



United States Department of the Interior



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IN REPLY REFER TO:

L7617 (PWRD-P)

JUL 11 2018

Memorandum

To: Superintendent, Lassen Volcanic National Park

From: Regional Director, Pacific West Region

Subject: Environmental Compliance for Bumpass Pass Trail Improvements

The *Finding of No Significant Impact* (FONSI) addressing deferred visitor use and public safety upgrades to this iconic CCC era trail are approved.

In order to complete this particular conservation planning-environmental impact analysis effort, at the time when the park provides public notice of the decision to park stakeholders, the FONSI should be made available to all those who received or commented on the supporting environmental assessment.

for 
for Stan Austin

Attachment



Bumpass Hell Trail Visitor Use Improvements

Finding of No Significant Impact

June 2018

This Finding of No Significant Impact (FONSI) documents the decision of the National Park Service (NPS) to adopt the preferred alternative in the Bumpass Hell Trail Visitor Use Improvements Environmental Assessment (EA), which is Alternative 2: *Expand Opportunities for Visitor Use (Proposed Action/Preferred Alternative)*. This alternative was evaluated against Alternative 3: *Improve Visitor Use*, and Alternative 1: *No Action (Continue Current Management)*. All three alternatives were described and analyzed in the EA. This FONSI documents the NPS determination that no significant impacts on the quality of the human environment will occur from implementation of this trail rehabilitation.

Purpose and Need

The purposes of this project are to improve the trail surface and ease of maintenance on the Bumpass Hell Trail; to facilitate safe visitor access to and within the Bumpass Hell Basin, while preserving natural and historic resources and wilderness values; to improve interpretive and educational opportunities; and accommodate high visitor use.

Need for this project and the environmental assessment centers around improving safety, maintenance of the boardwalk and trail, and visitor experience, while mitigating damages to resources. Designated trails and boardwalk to and within Bumpass Hell Basin provide safe visitor access and resource protection, thus are needed to reduce off-trail travel and to minimize hazards associated with dynamic hydrothermal features and difficult terrain.

Bumpass Hell Basin is one of the most heavily visited places in the park. There is increased need to accommodate larger groups, consider alternative/additional trail access into the basin, improve vistas and overlooks, and reduce overall crowding. Interpretive waysides have exceeded their useful lives, needing new information and fabrication. The park needs to address these concerns while maintaining the rustic, up-close, and full sensory visitor experience unique to Bumpass Hell Basin.

Heavy annual snow loads, encroaching thermal features, and the dynamic environment within the basin creates a constant need for boardwalk maintenance and trail management. Required repairs are difficult, expensive, and often hindered by the proximity of hydrothermal features and/or unstable soils, particularly if relocation is needed.

Where trails in the basin are not well-delineated, they may encourage off-trail travel and damage resources. Boardwalk construction materials may be affecting area resources both visually and through the leaching of metals and toxins from treated wood. High visitation and distance to restroom facilities (1.5 miles from Basin to parking area) can result in human waste impacts. Building flexible infrastructure in the basin will help address the dynamic environment with fewer resource impacts.

Actions Unique to the Selected Alternative

In addition to the actions identified above, the selected alternative would include a variety of changes to expand opportunities for visitor use, while continuing to protect park resources.

Bumpass Hell Trail

Main Trail: A range of existing and new opportunities, such as continued access to the Bumpass Hell Basin and an improved trail tread to Bumpass Hell Overlook will be available for visitors. The selected alternative will improve passage at the pinch points via trail widening. This will be accomplished by restoring stone retaining walls, removing slough, and rehabilitating trail tread to its historic width/level. Importantly, the modifications will be such that the trail will retain the same alignment and preserve character-defining features noted in the Determination of Eligibility (the analysis that states that the Bumpass Hell Trail is eligible for listing in the National Register of Historic Places).

Beginning with the connection of the trail to the Bumpass Hell parking area, the trail will be restored to its original width (approximately 4-feet) and mild (approximately 6 percent) grade, improving the surface, where possible, to provide for visitors with mobility impairments to use on their own or with assistance. In several short sections, the trail will likely be steeper than 6 percent. The trail will be ramped, outside retaining walls constructed, and the trail filled to reduce the grade as much as possible within these short sections.

