations with members of the planning team. After the presentation, group discussions were held about park planning issues and planning team members recorded comments on flipcharts.

On June 5, 2006 a public meeting was held in Klamath Falls at the Oregon Institute of Technology College Union. Representatives of the U.S. Forest Service, park staff and one member of the public attended this meeting. On June 7, 2006, a second meeting was held in Tulelake at the Fairgrounds. One member of the public attended this meeting. On June 8, 2006 a meeting was held in Yreka, California at the Community Center. A member of the California Wilderness Coalition and a member of the Volcanic Legacy Scenic Byway Committee attended.

### STAKEHOLDER MEETINGS

Throughout the scoping period presentations and meetings with local organizations, agencies and tribes were conducted by the Superintendent and members of the planning team. Organizations and agencies included:

- Klamath, Lake, Modoc, Siskiyou Counties Tourism Board
- Modoc County Commissioners
- Shaw Historical Library
- The Klamath Tribes, Tribal Council
- Klamath County Tourism, 10-15 people
- Tulelake Rotary, 10-15 people
- Klamath Falls Rotary, 75 people
- City of Merrill
- Sunrise Rotary Club
- Tulelake City Council
- Klamath Basin Wildlife Refuge Association
- Tule Lake Committee; NHL plaque dedication with Caltrans
- Town of Tionesta
- Volcanic Scenic Legacy Byway Core Group
- Tulelake Town Council
- Klamath Refuges Friends Group
- Lava Beds Natural History Association
- Volcanic Legacy Scenic Byway Group

## COMMENTS RECEIVED

During the scoping period, a total of 30 written comments were received by the planning team. Most of the comments (26) were submitted via the comment form that was distributed through the newsletter, the park visitor center and at various public and stakeholder meetings. Two comments were entered directly into the PEPC site. Comment letters were received from The Klamath Tribes and the California Wilderness Coalition. Most comments received were from organizations and individuals in Oregon and California. These comments were considered and incorporated into the issues for the plan. The NPS distributed a second newsletter in July 2007, describing issues identified during public scoping.

Topics that received the greatest number of comments during public scoping included: new ideas about visitor education programs and suggestions for more interpretation opportunities; support for protection of cultural and natural resources; an emphasis on working with surrounding agencies, tribes, schools and communities; preserving the undeveloped character of the park; greater protection of sensitive resources at Petroglyph Point; preserving the rustic, undeveloped character of the monument; and ideas for improving visitor services such as camping.

In addition to issues to be addressed in the GMP, the planning team received comments on the draft park purpose and significance statements presented in Newsletter 1. The statements captured what most

comments value and find most important about Lava Beds National Monument: the caves and other geologic features, the history conveyed (Modoc War, Native American history, settlement), the landscape, the undeveloped character of the park, the wilderness, the plant communities, wildlife, and the rock art. Many of the commenters value opportunities to explore the monument on their own and the educational opportunities that Lava Beds provides.

While the comments were generally in agreement with the draft park purpose and significance statements, one commenter suggested that the stories related to park purpose and significance should be connected to their larger area of interest, e.g. the Great Basin, Medicine Lake Volcano, and the tribal territory of the Modoc.

## Preliminary Alternatives/Management Concepts

The Lava Beds National Monument GMP planning team developed preliminary alternatives for the GMP in Summer/Fall 2007. On January 9, 2008, the GMP team released a newsletter with preliminary management concepts for public review. Almost 200 newsletters were mailed to organizations and individuals on the park mailing list. In addition, nearly 800 newsletter copies were distributed at the park visitor center, to local communities and businesses, and at public and stakeholder meetings.

The purpose of the newsletter was to provide opportunities for the public and stakeholders to comment on the preliminary alternatives to identify strengths, areas for improvements, and preferences. Preliminary management concepts presented to the public included:

- Concept A: Continue Current Management
- Concept B: Expanded Resource Preservation and Restoration
- Concept C: Diversified Recreation Opportunities
- Concept D: Interpretation and Education

A comment form was included in the newsletter so that members of the public could provide feedback to the planning team. Comments on the preliminary management concepts were received through February 28,

2008. Press releases asking for public comments on the preliminary management concepts were distributed to local newspapers. The local newspaper in Klamath Falls, OR (Klamath Falls Herald and News) announced the public meeting and carried two feature stories on the preliminary management concepts.

### **PUBLIC MEETINGS**

A public meeting was held in Klamath Falls, Oregon on January 29, 2008. Included in the agenda of the meeting was a presentation of the preliminary management concepts followed by an opportunity for participants to ask questions and share ideas. One person attended this meeting. Low attendance was due in part to poor winter weather conditions on the night of the meeting.

### **STAKEHOLDER MEETINGS**

Throughout the public comment period presentations and meetings with interested organizations and agencies were conducted by NPS staff. Organizations and agencies included:

- Tulelake Rotary Club, 12-15 attendees
- Lava Beds Natural History Association Board, 3 attendees
- Klamath Basin Audubon Society, 46 attendees
- National Speleological Society Chapters (San Francisco, Diablo and Mother Lode Chapters), over 60 attendees
- Bureau of Land Management
- U.S. Forest Service
- U.S. Fish and Wildlife Service, 3 attendees

### **TOTAL COMMENTS RECEIVED**

The planning team received a total of 24 written comments. One comment was submitted to the monument over the phone (Good Sam Club). Seven transcripts of comments made at stakeholder meetings were recorded and included in the comment analysis. Of the 24 written comments submitted, 18 comments were from individuals. Agencies and organizations that submitted comments through stakeholder meetings or individual letters include the: National Speleological Society (San Francisco, Diablo, Shasta, and Mother Lode Chapters); Cave Research Foundation; Bureau of Land Management; United States Geological Survey; California Wilderness Coalition; United States Fish and Wildlife Service; CHS Speak; Natural History Association; and the United States Forest Service.

Comments on the preliminary management concepts included both preferences for the management concepts and preferences for the desired conditions associated with each of the concepts. Overall, commenters placed a high value on preserving the character of Lava Beds while recognizing that it is an important place to learn about history and science. A strong preference for one management concept did not emerge. Most commenters expressed a preference for a combination. For example, many commenters that expressed a preference for Management Concept D (Interpretation and Education) preferred this concept only in combination with either B (Expanded Resource Preservation and Restoration) or C (Diversified Recreation Opportunities).

Commenters expressed positive support for most of the desired conditions associated with the management concepts. Desired conditions for which commenters had concerns include: restoring the landscape to pre-European conditions, decommissioning roads, wilderness expansion, co-locating some monument staff with other agencies, increased Tribal involvement, closing the cave loop at night, improving the campground to accommodate large vehicles, and providing areas for large groups. Some commenters were concerned about the potential impacts of more tour groups and new recreational activities associated with alternative C, Diversified Recreation.

