Lassen Volcanic National Park

National Park Service
U.S. Department of the Interior

Lost Creek Campground and Volcano Adventure Camp Water Well

Environmental Assessment

Figure 1: Students at Volcano Adventure Camp (NPS photo)

April 2022

Lassen Volcanic National Park
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How to Comment on this Environmental Assessment

This Environmental Assessment (EA) is being made available to the public, federal, state and local agencies and organizations through press releases distributed to a wide variety of news media, direct mailing, placement on park websites and announcements in press releases as well as in some local public libraries and other public places.

Copies of the document may be obtained from Planning, Environment, and Public Comment website (PEPC) or Lassen Volcanic National Park:
Internet: https://parkplanning.nps.gov/lavo (PEPC Project Number 94370) or https://parkplanning.nps.gov/lostcreekwell.

In addition, written comments will be accepted at the above or following locations:
Email: lavo_information@nps.gov
Fax: (530) 595-3262
Phone: (530) 595-6100

Mail:
Lassen Volcanic National Park
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Note to Reviewers: Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment –including your personal identifying information– may be made publicly available at any time. Although you can ask the National Park Service (NPS) in your comment to withhold your personal identifying information from public review, the NPS cannot guarantee that it will be able to do so.

Responses to substantive comments on the EA will be addressed in the proposed Finding of No Significant Impact (FONSI) or will be used to prepare an Environmental Impact Statement (EIS) (if warranted).

Note: For more information about specific agency and staff consultation, see Chapter 4: *List of Persons and Agencies Consulted.*

Chapter 1: Purpose of and Need for Action

This chapter describes the purpose and need and introduces the project area and the planning background for the project. It also includes impact topics, which are the potentially affected resources. This chapter also discusses topics that have been dismissed from further analysis, because there are no or very small impacts.

Introduction

Lost Creek Campground and the Volcano Adventure Camp (formerly Crags Campground) (Figure 2) are popular overnight destinations located in the northwest corner of Lassen Volcanic National Park. Open seasonally from the middle of June to the middle of September, the campgrounds are accessed from the Lassen National Park Highway (California Highway 89), five miles south of the Manzanita Lake entrance to the park. Lost Creek provides a seasonal water source for these campgrounds.

The Lost Creek Campground was originally a Civilian Conservation Corps camp in the 1930-40s, later called the Old Boundary Springs Campground, which was open from 1933-1940. Later, during the National Park Service (NPS) Mission 66 development period (late 1950s-mid-1960s), the NPS redesigned the campground and it has been open to the public since then. In 2016 the NPS converted the adjacent Mission 66 era Crags Campground to the Volcano Adventure Camp.

Lost Creek Campground has eight group campsites that accommodate 10-25 people per campsite. These campers rely on vault toilets and the existing Lost Creek intake for potable water. The Volcano Adventure Camp is a youth camping facility that introduces school-aged visitors to the park. Park staff and the Lassen Park Foundation support school districts throughout California in bringing in children that may not otherwise experience an overnight stay in a natural setting. Amenities include ten canvas cabins and four tent sites, vault toilets, covered pavilions to gather for meals and learning, hot showers, propane grills, vault toilets, and dishwashing sinks. When full, the camp accommodates 21-40 people per night.

A. Purpose and Need

Lost Creek experiences seasonal (spring runoff) and episodic cloudiness (high turbidity) due in part to fine-grained pyroclastic material and other sediment from the area entering the watershed. This particulate material clogs the Lost Creek intake's filtration system, requiring time-consuming and expensive maintenance, and increased treatment efforts by park staff to meet drinking water quality standards (NPS Water Resources Division [WRD] 2019).

As a result, during short periods, the water delivered to the Lost Creek and Volcano Adventure Camp public campgrounds fails to meet secondary drinking water standards for turbidity and total dissolved solids[1]. During these periods the park must discontinue delivery of potable water from the Lost Creek Intake to these campgrounds. During poor water quality events the park incurs additional costs from trucking water from the Manzanita Lake area to meet basic water needs at the campgrounds. In addition, the episodic high turbidity and suspended solids require

[1] Total dissolved solids is a measure of the combined content of all contaminants contained in drinking water.

frequent replacement of expensive filters in the treatment system.