The Bumpass Hell Trail, improved by the Civilian Conservation Corps (CCC) in the 1930s, is important for its alignment, constructed features, and the ability of visitors to traverse the Bumpass Hell Basin. Some of its historic components, such as dry-stack rock retaining walls, have collapsed, although evidence of their construction is clear. Under the selected alternative, these features will be reconstructed or rehabilitated, according to the Secretary of the Interior's Standards, pulling up material that has sloughed off and adding adjacent compatible rock. Other features, such as rock lining of some parts of the trail will be retained and/or rehabilitated where needed.

Abandoned Access Trail: An historic trail to the Bumpass Hell Basin that has been abandoned since the early 1990s will also be rehabilitated, improving tread and drainage by replacing water crossings, including a bridge (approximately 3 x 6 feet) and constructing a short section of boardwalk (approximately 3 x 20 feet) through area wetlands. This trail was the primary access to the Bumpass Hell Basin before it was abandoned and the trail that traverses the west slope was constructed. It provides better shoulder season access since it is less steep and melts out before the existing trail. It also includes some features not accessed by the other trail, including a close-up look at frypans and area native vegetation, such as the wetlands comprised of rushes and sedges. The trail is approximately 0.2 mile (880 feet) long and four feet wide and extends east from a curve in the current access trail down into the basin.

Trail Overlooks (4 Formal)

Brokeoff Volcano overlook

The Brokeoff Volcano Overlook will be improved by reconfiguring the current open gathering space to accommodate school and other groups stopping in the area to take advantage of opportunities for extended education/interpretation. Seating will be added and barriers and/or revegetation will be used to reduce the disturbance area within the site. Because this area has good cell phone coverage, the selected alternative includes providing an option for an audio tour or other digitally accessible information about the area and Bumpass Hell Trail features.

Bumpass Hell overlook

Enhancing the Bumpass Hell Overlook includes raising and leveling the area to provide a better view, while reconfiguring the gathering space to better accommodate visitors in the designated area. Additional seating will be added to accommodate groups and to provide for those who do not descend into the basin. Limited vista clearing will improve already good views by removing a few small trees not present historically. The area wayside will be updated and safety signage added. Near the edge of the viewpoint,

Facilities

No additional facilities (toilet, webcam, nor other components considered under Alternative 3) will be included in this project.

Restoration

Several areas, including the Eastern Overlook will also be delineated.

Interpretation

In addition to improved interpretive exhibits and improvements at the Bumpass Hell Overlook (spotting scopes), the park will develop signage to delineate natural features along the Bumpass Hell Trail, creating a nature trail by identifying numbered stops via an electronic and/or paper trail brochure.

Safety

Actions will be the same as identified for all alternatives.

General Construction Schedule

Reconstruction of the boardwalk is scheduled to begin as soon as the road has been cleared to the Bumpass Hell parking lot. In a heavy snow year this occurs in July. However, this winter has been exceptionally mild with snowpack at less than 30% of normal. Therefore access to the project site could occur as early as May 2018.

Selected Alternative Rationale for the Decision

The selected alternative will restore historic sections and features of the trail, including its historic width and mild (approximately 6 percent) grade. Filling the trail, adding soil binders (if feasible), and fixing trail edges (including rock retaining walls) will reduce soil erosion and remove obstacles in the tread. Restoration of disturbed areas and social trails will benefit vegetation. Boardwalk, signage, and trail tread improvements will reduce existing human health and safety impacts, including the potential for injury. Replacement of existing boardwalk structure with new materials will improve the character of the basin and reduce impact to the environment from boardwalk debris. Visitor experience will benefit from restored viewpoints, improved interpretive signs, and a trail in good condition. The selected alternative also provides the greatest balance between providing an enhanced accessibility and visitor experience, while continuing to protect natural and cultural resources in the project area.