## **Consultation with Other Agencies, Officials, and Organizations (To Date)**

### **SECTION 7 CONSULTATION**

#### *Consultation with U.S. Fish and Wildlife Service*

The Endangered Species Act of 1963, as amended, authorizes federal agencies to enter into early consultation with the U.S. Fish and Wildlife Service (USFWS) to ensure that any federal action would not jeopardize the existence of any listed species or destroy or adversely modify its habitat. During the preparation of this plan, NPS staff initiated consultation with the Klamath Falls U.S. Fish and Wildlife Office in November 2006 documenting a list of threatened and endangered species for Modoc and Siskiyou counties. The letter and accompanying list are included in Appendix B.

## SECTION 106 CONSULTATION

Federal agencies that have direct or indirect jurisdiction over historic properties are required by Section 106 of the National Historic Preservation Act (NHPA), as amended (16 USC 270, et seq.), to take into account the effect of their undertakings on properties either listed in or eligible for listing in the National Register of Historic Places.

### *Consultation with the California State Historic Preservation Office*

Under the terms of stipulation V.I.E of the 1995 programmatic agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers, the National Park Service, "...in consultation with the SHPO [state historic preservation office], will make a determination about which undertakings are programmatic exclusions under IV.A and B, and for all other undertakings, whether there is sufficient information about resources and potential effects on those resources to seek review and comment under 36 CFR 800.4-6 during the plan review process."

To meet the requirements of the Advisory Council on Historic Preservation implementing Section 106, the National Park Service sent a letter to the California State Historic Preservation Officer on August 17, 2006 inviting the office to participate in the planning process. The letter is included in Appendix B.

### *Consultation with Native American Tribes*

The National Park Service recognizes that indigenous peoples may well have traditional and contemporary interests and ongoing rights in lands now under National Park Service management, as well as concerns and contributions to make for the future via the scoping process for general management plans and other projects. Related to tribal sovereignty, the need for government-to-government Native American consultations stems from the historic power of Congress to make treaties with American Indian tribes as sovereign nations. Consultations with American Indians and other Native Americans, such as Alaska Natives and Native Hawaiians, are required by various federal laws, executive orders, regulations, and policies. For example, such consultations are needed to comply with Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended. Implementing regulations of the Council on Environmental Quality (CEQ) for the National Environmental Policy Act of 1969),

as amended (NEPA), also call for Native American consultations.

During the public scoping period the Lava Beds National Monument superintendent invited the chairperson of The Klamath Tribes to meet at their convenience, at a tribally selected place. The purpose of the meeting was to discuss the general management planning process underway and any concerns the tribal government, on behalf of the members of the tribe, might have about protecting, preserving, and managing Lava Beds National Monument's cultural and natural resources. The planning team met with the Klamath Tribes Tribal Council on June 6, 2006 at the Klamath Tribes Headquarters in Chiloquin, OR to receive input on issues that should be addressed in the general management plan.

The national monument respects tribal sovereignty and the fact that tribes decide their own priorities and ways of doing business. The national monument has worked well with the tribes in the past when issues of concern have materialized. The rights, privileges, concerns, and interests of the national monument's American Indian neighbors are very important to consider; it is equally important to work out mutually acceptable arrangements on particular issues. The tribes have been kept fully informed throughout the planning process and have been sent all newsletters and copies of the draft general management plan. Although The Klamath Tribes have not initiated further contact, the monument is open now and in the future for consultation on any features of the plan or on any other possible issues that might be of tribal concern.

## Future Compliance Requirements

The NPS will conduct additional site-specific compliance as individual projects or actions included in the preferred alternative are implemented. Some of the specific future compliance requirements of the preferred alternative are listed in table 22. Included are the NPS determinations of how those individual requirements relate to the National Environmental Policy Act (NEPA), the Endangered Species Act (Section 7 requirements), and the 2006 programmatic agreement in relation to cultural resources (Section 106 Historic Preservation Act Requirements).



**TABLE 22: FUTURE COMPLIANCE REQUIRED FOR IMPLEMENTATION OF SPECIFIC ACTIONS**

<b>FUTURE COMPLIANCE REQUIRED</b>	
<b>Action</b>	<b>Compliance Requirement</b>
<p>Routinely monitoring and stabilizing archeological sites.</p> <p>Monitoring cultural landscapes and historic structures to protect, preserve, maintain, and research them.</p>	<p>These items are programmatically excluded from future Section 106 review and SHPO consultation in accordance with the 2006 Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers.</p>
<p>New visitor facilities including, trails, the Petroglyph Point Seasonal Contact Station and day use facilities, building additions (visitor and research centers), backcountry campsites, campground improvements, and vault toilets.</p> <p>Road realignment at Petroglyph Point.</p> <p>New sustainable technologies such as solar panels or wind turbines.</p> <p>Access improvements to monument attractions such as Captain Jacks Stronghold.</p> <p>New habitat restoration efforts.</p> <p>Removal of existing facilities including the wildlife overlooks and overhead utilities.</p>	<p>NEPA Compliance – Although some of the listed actions have been generally assessed in the environmental consequences of this document, many details have yet to be identified (e.g. precise location, design, and size of a facility). Appropriate NEPA compliance would be completed for these actions before their implementation.</p> <p>Future Section 7 compliance - Consultation with the U.S. Fish and Wildlife Service) would occur for restoration of monument habitat.</p> <p>Future Section 106 compliance review and SHPO consultation would likely be necessary and required before construction at the project implementation planning or design stages.</p>

## Public Officials, Agencies, Organizations, and Individuals Receiving a Copy of This Document

### FEDERAL AGENCIES

- Bureau of Land Management
  - Alturas Field Office
  - Lakeview District, Klamath Falls, OR
- Bureau of Reclamation
  - Klamath Basin Area Office
- National Park Service
  - Crater Lake National Park
  - Denver Service Center
  - Klamath Network Inventory and Monitoring Coordinator
  - Lassen Volcanic National Park
  - Oregon Caves National Monument
  - Pacific West Region
  - Park Planning and Special Studies Division
  - Redwood National Park
  - Whiskeytown National Recreation Area
- U.S. Fish and Wildlife Service
  - Klamath Basin National Wildlife Refuges
  - Region 1

- U.S. Forest Service
  - Modoc National Forest
  - Klamath National Forest
  - Shasta-Trinity National Forest
  - Winema National Forest
- U.S. Geological Survey
- US Post Office
  - Dorris CA 96023
  - Klamath Falls, OR 97603
  - Malin, OR 97632
  - Merrill, OR 97633
  - Tulelake, CA 96134