Usually, groundwater from a well can provide less turbid drinking water than intakes from creeks and lakes. The National Park Service (NPS) proposes to test and, with successful testing, to develop a groundwater source to replace the Lost Creek intake to provide a consistent supply of high-quality drinking water to these campgrounds during their operating season.

Background

Under typical conditions the Lost Creek Intake and Water Treatment System provides an adequate supply of high-quality drinking water to the Lost Creek and Volcano Adventure campgrounds. This water system often fails to meet secondary drinking water standards for turbidity and total dissolved solids. This is due to fine glassy volcanic sediment in the watershed entering Lost Creek and causing visible turbidity upstream of the Lost Creek intake. During these events, the turbidity in the creek rises dramatically, often over the course of just a few minutes. When the raw water entering the treatment plant exceeds 2.0 NTUs[2], it must be shut down to meet State standards. Water treatment facilities cannot filter out this degree or type of sediment with any existing technology. During these events park staff shut down the treatment plant and discontinue water service from the Lost Creek Intake by trucking water to the tank until the turbidity problem is abated.

In 2019, NPS Hydrologists from the Water Resources Division (WRD) (Ft. Collins, Colorado) conducted a field visit to the area to investigate the possibility of developing a groundwater source. Their field review determined that there may be adequate groundwater present, but their report recommended that a test well be drilled to determine if adequate groundwater resources exist to provide drinking water to the campgrounds (NPS WRD 2019).

If sufficient groundwater is found at the test well (Figure 3), the existing surface water collection system would be decommissioned, and the park would convert to the new groundwater source. A new water treatment plant would be constructed to provide groundwater disinfection and distribution without the additional costly monitoring requirements that are required for surface water sources.

[2] The State requires the NPS to shut down the treatment system if influent exceeds 2.0 NTU (a measurement of turbidity – cloudiness).