Other Alternatives Considered

Alternative 1: No Action

Under Alternative 1, management of the Bumpass Hell Trail would include ongoing maintenance, existing plans and currently approved actions and seasonal repairs to the trail and boardwalk.

The trail to the Bumpass Hell Basin begins from the Bumpass Hell parking area and continues to an overlook above the basin. From there, the main trail descends to the lower basin. An abandoned trail forks off the main trail partway down. For much of the past 42 years, a boardwalk to provide closer access hydrothermal features has been provided. Eventually the trail ascends toward Cold Boiling Lake and on to the Kings Creek Picnic Area. It is the trail to and within the basin that is the subject of this plan.

Bumpass Hell Trail

The trail to Bumpass Hell has deteriorated from heavy use and lack of cyclic maintenance since its last major rehabilitation in the 1970s. Historic walls have failed and the tread is marked by numerous tripping hazards, including rocks and roots. Under Alternative 1, the park would continue to undertake regular trail maintenance actions, such as fixing the tread but would not reconstruct heavily deteriorated features, such as rock walls. Therefore, the trail would remain similar to its current condition, including bare and eroded areas adjacent to the trail.

Typical annual maintenance actions on the trail would continue to include marking the trail with bamboo wands in spring through remaining snow and digging out some drifted sections to minimize later trail

the Bumpass Hell Basin, and the surrounding backcountry. As in the selected alternative, the gathering space would accommodate groups by adding more seating for those who remain at the top; improve views by limited vista clearing; improve safety messaging; and provide some additional reinforcement to the unstable slope below the area by improving drainage and keeping visitors back from the edge.

Brokeoff Overlook enhancements also include installing a webcam in a non-visible area near the overlook to provide internet-accessible views of the area for remote visitors. A single pole would be used to support equipment needed, including a small solar panel, a power storage case, a cellular wireless hotspot and antenna, and the webcam plus outdoor enclosure. The camera will upload photos through a wireless connection. The color of the equipment will blend with the surrounding area. The proposed south aspect provides a clear view of the basin and maximizes solar efficiency. A set of hemlock trees provides an enclosure on the west side, nearly eliminating the visibility from the Bumpass Hell Trail. Other equipment would be stored in a metal box at the base of the pole. The location is accessible in the winter via a northeastern route and in the summer from the Bumpass Hell Trail. The exact location would be selected based on cellular service reception, efficacy of the solar panel, and visibility from the trail and boardwalk.

Boardwalk

Actions to reconstruct the boardwalk would be the same as in the selected alternative. The boardwalk; however, would be truncated close to the Big Boiler. Because the boardwalk would not extend to the Pyrite Pool, another overlook (Eastern Overlook) would be enhanced along the Bumpass Hell Trail above the basin toward Cold Boiling Lake, which would provide views looking down on the Pyrite Pool.

This new overlook would be delineated with an edge treatment, such as a split rail fence and enhanced with interpretation to replace those lost along the removed sections of boardwalk. The barrier would be intended to minimize disturbance of the adjacent slope and adjoining creek.

Facilities

An enclosed self-contained (accessible) toilet would be installed at, but concealed visually from, the Bumpass Hell Basin Overlook. This would replace a pit toilet, constructed in the 1930s, formerly located in the area. The facility would be either a composting toilet or a dehydration system with small solar panels. To minimize visual intrusion, it would be sited on the hillside in the trees near the overlook to facilitate waste removal and maintenance. The building would be prefabricated and similar to CXT construction in order to withstand heavy snow loads at this high elevation site. The facility would improve the experience for those visitors ending their journey at the overlook as well as for those wanting to spend more time in the basin. Depending on the type of toilet constructed, the need to remove human waste would be minimized. To minimize or avoid the use of air support for this operation, which could affect nearby wilderness, human waste would be removed using a trail vehicle.

Restoration and Safety

Actions would be the same as in all alternatives.

Interpretation

Actions would be the same as in the selected alternative.