### U.S. SENATORS AND REPRESENTATIVES

- Honorable Barbara Boxer, U.S. Senator, CA
- Honorable Dianne Feinstein, U.S. Senator, CA
- Honorable Jeff Markley, U.S. Senator, OR
- Honorable Ron Wyden, U.S. Senator, OR
- Honorable Wally Herger, U.S. Representative, 2nd District, California
- Honorable Tom McClintock, U.S. Representative, 4th District, California

### STATE ELECTED OFFICIALS

- California State Senators and Assembly Members
- Senator Sam Aanestad
- Senator Dave Cox
- Assembly Member Jim Nielson

## **STATE AGENCIES**

- California Department of Fish and Game
- California Department of Forestry and Fire Protection
- California Department of Parks & Recreation/  
California State Parks
- Cultural Resources Division
- Northern Buttes District
- North Coast Redwoods District
- California Department of Transportation, District 2
- California Flight Standards District Office
- California State Office of Historic Preservation

## **AMERICAN INDIAN TRIBES AND ORGANIZATIONS**

- The Klamath Tribes

## **LOCAL AND REGIONAL GOVERNMENTS**

- Alturas City Hall
- Dorris City Hall
- Klamath County, Oregon, Mayor and City Council
- Klamath Falls City Hall
- Malin City Hall
- Merrill City Hall
- Modoc County, California, Board of Supervisors
- Siskiyou County, California, Board of Supervisors
- City of Tulelake
- Tulelake Irrigation District

## **COLLEGES, UNIVERSITIES AND SCHOOLS**

- California State University, Chico
- College of the Siskiyous
- Humboldt State University
- Klamath Community College
- Oregon Institute of Technology
- Oregon Institute of Technology
- Oregon State University
- Oregon State University
- Phoebe A. Hearst Museum of Anthropology,  
University of California, Berkeley
- Shasta College
- Southern Oregon University
- Tulelake High School
- University of Nevada

## **ORGANIZATIONS AND BUSINESSES**

- AAA Oregon
- Bravo Tours
- California Wilderness Coalition
- Capt. Jack's Restaurant
- Cascade Civil War Society
- Cave Research Foundation
- Civilian Conservation Corps Alumni
- Cookeville High Chapter, SPEAK

- Dragonfly Adventures
- Eagle's Nest RV Park
- Great Basin Visitor Association
- High Desert Trail Riders
- Jackson Co. Horseman's Association
- Klamath Basin Audubon Society
- Klamath Co. Tourism Bureau
- Klamath County Museum
- Klamath Water Users Association
- Klamath Wing Watchers, Inc.
- Horse & Carriage Society
- Lassen Tours
- LuCena West Tours
- Medicine Lake Homeowners Association
- Modoc County Historical Society
- NACCCA Headquarters
- National Parks Conservation Association
- National Parks Conservation Association
- National Speleological Society
- National Trust for Historic Preservation
- Natural History Association
- Northwest Trail Riders
- Ore-Cal RC&D Area
- Rotary International of Tulelake
- 211HShasta Area Grotto
- Shaw Historical Library
- Sierra Club Chapter - Redding
- Siskiyou County Historical Society
- Spokes, Unlimited
- The Wilderness Society
- Timber Mountain Store
- Tule Lake Preservation Committee
- Tule Lake Reunion Group
- Tulelake Growers Association
- Tulelake Partnership Committee
- Tulelake-Butte Valley Fairgrounds
- Volcanic Legacy Community Partnership
- Volcanic Legacy Scenic Byway
- Volcanic Legacy Scenic Byway
- Native Plant Society of Oregon
- Wilderness Society
- Winema 4H
- Yreka Chamber of Commerce

## **MEDIA**

- Lost River Star
- Jefferson Public Radio
- KLAD Radio
- KOTI TV
- KTVL Radio

## INDIVIDUALS

Copies were also mailed to approximately 60 individuals who signed up for mailings at public meetings and events.

## List of Preparers

### PLANNING TEAM COMPOSITION AND FUNCTIONS

#### *NPS: Pacific West Regional Office*

Jean Boscacci, Outdoor Recreation Planner  
Pacific West Region, Oakland

- Involved in foundation planning, development of alternatives, and identification of the preferred alternative. Responsible for scoping comment analysis; newsletter editing, design and production; and public involvement efforts.

Barbara Butler, Landscape Architect  
Pacific West Region, Oakland

- GMP Project Manager, overall responsibility for preparing the GMP, public involvement, organization of GMP meetings and workshops.

Cortney Cain Gjesfjeld, Historical Landscape Architect  
Pacific West Region, Seattle

- Involved in development of alternatives, identification of the preferred alternative, and development of user capacity indicators and standards. Responsible for writing sections related to cultural landscapes and historic resources issues.

Martha Crusius, Senior Planner  
Pacific West Region, Oakland

- Involved in foundation planning, development of alternatives, and identification of the preferred alternative. Responsible for project oversight and reviews.

Kirstie Haertel, Archeologist  
Pacific West Region, Seattle

- Involved in foundation planning, development of alternatives, and identification of the preferred alternative. Responsible for writing sections related to archaeology and ethnographic issues.

Amanda Kaplan, Environmental Protection Specialist  
Pacific West Region, Seattle

- Project environmental compliance coordinator. Involved in public scoping efforts, development

of alternatives and identification of the preferred alternative. Responsible for coordinating and writing sections for affected environment and environmental consequences.

Brad Phillips, Outdoor Recreation Planner  
Pacific West Region, Oakland

- Involved in identification of the preferred alternatives, development of user capacity indicators and standards and public outreach efforts. Responsible for coordination, editing, design and production of the draft plan, writing sections related to climate change, user capacity and alternatives.

#### *NPS: Lava Beds National Monument*

Al Augustine, Fire Management Officer

- Involved in foundation planning and development of alternatives. Responsible for writing sections related to fire management.

Kale Bowling, Lead Interpreter/Park Ranger

- Involved in foundation planning, development of alternatives, identification of the preferred alternative and development of user capacity indicators and standards. Responsible for writing sections related to interpretation and education.

James Deshayes, Former Chief of Maintenance

- Involved in foundation planning and internal scoping for the General Management Plan.

Craig Dorman, Former Superintendent

- Involved in GMP start and orientation, foundation planning, public and internal scoping for the General Management Plan.

Shane Fryer, Cave Technician

- Involved in development of alternatives, identification of the preferred alternative and development of user capacity indicators and standards. Responsible for writing sections related to natural resources.

Terry Harris, Chief Ranger

- Involved in foundation planning, development of alternatives, identification of the preferred alternative and development of user capacity indicators and standards. Responsible for writing sections related to recreation, monument operations and visitor services.