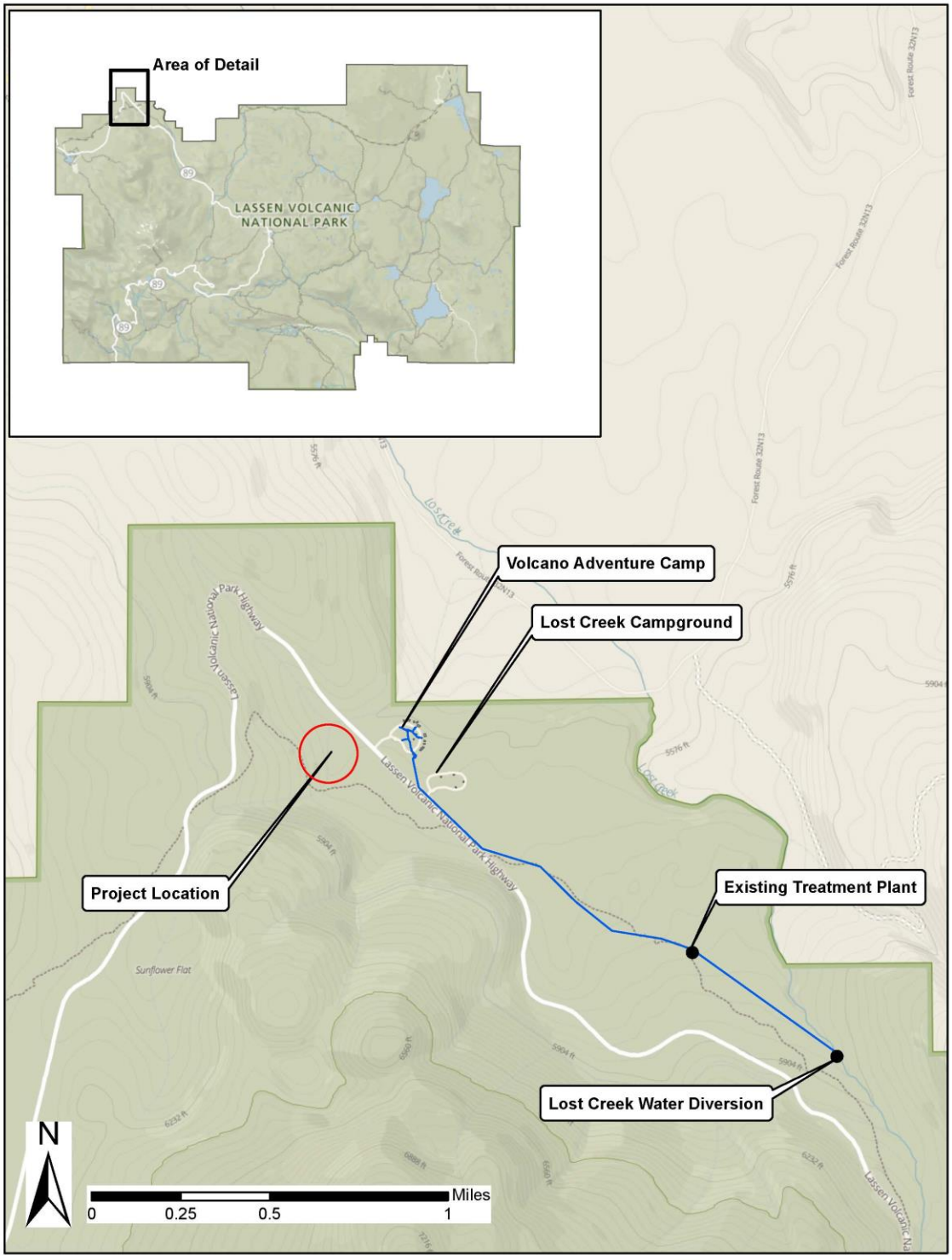

Figure 2: Existing Lost Creek Campground, Volcano Adventure Camp, and Water Intake and Storage