Number	Mitigation Measure	Responsible Party
Water Resources		
WR-1	Use temporary sediment control devices such as filter fabric fences, or sediment traps as needed during work near water.	Trails Foreman
WR-2	Minimize soil disturbance and re-seed or revegetate disturbed areas as soon as practicable.	
WR-3	Add rocks, soil, or duff to areas without vegetation.	Trails Foreman
WR-4	Locate staging areas away from areas where water would runoff to adjacent water bodies.	Trails Foreman
WR-5	Cover stockpiled soil and rock throughout the duration of the project with a breathable, water repellent fabric anchored around the perimeter to minimize sedimentation.	Trails Foreman
WR-6	Minimize the amount of disturbed earth area and the duration of soil exposure to rainfall.	Trails Foreman
WR-8	Use swales, trenches or drains to divert stormwater runoff away from disturbed areas. Outslope the rehabilitated trail.	Trails Foreman
Wetlands		
WT-1	Avoid wetlands where possible by trail routing.	Trails Foreman
WT-2	Use bridges rather than culverts to cross drainages.	Trails Foreman
WT-3	Avoid excavation during wet periods.	Trails Foreman
Vegetation		
VG-1	Narrow limits of construction would be established to avoid impacting sensitive, slow-growing subalpine and alpine plants.	Trails Foreman
VG-2	Rock imported from outside the park would be from approved sources and would be inspected and/or approved by NPS staff prior to importation into the park to avoid inadvertent importation of invasive species.	Trails Foreman/ Terrestrial Ecologist
VG-3	Materials used in project work would be transported and stored so as not to acquire noxious weed seeds from adjacent areas.	Trails Foreman/ Terrestrial Ecologist
VG-4	The project area would be monitored for undesirable plant species (exotics) and control strategies implemented if such species occur.	Trails Foreman/ Terrestrial Ecologist
VG-5	Although most restoration would include only replacement of rocks, if seeding or planting occurs, only native species, appropriate to the site would be used.	Terrestrial Ecologist
VG-6	Where possible, removed native plants would be salvaged and transplanted.	Terrestrial Ecologist
Archeological and Historic Resources		

Why the Selected Action Will Not Have a Significant Effect on the Human Environment

As defined in 40 CFR 1508.27, significance is determined by examining the following ten criteria:

Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial: No major adverse or beneficial impacts were identified in the environmental assessment that require analysis in an environment impact statement.

The primary impact topics identified in the environmental analysis and documented in the environmental assessment included: soils and geology (including hydrothermal resources), water resources (water quality and wetlands), vegetation, archeology and historic resources, visitor experience, and human health and safety.

Degree to which the proposed action affects public health or safety: Under the selected alternative, the Bumpass Hell trail and boardwalk will undergo improvements to increase safety for visitors and park employees. The trail tread will be evened and smoothed facilitating easier passage. The trail will be widened to its historic width (approximately 4 feet) to allow groups to pass and wheelchairs room to maneuver. Where possible, grade will be eased to 6%. These improvements will allow more visitors to hike to Bumpass Hell to experience the unique hydrothermal features of the area.

Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas: As analyzed in the environmental assessment, there will be no significant effects on park lands, including prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. The Bumpass Hell trail is historic. All work undertaken in the selected alternative has been analyzed under National Historic Preservation Act regulations and State Historic Preservation Officer (SHPO) consultation has been completed, with concurrence that no adverse effect will occur. Most improvements are to restore historic features of the trail and/or to improve accessibility.

Degree to which the effects on the quality of the human environment are likely to be highly controversial: No highly controversial effects were discovered during the preparation of the environmental assessment.

Degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risks: No highly uncertain or unique or unknown risks were discovered during the preparation of the environmental assessment.

Degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration: The selected alternative neither establishes a precedent for future actions with significant effects nor represents a decision in principle about a future consideration.

Whether the action is related to other actions with individually insignificant, but cumulatively significant, impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or breaking it down into small component parts: The selected alternative is not related to other actions with individually insignificant, but cumulatively significant impacts.