David Hays, Resource Management Specialist

- Involved in foundation planning, development of alternatives, and identification of the preferred alternative. Responsible for GIS mapping and analysis and writing sections related to natural resources, socioeconomic and recreation issues.

Dave Kruse, Superintendent

- Involved in the development of alternatives, public involvement and outreach, identification of the preferred alternative, and development of user capacity indicators and standards. Responsible for writing sections related to park operations, facilities and infrastructure, visitor access and transportation, visual resources, and energy use/sustainability.

David Larson, Chief of Resource Management

- Involved in foundation planning, public involvement and outreach, development of alternatives, identification of the preferred alternative and development of user capacity indicators and standards. Responsible for compliance consultation and coordination, writing sections and coordinating impact topics related to natural and cultural resources.

Jason Mateljak, Resource Management Specialist

- Involved in identification of the preferred alternative and development of user capacity indicators and standards.

Angela Sutton, Education Coordinator and Interpretive Park Ranger

- Involved in identification of the preferred alternative and development of user capacity indicators and standards. Responsible for writing sections related to interpretation and education.

### ***NPS: Crater Lakes National Park***

Marsha McCabe, Chief of Interpretation

- Involved in foundation planning and development of alternatives. Provided guidance on topics related to interpretation and education.

### ***Consultants***

#### ***NPS: Denver Service Center***

Sarah Bodo, Community Planner

- Produced cost estimates for the alternatives.

Kerri Cahill, Community Planner

- Facilitated the user capacity workshop. Provided guidance for developing user capacity indicators and standards for the general management plan.

Erin Flanagan, Community Planner

- Coordinated preparation for selecting the preferred alternative and facilitated the Choosing by Advantages Workshop.

Carla McConnell, Community Planner

- Facilitated the Alternatives Development Workshop.

Stephan Nofield, Community Planner

- Facilitated the GMP Foundation Workshop. Wrote initial draft of monument foundation statement.







# Appendix A: Presidential Proclamation Establishing Lava Beds National Monument

Proclamation No. 1755, November 21, 1925, Establishing Lava Beds National Monument

## A Proclamation

Whereas, lands of the United States within the area hereinafter described in the State of California contain objects of such historic and scientific interest as to justify their reservation and protection as a National Monument;

Now, Therefore, I, Calvin Coolidge, President of the United States of America, by virtue of the power in me vested by Section 2 of the Act of Congress approved June 8, 1906 (34 Stat. 225), entitled, "An Act For the preservation of American antiquities," do proclaim that there are hereby reserved from all forms of appropriation under the public land laws, subject to all prior valid adverse claims, and set apart as the Lava Beds National Monument, all tracts of land owned by the United States in the State of California lying within the area described as follows:

Beginning at the quarter section corner on the east side of Section thirteen, Township forty-six North Range three East, Mount Diablo Meridian; thence running due east to the shore line of Tule Lake; thence following the shore line of said Lake in a southerly and easterly direction to its intersection with the east line of Section seven, Township forty-six North, Range five East, thence running southerly along the section line to the southeast corner of Section thirty-one, said Township; thence westerly to the northeast corner of Township forty-five North, Range four East; thence southerly to the southeast corner of said Township; thence westerly to the southwest corner of Section thirty-five, Township forty-five North, Range three East; thence northerly to the northwest corner of Section two, said Township; thence easterly to the southeast corner of Township forty-six North, Range three East; thence northerly to the point of beginning; also Lot three, Section ten, Township forty-six North, Range five East 00 all Mount Diablo Meridian.

The reservation made by this proclamation is not intended to prevent the use of the lands for National Forest purposes under the proclamation establishing the Modoc National Forest, and the two reservations shall both be effective on the land withdrawn but the National Monument hereby established shall be the dominant reservation and any use of the land which interferes with its preservation or protection as a National Monument is hereby forbidden.

Warning is hereby given to all unauthorized persons not to appropriate, injure, deface, remove, or destroy any feature of this National Monument, or to locate or settle on any of the lands reserved by this proclamation.

IN WITNESS WHEREOF I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the City of Washington this 21st day of November, in the year of our Lord one thousand nine hundred and twenty-five, and of the Independence of the United States of America, the one hundred and fiftieth.

By the President: Calvin Coolidge  
Frank B. Kellogg, Secretary of State.

## Appendix B: Consultation Letters



### United States Department of the Interior NATIONAL PARK SERVICE

Lava Beds National Monument  
1 Indian Well Headquarters  
Tulelake, California 96134

IN REPLY REFER TO:

D18

August 17, 2006

Milford Wayne Donaldson  
State Historic Preservation Officer  
1416 9th Street, Room 1442-7  
Sacramento, CA 95814

Dear Mr. Donaldson,

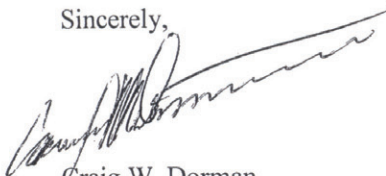
In accordance with our responsibilities under the National Historic Preservation Act of 1966 and the amended Programmatic Agreement between the National Park Service, the National Conference of State Historic Preservation Offices, and the Advisory Council on Historic Preservation, this letter is to inform you of the National Park Service's intent to prepare a General Management Plan (GMP) for Lava Beds National Monument.

The GMP will set forth the basic management philosophy for the park and will provide strategies for addressing issues relevant to natural and cultural resources management, visitor use, and interpretation of those resources. We invite your office to attend meetings of the planning team preparing the GMP.

The NPS held public scoping meetings in both California and Oregon during June 2006. The public comment period will come to a close on September 2, 2006. Our team will begin to develop management alternatives in early 2007. Current information relevant to the GMP is available on the National Park Service Planning, Environment and Public Comment (PEPC) website located at <http://parkplanning.nps.gov/labe>.

We encourage your involvement in this important planning process. If you have any questions please do not hesitate to contact me at 530-667-8101. We look forward to working with you and your staff on this endeavor.

Sincerely,



Craig W. Dorman  
Superintendent





**United States Department of the Interior**  
**NATIONAL PARK SERVICE**

Lava Beds National Monument  
1 Indian Well Headquarters  
Tulelake, California 96134

IN REPLY REFER TO:  
N1621

November 27, 2006

Curt Mullis  
Field Supervisor  
U.S. Fish and Wildlife Service  
Klamath Falls Fish and Wildlife Office  
1936 California Ave  
Klamath Falls, OR 97601

Dear Mr. Mullis,

In accordance with our responsibilities under section 7 of the Endangered Species Act, this letter is to inform you of the National Park Service's intent to prepare a General Management Plan (GMP) for Lava Beds National Monument (Lava Beds).