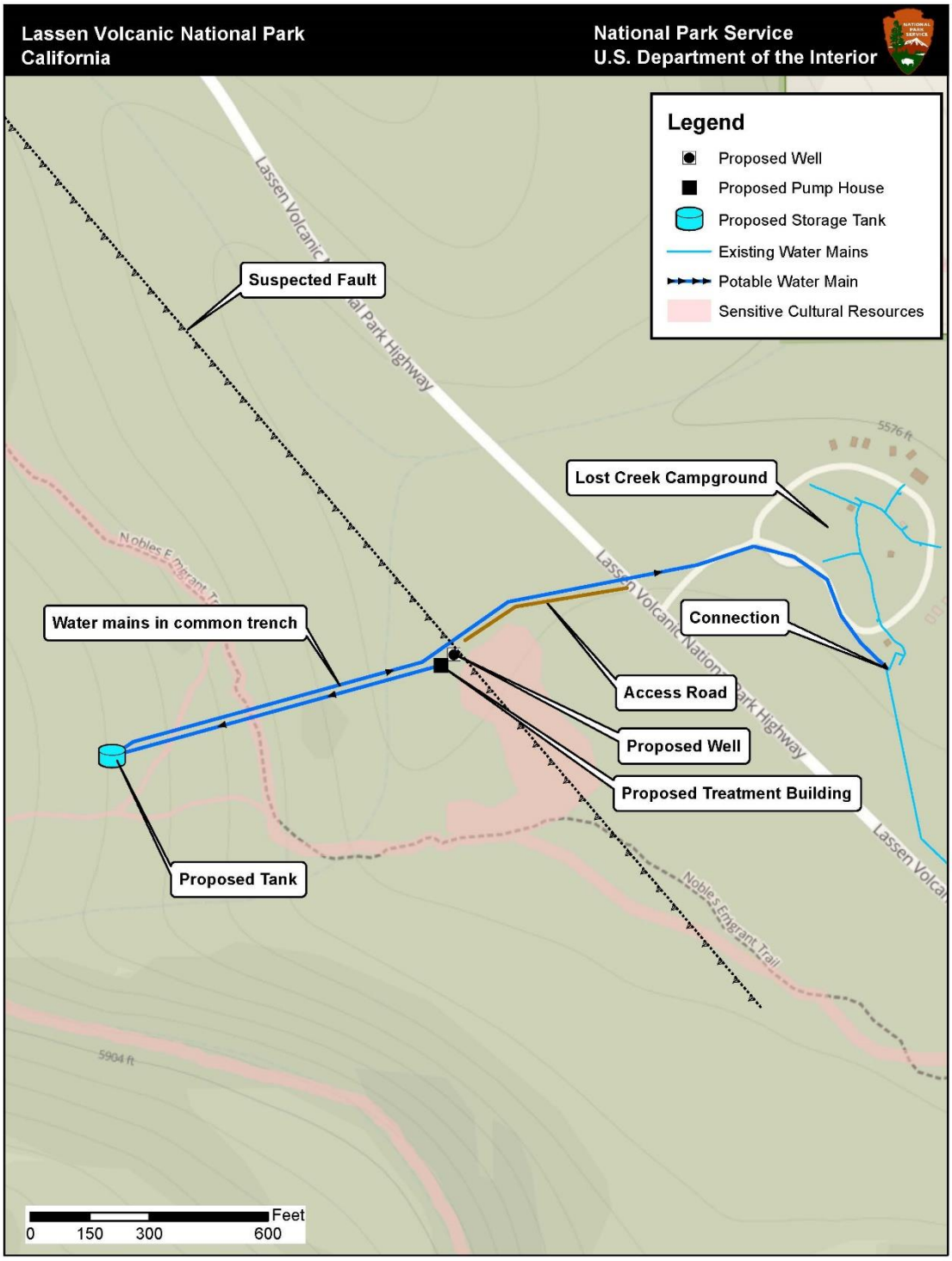

Figure 3: Potential Test Well Location

B. Issues and Impact Topics from NPS, Tribal and Public Scoping

Issues and impact topics are the resources of concern that may be affected by the range of alternatives considered in this Environmental Assessment (EA). Impact topics are used to analyze changes from the current conditions within the project area in the Affected Environment and Environmental Consequences chapter.

Impact topics were retained

- if they are directly related to the proposal;
- if analysis of environmental impacts is important to make a choice between the alternatives;
- if the environmental impacts were raised as a concern by the public and/or other agencies; or
- if there are potentially significant impacts associated with the issue.

The following resource topics are evaluated in this EA: Soils/Geology, Water Resources (hydrology, water quantity, and water quality), Vegetation, Cultural Resources (archeology, historic structures, and cultural landscapes), and Visitor Experience.

C. Issues and Impact Topics Considered but Dismissed

Issues and impact topics are dismissed from further evaluation if:

- they do not exist in the analysis area, or
- they would not be affected by the proposal, or
- the likelihood of impacts are not reasonably expected, or
- through the application of mitigation measures, there would be no measurable effects from the proposal.

The following topics were among those eliminated from detailed study because there would be minimal or no impacts: Air Quality, Fish and Wildlife, Socioeconomics, Indian Trust Resources, and Environmental Justice.

Historical survey data and NPS surveys have not documented the presence of any species protected by the federal Endangered Species Act. Therefore, the NPS determined that there would be no impact on federally listed species from the proposed action. Therefore, actions would result in a no effect determination on California red-legged frog (*Rana draytonii*), delta smelt (*Hypomesus transpacificus*), conservancy fairy shrimp (*Branchinecta conservatio*), shasta crayfish (*Pacifastacus fortis*), slender Orcutt grass (*Orcuttia tenuis*), and whitebark pine (*Pinus albicaulis*).

D. Decision to be Made

This EA evaluates impacts to park resources from the proposed project. The Regional Director, NPS Interior Regions 8, 9, 10, and 12 (formerly the Pacific West Region) will decide, based on a recommendation from the Superintendent of Lassen Volcanic National Park, whether to test and develop a groundwater source for campground use. This decision will be documented in the proposed Finding of No Significant Impact (FONSI) if this EA finds that there are no significant impacts (per section 102(2)(c) of the National Environmental Policy Act (NEPA). If

this EA reveals significant impacts on park resources from the project, the NPS would prepare an Environmental Impact Statement would be prepared to further evaluate alternatives.

E. Summary of Civic Engagement

During civic engagement from February 23 to March 5, 2022, the NPS received no public comments on this Environmental Assessment.