The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources: The selected alternative will not adversely

There was little support for removing the boardwalk or for alternatives that dramatically reduced its length. Most comments favored flexibility regarding the existing boardwalk and improvements to the visitor experience. There was quite a bit of support for making the trail as accessible as possible up to the Bumpass Hell Overlook; however, many commenters noted that they would be satisfied with any one of the boardwalk alternatives. Approximately one-third of commenters made a specific comment about the unique experience/benefits of being within the basin on the boardwalk. A few commenters were enthusiastic about the webcam, questioned the feasibility of a backcountry toilet, and/or voiced disapproval of potential impacts from adding another new trail around the basin.

Public Comment on Environmental Assessment Spring 2018

The public comment period on the Bumpass Hell Trail Visitor Use Improvements Environmental Assessment was open from March 8, 2018 through April 7, 2018. The opportunity for public review was advertised via the park's webpage and social media, through an official press release, and through the PEPC website. In each of these instances, the public was directed to use PEPC for submitting comments.

There were a total of 13 individuals submitting correspondences in PEPC contributing 23 total comments. Only one comment was considered substantive, as all other comments either agree or disagree with some aspect of the alternatives. These comments were coded into seven broad categories: Prefer No Action Alternative (3); Wilderness-Development (1); Park Operations: Impacts (2); Editorial (4); Impacts to Visitor Experience (7); In Favor of Keeping Boardwalk (4); and Impacts to Natural Resources (2). All of these comments are in line with comments heard and addressed in previous public scoping efforts. The 13 persons corresponding were from the state of California (USA) and represented six counties: Shasta (3), Alameda (1), Butte (4), Santa Clara (1), Sacramento (3), and Santa Cruz (1). All correspondents were unaffiliated with organizations, except for one person who identified both as unaffiliated and affiliated with Butte County Land Use Coordinating Committee. They indicated support for the preferred alternative (2).

The one substantive comment included a request for improved accessibility, including at least one accessible viewpoint. To make the trail fully accessible based on the ABA standards (ABAAS), the trail would need switchbacks to alleviate steep grades on some sections of the historic trail. This would change the historic alignment of the trail and adversely affect the values which make it eligible for the NRHP. Nonetheless, where possible, rehabilitation improves numerous barriers, as much as feasible the park fulfilled the Architectural Barriers Act (ABA). Large obstacles are being removed, trail tread evened, and grade lessened where possible to make the trail to the Bumpass Hell Basin more easily accessible for visitor use. Along the trail between the parking area and the Bumpass Hell Overlook, no other locations overlook the Basin. The Bumpass Hell Overlook is being improved by raising and leveling the area for better views, reconfiguring the area to better accommodate visitors, adding seating, and safety signage. Although work on the trail cannot meet some accessibility guidelines due to terrain and compliance with the National Historic Preservation Act (NHPA), the selected project goes as far as possible in removing obstacles and improving opportunities for accessibility.

Agency Consultation

California State Historic Preservation Office

In accordance with Section 106 of the National Historic Preservation Act, the National Park Service provided the State Historic Preservation Officer (SHPO) of the California State Department of Archaeology and Historic Preservation an opportunity to comment on the effects of this project. Consultation on the draft Determination of Eligibility (DOE) and Area of Potential Effects (APE) was initiated June 22, 2017 (NPS_2017_0613_001). The SHPO concurred with our undertaking July 31st, 2017 and identification of historic properties on April 25th, 2018. In accordance with 36 CFR 800.11 (c) of the National Historic Preservation Act, the NPS provided the California SHPO with adequate documentation for a finding of no adverse effect on May 4, 2018. The SHPO failed to respond within the 30-day review period, and subsequent e-mails and voicemails have not been returned. Per 36 CFR 800.5 (c) (1), The



Non-Impairment Determination Lassen Volcanic National Park Bumpass Hell Trail Visitor Use Improvements

By enacting the NPS Organic Act of 1916 (Organic Act), Congress directed the U.S. Department of the Interior and the National Park Service (NPS) to manage units "to conserve the scenery, natural and historic objects, and wild life in the System units and to provide for the enjoyment of the scenery, natural and historic objects, and wild life in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (54 U.S.C. 100101). *NPS Management Policies 2006*, Section 1.4.4, explains the prohibition on impairment of park resources and values:

"While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the National Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them."