A new GMP is scheduled to be completed in 2009 and will set forth the basic management philosophy for the park and will provide strategies for addressing issues relevant to natural and cultural resources management, visitor use, and interpretation of those resources. On June 27, 2006 Lava Beds downloaded an electronic copy of the U.S. Fish and Wildlife Service (USFWS) listed, proposed, and candidate species that may occur in Siskiyou and Modoc counties of California. This list will serve as the official list for the Lava Beds GMP planning process and will be updated on a quarterly basis through the USFWS website. One additional species not found on the USFWS list, but listed for Lava Beds on the National Park Service (NPS) Threatened and Endangered list is the gray wolf (*Canis lupus*). With concurrence from the USFWS, it is identified by the NPS that this species is listed as historic and will not be considered within the current GMP planning process. It is recognized that this species may become a higher management goal in the future due to re-colonization into neighboring areas.

The NPS held public scoping meetings in both California and Oregon during June 2006. The public comment period came to a close on September 2, 2006. Our team will begin to develop management alternatives in early 2007. Current information relevant to the GMP is available on the National Park Service Planning, Environment and Public Comment (PEPC) website located at <http://parkplanning.nps.gov/labe>.

If you have any questions please do not hesitate to contact David Larson (Chief of Resources) at 530-667-8106. We look forward to working with you and your staff on this endeavor.

Sincerely,

Craig W. Dorman

Enclosures

cc: Barbara Butler, Landscape Architect, PWR



**United States Department of the Interior**  
**FISH AND WILDLIFE SERVICE**

Klamath Falls Fish and Wildlife Office  
6610 Washburn Way  
Klamath Falls, Oregon 97603  
(541) 885-8481 FAX (541) 885-7837  
kfallsfwo@fws.gov



**LISTED, PROPOSED, AND CANDIDATE SPECIES THAT  
MAY OCCUR IN SISKIYOU COUNTY, CALIFORNIA**

Status: **Endangered**

Phylum	Common Name	Scientific Name	Critical Habitat
Fish	winter-run chinook salmon	Oncorhynchus tshawytscha	Designated
Fish	Shortnose sucker	Chasmistes brevirostris	Proposed
Fish	Lost River sucker	Deltistes luxatus	Proposed
Invertebrate	Shasta Crayfish	Pacifastacus fortis	
Plant	Yreka phlox	Phlox hirsuta	

Status: **Threatened**

Phylum	Common Name	Scientific Name	Critical Habitat
Amphibian	California red-legged frog	Rana aurora draytonii	Designated
Bird	Northern spotted owl	Strix occidentalis caurina	Designated
Bird	Bald eagle	Haliaeetus leucocephalus	
Fish	S. OR/N. CA coho salmon	Oncorhynchus kisutch	Designated
Fish	Central Valley spring-run chinook salmon	Oncorhynchus tshawytscha	Designated
Fish	CA coastal chinook salmon	Oncorhynchus tshawytscha	Designated
Fish	Sacramento splittail	Pogonichthys macrolepidotus	
Plant	Slender Orcutt grass	Orcuttia tenuis	Proposed

Status: **Candidate**

Phylum	Common Name	Scientific Name	Critical Habitat
Amphibian	Oregon Spotted frog	<i>Rana pretiosa</i>	
Bird	Yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	
Fish	Central Valley fall-run chinook salmon	<i>Oncorhynchus tshawytscha</i>	
Invertebrate	Mardon skipper butterfly	<i>Polites mardon</i>	



## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

Klamath Falls Fish and Wildlife Office  
 6610 Washburn Way  
 Klamath Falls, Oregon 97603  
 (541) 885-8481 FAX (541) 885-7837  
 kfallsfwo@fws.gov



### LISTED, PROPOSED, AND CANDIDATE SPECIES THAT MAY OCCUR IN MODOC COUNTY, CALIFORNIA

#### Status: **Candidate**

Phylum	Common Name	Scientific Name	Critical Habitat
Amphibian	Oregon Spotted frog	<i>Rana pretiosa</i>	
Bird	Yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	

#### Status: **Endangered**

Phylum	Common Name	Scientific Name	Critical Habitat
Invertebrate	Shasta Crayfish	<i>Pacifastacus fortis</i>	
Fish	Modoc sucker	<i>Catostomus microps</i>	
Fish	Lost River sucker	<i>Deltistes luxatus</i>	Proposed
Fish	Shortnose sucker	<i>Chasmistes brevirostris</i>	Proposed

#### Status: **Proposed Endangered**

Phylum	Common Name	Scientific Name	Critical Habitat
Fish	Cowhead Lake Tui Chub	<i>Gila bicolor vaccaiceps</i>	

#### Status: **Threatened**

Phylum	Common Name	Scientific Name	Critical Habitat
Plant	Slender Orcutt grass	<i>Orcuttia tenuis</i>	Proposed

Tuesday, June 27, 2006

Page 1 of 2





# Glossary

***A'a lava flows:*** Solidified lava with a rough, clinkery surface.

***Accessibility:*** Occurs when individuals with disabilities are able to reach, use, understand, or appreciate NPS programs, facilities, and services, or to enjoy the same benefits that are available to persons without disabilities. See also, “universal design.”

***Adaptive management:*** A system of management practices based on clearly identified outcomes, monitoring to determine if management actions are meeting outcomes, and, if not, facilitating management changes that will best ensure that outcomes are met or to re-evaluate the outcomes. Adaptive management recognizes that knowledge about natural resource systems is sometimes uncertain and is the preferred method of management in these cases.

***Archeology:*** The scientific study, interpretation, and reconstruction of past human cultures from an anthropological perspective based on the investigation of the surviving physical evidence of human activity and the reconstruction of related past environments. Historic archeology uses historic documents as additional sources of information.

***Archeological resource:*** Any material remains or physical evidence of past human life or activities which are of archeological interest, including the record of the effects of human activities on the environment. They are capable of revealing scientific or humanistic information through archeological research.

***Area-specific desired condition (also called area-specific action):*** Based on management zones, area-specific guidance about the desired resource conditions, visitor experience opportunities, and appropriate kinds and levels of management, development, and access (modes of transportation) for particular areas of the monument; also the kinds of changes needed to move from the existing to the desired conditions.

***Asset:*** A physical structure or grouping of structures, land features, or other tangible property which has a specific service or function.

***Asset management:*** A systematic process of maintaining, upgrading, and operating assets cost-effectively by combining engineering principles with sound business practices and economic theory.

***Backcountry:*** Primitive, undeveloped portions of park units, some of which may be managed as “wilderness.”

***Best management practices (BMPs):*** Practices that apply the most current means and technologies available to not only comply with mandatory environmental regulations, but also maintain a superior level of environmental performance. See also, “sustainable practices/principles.”

***Carbon Footprint:*** A measure of the amount of carbon dioxide produced by a person, organization or state in a given time.

***Climate Change:*** refers to any distinct change in measures of climate lasting for a long period of time. In other words, “climate change” means major changes in temperature, rainfall, snow, or wind patterns lasting for decades or longer. Climate change may result from:

- natural factors, such as changes in the Sun’s energy or slow changes in the Earth’s orbit around the Sun;
- natural processes within the climate system (e.g., changes in ocean circulation);
- human activities that change the atmosphere’s make-up (e.g., burning fossil fuels) and the land surface (e.g., cutting down forests, planting trees, building developments in cities and suburbs, etc.).

***CLIP Tool:*** Software developed jointly by the Environmental Protection Agency and the NPS, was used to calculate the park’s greenhouse gas emissions.

***Conserve:*** To protect from loss or harm; preserve. Historically, the terms conserve, protect, and preserve have come collectively to embody the fundamental purpose of the NPS—preserving, protecting and conserving the national park system.

**Consultation (cultural resources):** A discussion, conference, or forum in which advice or information is sought or given, or information or ideas are exchanged. Consultation generally takes place on an informal basis; formal consultation requirements for compliance with section 106 of the NHPA are published in 36 CFR Part 800. Consultation with recognized tribes is done on a government-to-government basis.

**Cultural Landscape:** A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or esthetic values. There are four non-mutually-exclusive types of cultural landscapes: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes.

**Cultural Resource:** An aspect of a cultural system that is valued by or significantly representative of a culture or that contains significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as districts, sites, buildings, structures, and objects for the National Register of Historic Places; and as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources for NPS management purposes.

**Cumulative actions:** Actions that, when viewed with other actions in the past, the present, or the reasonably foreseeable future regardless of who has undertaken or will undertake them, have an additive impact on the resource the proposal would affect.

**Desired condition (also called management direction and management actions):** A park's natural and cultural resource conditions that the National Park Service aspires to achieve and maintain over time, and the conditions necessary for visitors to understand, enjoy, and appreciate those resources.

**Developed area:** An area managed to provide and maintain facilities (e.g., roads, camp-grounds, housing) serving visitors and park management functions. Includes areas where park development or intensive use may have substantially altered the natural environment or the setting for culturally significant resources.

**Ecosystem:** A system formed by the interaction of a community of organisms with their physical and biological environment, considered as a unit.

**Ecosystem management:** A collaborative approach to natural and cultural resource management that integrates scientific knowledge of ecological relationships with resource stewardship practices for the goal of sustainable ecological, cultural, and socio-economic systems.

**Enabling legislation:** The law(s) that establish a park as a unit within the national park system.

**Environmental assessment (EA):** A brief NEPA document that is prepared, with public involvement, (a) to help determine whether the impact of a proposed action or its alternatives could be significant; (b) to aid the NPS in compliance with NEPA by evaluating a proposal that will have no significant impacts, but may have measurable adverse impacts; or (c) as an evaluation of a proposal that is either not described on the list of categorically excluded actions, or is on the list, but exceptional circumstances apply.

**Environmentally preferred alternative (or environmentally preferable alternative):** Of the action alternatives analyzed, the one that would best promote the policies in NEPA section 101. This is usually selected by the planning team members. CEQ encourages agencies to identify an environmentally preferable alternative in the draft EIS or EA.

**Ethnographic resource:** A site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it.

**Existing infrastructure:** The systems, services, and facilities currently in a park unit, including buildings, roads, trails, power equipment, water supply, etc.

**Finding of No Significant Impact (FONSI):** A determination based on an EA and other factors in the public planning record for a proposal that, if implemented, would have no significant impact on the human environment.

**Foundation statement:** A statement that begins a park unit's planning process and sets the stage for all future planning and decision-making by identifying the park's mission, purpose, significance, special mandates and the broad, park-wide mission goals. Incorporated into a park unit's GMP, but may also be produced as a stand-alone document for a park unit.

**Fundamental resources and values:** Those features, systems, processes, experiences, stories, scenes, sounds, smells, or other attributes determined to warrant primary consideration during planning and management because they are critical to achieving the park unit's purpose and maintaining its significance. A fundamental value, unlike a tangible resource, refers to a process, force, story or experience, such as such as an island experience, the ancestral homeland, wilderness values, or oral histories.

**Fossil:** Any evidence of past life found in a geological context.

**Fossiliferous:** Containing fossils.

**Gateway community:** A community that exists in close proximity to a unit of the national park system whose residents and elected officials are often affected by the decisions made in the course of managing the park unit, and whose decisions may effect the resources of the park. Because of this, there are shared interests and concerns regarding decisions. Gateway communities usually offer food, lodging, and other services to park visitors. They also provide opportunities for employee housing, and a convenient location to purchase goods and services essential to park administration.

**General management plan (GMP):** A plan which clearly defines direction for resource preservation and visitor use in a park, and serves as the basic foundation for decision making. GMPs are developed with broad public involvement.

**Geologic period:** The period is a basic unit of geological time. Two or more periods comprise a geological era. Most periods are divided into smaller units called epochs.

**Geologic resources:** Features produced from the physical history of the earth, or processes such as exfoliation, erosion and sedimentation, glaciation, karst or shoreline processes, seismic, and volcanic activities.

**Historic district:** A geographically definable area, urban or rural, possessing a significant concentration, linkage, or continuity of sites, landscapes, structures, or objects, united by past events or aesthetically by plan or physical developments.

**Human environment:** Defined by CEQ as the natural and physical environment, and the relationship of

people with that environment. Although the socioeconomic environment receives less emphasis than the physical or natural environment in the CEQ regulations, NPS considers it to be an integral part of the human environment.

**Impact:** The likely effect of an action or proposed action upon specific natural, cultural or socioeconomic resources. Impacts may be direct, indirect, individual, cumulative, beneficial, or adverse. (Also see Unacceptable impacts.)

**Impact topics:** Specific natural, cultural, or socioeconomic resources that would be affected by the proposed action or alternatives (including no action). The magnitude, duration, and timing of the effect to each of these resources is evaluated in the impact section of an EA or an EIS.

**Impairment:** An impact that, in the professional judgment of a responsible NPS manager, would harm the integrity of park resources or values and violate the 1916 NPS Organic Act's mandate that park resources and values remain unimpaired.

**Implementation plan:** A plan that focuses on how to implement an activity or project needed to achieve a long-term goal. An implementation plan may direct a specific project or an ongoing activity.