An action constitutes impairment when its impacts "harm the integrity of park resources or values, including the opportunities that otherwise will be present for the enjoyment of those resources or values" (NPS 2006, Section 1.4.5). To determine impairment, the NPS must evaluate the "particular resources and values that will be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts. An impact on any park resource or value may constitute impairment, but an impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance (NPS 2006, Section 1.4.5).

Fundamental resources and values for Lassen Volcanic National Park are identified in the enabling legislation for the park, the Foundation for Planning and Management, and other planning documents. Based on a review of these documents, the fundamental resources and values for Lassen Volcanic National Park come from the park's wide array of volcanic and hydrothermal features and associated geology, biodiversity and distinctive range of flora and fauna, human pathways and ties with the landscape, lands with wilderness character and other backcountry areas, and diversity of traditional recreational values and visitor experiences.

Hell Trail up to and including the new boardwalk in the basin would be rehabilitated (approximately three miles, 4-foot wide) resulting in both adverse and beneficial effects from modifications to the existing tread and from imported materials.

In addition, there would be approximately 1,584 feet of trail rehabilitation associated with improving the abandoned access trail into the basin. This trail would continue to be 4-foot wide, resulting in disturbance of approximately 6,336 square feet (0.15 acres). Included would be 15 cubic feet of excavation for trail bridge footings and up to 35 feet of puncheon or boardwalk construction to minimize adverse impacts to a small seep wetland.

Similarly, overlooks and rest stops would be rehabilitated. The largest two (Brokeoff Volcano and Bumpass Hell) would be redesigned to accommodate the school and other groups that are frequent users of the trail, and would include site furnishings, such as benches or large seating rocks pulled from surrounding areas or imported. Although no paving or hardening of the sites would occur, the wide areas encompassing the overlooks would continue to have compacted soils. At the Bumpass Hell Overlook, modifications would occur to create a single large overlook by correcting erosion along the edges and by removing a few small trees and other vegetation that blocks views of the basin. Each of these actions would affect soils and geology to varying degrees. Soils would be affected slightly by the small degree of vegetation removal, with more effects from continued compaction. Geology would be affected by importing materials from the surrounding area, other parts of the park, or suitable materials from outside the park, depending on availability of stockpiled materials. This is because no borrow areas are available or can be created. Approximately 10,000 square feet of imported material would be used to cover rocky protuberances in the existing trail tread to eliminate tripping hazards. Rock needed to reconstruct the rock walls and overlooks would consist of approximately eight cubic yards and would be procured locally. Excavation would occur for placement of new or rehabilitation of old wayside exhibit bases. Another 1,000 square feet of imported fill would be needed annually to maintain the trail tread and to withstand mechanical erosion from hikers and water flow during spring snowmelt.

Improvements at the eastern overlook would also reduce social trailing in that area by delineating a small area for the viewpoint. In addition, there would be restoration actions associated with delineation of the Bumpass Hell and Brokeoff Volcano overlooks and the trailside rocks area plus the trail through the lupine meadow would be restored, resulting in beneficial effects on soils from improved vegetation coverage and from making the area of disturbance associated with visitor use smaller.

Conclusion: The selected alternative will not adversely affect soils or geology, except in a very small localized area associated with the trail alignment, and from compaction related to replacement of the boardwalk in the Bumpass Hell Basin and use of overlooks. Instead, the selected alternative will improve soil retention within the trail tread, reducing short- and long-term erosion. Boardwalk reconstruction would continue to protect hydrothermal features, including fragile areas from human foot traffic.

Water Resources, including Water Quality and Wetlands

Park water resources are diverse and include lakes, streams, ponds and springs. In the Bumpass Hell area, water resources consist of one small unnamed intermittent creek and a small spring-fed wetland on the historic access trail and boiling springs, a hot creek and boiling pools within the Bumpass Hell Basin.