**Indicators of user capacity:** Specific, measurable physical, ecological, or social variables that can be measured to track changes in conditions caused by public use, so that progress toward attaining the desired conditions can be assessed

**Issue:** Some point of debate that needs to be decided.

**Life cycle costing (analysis):** An accounting method that analyzes the total costs of a product or service, including construction, maintenance, manufacturing, marketing, distribution, useful life, salvage, and disposal.

**Light Pollution:** The illumination of the night sky caused by artificial light sources, decreasing the visibility of stars, and other natural sky phenomena. Also includes other incidental or obtrusive aspects of outdoor lighting such as glare, trespass into areas not needing lighting, alternation of nighttime landscape, and negative impact to ecosystems.



**Management concept:** A brief, statement of the kind of place the park should be (a “vision” statement)

**Management zone:** A geographical area for which management directions have been developed to determine what can and cannot occur in terms of resource management, visitor use, access, facilities or development, and park operations. Each zone has a unique combination of resource and social conditions and a consistent management direction. Different actions are taken by the NPS in different zones.

**Management zoning:** The application of management zones to a park unit. The application of different type of zones and/or size of zones will likely vary in different alternatives.

**Management direction (also called desired condition and management prescription):** A planning term referring to statements about desired resource conditions and visitor experiences, along with appropriate kinds and levels of management, use, and development for each park area.

**Manager:** The managerial-level employee who has authority to make decisions or to otherwise take an action that would affect park resources or values. Most often it refers to the park superintendent or regional director, but may at times include, for example, a resource manager, facility manager, or chief ranger to whom authority has been re-delegated.

**Mitigation:** A modification of a proposal to lessen the intensity of its impact on a particular resource. Actions can be taken to avoid, reduce, or compensate for the effects of environmental damage.

**Museum Collection:** Assemblage of objects, works of art, historic documents, or natural history specimens collected according to a rational scheme and maintained so they can be preserved, studied, and interpreted for public benefit. Museum collections normally are kept in park museums, although they may also be maintained in archeological and historic preservation centers (NPS DO-28).

**Museum object:** A material thing possessing functional, aesthetic, cultural, symbolic, and/or scientific value, usually movable by nature or design. Museum objects include prehistoric and historic objects, artifacts, works of art, archival material, and natural history specimens that are part of a museum collection. Structural

components may be designated museum objects when removed from their associated structures.

**National Park Service Organic Act:** The 1916 law (and subsequent amendments) that created the National Park Service and assigned it responsibility to manage the national parks.

**National park system:** The sum total of the land and water now or hereafter administered by the Secretary of the Interior through the National Park Service for park, monument, historic, parkway, recreational or other purposes.

**National Register of Historic Places:** The comprehensive federal listing of nationally, regionally, or locally significant districts, sites, buildings, structures, and objects of national, regional, state, and local significance in American history, architecture, archeology, engineering, and culture kept by the National Park Service in authority of the National Historic Preservation Act of 1966.

**Native American:** Pertaining to American Indian tribes or groups, Eskimos and Aleuts, and Native Hawaiians, Samoans, Chamorros, and Carolinians of the Pacific Islands. Groups recognized by the federal and state governments and named groups with long-term social and political identities who are defined by themselves and others as Indian are included.

**NEPA process:** The objective analysis of a proposed action to determine the degree of its impact on the natural, physical, and human environment; alternatives and mitigation that reduce that impact; and the full and candid presentation of the analysis to, and involvement of, the interested and affected public—as required of federal agencies by the National Environmental Policy Act of 1969.

**Other important resources and values:** Those attributes that are determined to be particularly important to park management and planning, although they are not related to the park’s purpose and significance

**Paleontological / paleoecological resources:** Resources such as fossilized plants, animals, or their traces, including both organic and mineralized remains in body or trace form. Paleontological resources are studied and managed in their paleoecological context (that is, the geologic data associated with the fossil that provides information about the ancient environment).

***Planning, Environment, and Public Comment***

***(PEPC) System:*** An online database designed to facilitate the project management process in conservation planning and environmental impact analysis. It assists NPS employees in making informed decisions with regard to a number of compliance issues throughout the planning, design, and construction process.

***Potential boundary modifications:*** The description of areas or resources that meet criteria for boundary adjustments, along with the rationale for an adjustment,

***Potential management zone:*** General guidance about an integrated set of resource conditions and associated visitor experiences that could be applied to various locations throughout a park,

***Preferred alternative:*** The alternative an NPS decision-maker has identified as preferred at the draft EIS stage. It is identified to show the public which alternative is likely to be selected to help focus its comments.

***Preserve:*** To protect from loss or harm; conserve. Historically, the terms preserve, protect and conserve have come collectively to embody the fundamental purpose of the NPS—preserving, protecting and conserving the national park system.

***Preservation (cultural resources):*** The act or process of applying measures to sustain the existing form, integrity, and material of a historic structure, landscape or object. Work may include preliminary measures to protect and stabilize the property, but generally focuses upon the ongoing preservation maintenance and repair of historic materials and features rather than extensive replacement and new work.

***Primary interpretive themes:*** The most important ideas or concepts to be communicated to the public about a park

***Professional judgment:*** A decision or opinion that is shaped by study and analysis and full consideration of all the relevant facts, and that takes into account

- the decision-maker's education, training, and experience
- advice or insights offered by subject matter experts and others who have relevant knowledge and experience

- good science and scholarship; and, whenever appropriate,
- the results of civic engagement and public involvement activities relating to the decision.

***Public involvement (also called public participation):*** The active involvement of the public in NPS planning and decision-making processes. Public involvement occurs on a continuum that ranges from providing information and building awareness, to partnering in decision making.

***Projected implementation costs:*** A projection of the probable range of recurring annual costs, initial one-time costs, and life-cycle costs of plan implementation.

***Purpose:*** The specific reason(s) for establishing a particular park unit.

***Rehabilitation:*** In reference to cultural resources, the act or process of making possible an efficient compatible use for a historic structure or landscape through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, and architectural values (NPS DO-28).

***Research Natural Area (RNA):*** Research Natural Areas are part of a national network of sites administratively designed to facilitate research and preserve natural features. RNAs are usually established in a typical example of an ecological community type, preferably one having been little disturbed in the past and where natural processes are not unduly impeded. The tract is set aside permanently and is managed exclusively for approved non-manipulative research; i.e., research that measures but does not alter existing conditions. Activities in RNAs are restricted to non-manipulative research, education, and other activities that will not detract from an area's research values. An RNA in a park is designated by the National Park Service.

***Restoration:*** From a cultural resource perspective, (1) The act or process of accurately depicting the form, features, and character of a historic structure, landscape, or object as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period; (2) The resulting structure, landscape, or object.

From a natural resource perspective, restoration refers to the reestablishment/recovery of biological community structure, natural functions and processes in landscapes that have been disturbed or altered by people — actions taken to return disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated.