Water Quality: Work in or near water would include installing footbridges at one unnamed intermittent creek and a raised boardwalk in one wetland, near a spring. Trail work would also occur near boiling springs and a hot creek within the Bumpass Hell Basin. Because the creek would be bridged, above the ground surface, avoiding bank impacts there would be no need to redirect flow during installation. Similarly, constructing a structure, such as a boardwalk, that would allow water flow beneath it would have long-term beneficial effects on water quality.

Elsewhere, trail work in the basin would not be expected to cause sedimentation. Overall, these actions are small and could result in localized inputs of sediment to their associated water bodies, constituting very small localized short-term adverse effects. Beneficial effects on water resources could occur from

placement of rocks and logs and building up the elevation slightly would also require importation of soil and the rocks/logs for seating, with potential adverse effects from adding these elements and from the disturbance to potentially result in nonnative invasive plant communities. Improving drainage may also result in minimal loss of vegetation. Although numerous areas along this high elevation trail have little vegetation, some, such as the trailside rocks area have been denuded from visitor use, such as rest stops and social trailing in the vicinity. In these areas, some rehabilitation, such as placement of brush combined with replanting or seeding would be undertaken, improving the area by distinguishing resting and restoration areas.

Elsewhere, there would be specific plans developed to revegetate areas surrounding overlooks as well as areas that are no longer used, such as the trail through the lupine meadow. These restoration areas could comprise approximately 3,000 square feet (0.07 acre).

Conclusion: The small range of adverse impacts to vegetation from the selected alternative would not impair vegetation or vegetation-related values.

Archeological and Historic Resources

The area of potential effects for cultural resources for the Bumpass Hell Trail Repair consists of approximately 10 acres within and adjacent to the Bumpass Hell caldera basin. This area includes the trail for Bumpass Hell, beginning at the Bumpass Hell Parking Area, continuing to the access trail from the turnout across from Lake Helen, and the trail to Bumpass Hell, including the area comprised by the boardwalk in Bumpass Hell Basin and the trail to the Eastern Overlook (before the trail descends as it continues toward Cold Boiling Lake).

Ground disturbing activities, (e.g. excavation, grading, vegetation removal, and scarification for trail repair), rock wall reconstruction, improving overlooks, rehabilitating the historic trail, and rehabilitation/restoration of denuded areas could affect previously unknown prehistoric and historic archeological resources. To the extent that these activities occur on the historic portions of the Bumpass Hell Trail, including work on the trail and rock wall reconstruction, would also affect historic resources. A small portion of the current trail, from the Bumpass Hell Overlook to the basin, was constructed in the 1970s and is not part of the historic trail.

Because activities on the historic portions of the Bumpass Hell Trail, including reopening of the abandoned access trail into the basin, would be conducted in accordance with the Secretary of the Interior's Standards for Rehabilitation, actions would be intended to have no adverse effect on historic resources. Character-defining features, including conforming to the original width, grade, and alignment of the Bumpass Hell Trail and its small-scale features, such as rock lining, would be retained. Although there would be changes to improve tread in the selected alternative, these changes would be primarily related to reconstructing the trail to meet its original grade and width, in keeping with its construction by the CCC.

The current trail has two sections of stone steps, which were originally constructed by the CCC. One section is located on the uphill section adjacent to the historic dry-stack rock retaining walls which have deteriorated; the other is located on the descent to the Brokeoff Volcano Overlook. Other currently impassable features, such as protruding rocks and roots, are artifacts of the trail's deterioration since its construction. In many locations, the width of the trail has narrowed from 48-inches to 24 inches, due to deposition on the trail from above and from erosion of fines and other materials from the trail tread.

Rehabilitation of the trail would include reconstruction of dry-stack rock retaining walls along approximately 0.5 miles of the trail. These walls would source materials from the local area, including rocks that have fallen downslope as well as material removed from above the trail tread and would use traditional methods to reconstruct them. Slope retention may also be necessary in other areas, such as in the area downhill from the parking area, depending on the need to widen areas that have lost width from deposition or erosion or where the need to flatten the grade in steep sections exists. In these areas