Landscapes that have been disturbed by natural phenomena, such as floods and hurricanes, generally are allowed to recover naturally in parks unless manipulation is necessary to protect other park resources, developments, or employee and public safety.

**Sacred Sites:** Certain natural and cultural resources treated by American Indian tribes and Alaska Natives, and Native Hawaiians as sacred places having established religious meaning, and as locales of private ceremonial activities.

**Scoping:** Includes internal NPS decision-making on issues, alternatives, mitigation measures, the analysis boundary, appropriate level of documentation, lead and cooperating agency roles, available references and guidance, defining purpose and need, and so forth; and external scoping, the early involvement of the interested and affected public.

**Section 106:** Refers to Section 106 of the National Historic Preservation Act of 1966, which requires federal agencies to take into account the effects of their proposed undertakings on properties included or eligible for inclusion in the National Register of Historic Places and give the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed undertakings.

**Significance:** Statements of why, within a national, regional, and systemwide context, the park's resources and values are important enough to warrant national park designation.

**Social Trail:** A trail that is created by humans and is not part of the monument's official designated trail system; also called unofficial and visitor-created trails.

**Soil Association:** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Soil Map Units:** A unit of description used in soil surveys. It is a locality of soil containing specific characteristics. Soil associations can contain many different soil map units.

**Soundscape (natural):** The aggregate of all the natural, nonhuman-caused sounds that occur in parks, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive, and can be transmitted through air, water, or solid materials.

**State Historic Preservation Officer (SHPO):** An official in each state appointed by the governor to administer the state historic preservation program and carry out certain responsibilities relating to federal undertakings in the state (NPS DO-28).

**Structure:** Structures are constructed works, usually immovable by nature or design, consciously created to serve some human activity. Examples are buildings of various kinds, monuments, dams, roads, railroad tracks, canals, millraces, bridges, tunnels, locomotives, nautical vessels, stockades, forts and associated earthworks, Indian mounds, ruins, fences, and outdoor sculpture. In the national register program "structure" is limited to functional constructions other than buildings (NPS DO-28).

**Special mandates:** Legal mandates specific to a park unit that expand upon or contradict a park unit's legislated purpose.

**Stakeholders:** Individuals and organizations that are actively involved in the project, or whose interests may be positively or negatively affected as a result of the project execution /completion. They may also exert influence over the project and its results. For GMP planning purposes, the term stakeholder includes NPS offices/staff as well as public and private sector partners and the public, which may have varying levels of involvement.

**Standards:** The minimum acceptable condition for an indicator of a desired condition

**Stewardship:** The cultural and natural resource protection ethic of employing the most effective concepts, techniques, equipment, and technology to prevent, avoid, or mitigate unacceptable impacts.

**Strategic plan:** A Service-wide, 5-year plan required by GPRA (5 USC 306) in which the NPS states (1) how it plans to accomplish its mission during that time, and (2) the value it expects to produce for the tax dollars expended. Strategic plans serve as “performance agreements” with the American people.

**Superintendent:** The senior onsite NPS official in a park.

**Sustainable design:** Design that applies the principles of ecology, economics, and ethics to the business of creating necessary and appropriate places for people to visit, live in, and work. Development that has a sustainable design sits lightly upon the land, demonstrates resource efficiency, and promotes ecological restoration and integrity, thus improving the environment, the economy, and society.

**Sustainable practices/principles:** Those choices, decisions, actions and ethics that will best achieve ecological/ biological integrity; protect qualities and functions of air, water, soil, and other aspects of the natural environment; and preserve human cultures. Sustainable practices allow for use and enjoyment by the current generation, while ensuring that future generations will have the same opportunities.

**Traditionally associated peoples:** Social cultural entities such as tribes, communities, and kinship units exhibiting a continued identity and associated with a specific park unit, area, or resource.

**User Capacity:** The type and level of use that can be accommodated while sustaining the quality of park resources and visitor opportunities consistent with the purposes of the park unit. It is not necessarily a set of numbers or limits, but rather a process involving establishing desired conditions, monitoring, evaluation, and actions (managing visitor use) to ensure values are protected.

**Unacceptable impacts:** 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, or
  - NPS concessioner or contractor operations or services.

**Universal design:** The design of products and environments to be usable by all people to the greatest extent possible, without the need for adaptation or specialized design.

**Value analysis/value engineering:** An organized, multi-disciplined team effort that analyzes the functions of facilities, processes, systems, equipment, services, and supplies for the purpose of achieving essential functions at the lowest lifecycle cost consistent with required performance, reliability, quality, and safety.

**Visitor:** Anyone who physically visits a park for recreational, educational or scientific purposes, or who otherwise uses a park’s interpretive and educational services, regardless of where such use occurs (e.g., via Internet access, library, etc.).

**Visitor experience:** The perceptions, feelings, and reactions a person has while visiting a park. Examples of visitor experiences include: a sense of being immersed in a natural landscape; a feeling of being crowded; a feeling of being in an area where the sights and sounds of people and vehicles are predominant; having a sense of challenge and adventure; or a perception of solitude and privacy.

**Wilderness (designated):** Federal land that has been designated by Congress as a component of the national wilderness preservation system.

**Zone:** See “management zone.”



# Acronyms and Abbreviations

ABP	Asset Business Plan
ADA	Americans with Disabilities Act of 1970
APCD	Air Pollution Control District
API	Asset Priority Index
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
CBA	Choosing By Advantages
CCC	Civilian Conservation Corps
CEQ	Council on Environmental Quality
CLI	Cultural Landscape Inventory
CLIP	Climate Leadership in Parks
CFR	Code of Federal Regulations
CO <sub>2</sub>	Carbon Dioxide
CRV	Current Replacement Value
DO	Director's Order
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FCI	Facility Condition Index
FCRPA	Federal Cave Resources Protection Act of 1988
FMH	Fire Effects Handbook
FMSS	Facility Management Software System
FTE	Full time equivalent
FY	Fiscal Year
GIS	Geographic Information Systems
GMP	General Management Plan
I&M	Inventory and Monitoring

IMPROVE	Interagency Monitoring of Protected Visual Environments
LABE	Lava Beds National Monument (also Lava Beds and "the monument")
LCS	List of Classified Structures
MMP	Museum Management Plan
MNF	Modoc National Forest
NAGPRA	Native American Graves Protection and Repatriation Act
NHNO	Ammonium nitrate
NHSO	Ammonium sulfate
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NPS	National Park Service (also Park Service)
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
PAMP	Park Asset Management Plan
PEPC	Planning, Environment, and Public Comment
PL	Public Law
PWA	Public Works Administration
RV	Recreational Vehicle
SiO <sub>2</sub>	Silica
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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