F. Federal, State, Local Permits and Consultation Requirements

The proposed action to construct a groundwater source would require a well-drilling permit from Shasta County (Department of Resource Management). In addition, if a sustainable groundwater source is developed, the project would require a public water system permit from the county (Department of Environmental Health – Public Water System).

Chapter 2: Alternatives, Including the Proposed Action

This chapter describes two alternatives. The no action (continue current management) alternative is intended to describe continued operation of the existing Lost Creek water system, which supplies potable water to Lost Creek Campground and Volcano Adventure Camp. The proposed action/preferred alternative is intended to achieve replace the often unusable surface water source with a groundwater source which would (if successful) improve the reliability of drinking water for park visitors at these campgrounds. Other alternatives were considered but dismissed from additional consideration based on several factors, including adverse impacts to historic resources. The NPS developed the two alternatives described in this EA with collaborative interdisciplinary analysis derived from the expertise of planning team members and other experts consulted. The park also conducted civic engagement with state, and federal agencies, interested organizations, and individuals.

A. Description of the Alternatives

Alternative 1: No Action – Continue Current Management by Maintaining the Existing Lost Creek Campground and Volcano Adventure Camp Surface Water Source and Trucking Water When Necessary

Under this alternative, the park would continue to maintain the existing surface water source at Lost Creek to supply potable water to Lost Creek Campground and Volcano Adventure Camp. During intermittent loss of service from this system due to poor water quality, in conformance with the California Water Resource Control Board (WRCB) standards, the park would have to obtain water from a different source. This is usually accomplished by trucking in potable water from the Manzanita Lake system, and transferring that water to the Lost Creek storage tank for use in the campgrounds.

The current surface water system supplying the campgrounds collects from a horizontal infiltration gallery in Lost Creek approximately 1.5 miles upstream from the campgrounds. Water travels from the collection point to a treatment plant with a 10,000-gallon storage tank approximately 0.5 miles northwest of the intake. Operational access to this site is via an unimproved unpaved road off Highway 89 south of the Lost Creek Campground that follows the route of the Nobles Emigrant Trail.

The increased frequency of fine particulate material in the Lost Creek water source has caused this surface water source to be shut down more often lately (in four of the last ten years) due to failure to meet water quality standards. During any future periods of high turbidity, the system would continue to be shut down by the park operator because of the system's inability to deliver water meeting water quality standards.

The cost of providing drinking water to the campgrounds during these intermittent shutdowns would continue to increase. When needed, park staff would continue to truck drinking water from the Manzanita Creek system and transfer it into the Lost Creek storage tank to keep up with demand in the Lost Creek Group Campground and the Volcano Adventure Camp. For example, during an 8-day high turbidity event in July 2021, an employee made 6-8 trips per day

to move water from the Manzanita Lake area to the Lost Creek water system storage tank, consuming nearly all of their time.

Alternative 2: Change the Lost Creek Campground and Volcano Adventure Camp Water Supply from a Surface to a Groundwater Source (Proposed Action/Preferred Alternative)

Under Alternative 2 (proposed action/preferred alternative), the one or more test wells would be drilled and tested for adequate water yield. If the test well is found to yield an adequate water supply, the NPS would then construct a groundwater well and distribution system to convert the system to a reliable source of groundwater that meets water quality standards for drinking water set by the U.S. Environmental Protection Agency, as enforced by the California Water Resource Control Board. If groundwater is not found, as in Alternative 1, the existing summer Lost Creek intake and water treatment plant would continue to be used. This would mean using the existing intake and treatment system and continuing to truck water from the Manzanita Lake area during high-turbidity events.

If the test well (Figure 3) is successful, well development would occur.[3] Air rotary drilling technology, which results in less surface area disturbance and allows for more accurate measurements of production during drilling, would be used for test and production wells.

Test Well Drilling: Hydrologists from the NPS Water Resources Division (WRD) identified the most likely site for a successful well across California State Highway 89 from the public campgrounds, approximately 900 feet west of the entrance to the Volcano Adventure Camp (NPS WRD 2019). Test drilling would target fractures associated with a geologic fault traversing the area. A 5-inch diameter test well would be bored approximately 200-250 feet deep. If water yield is inadequate, the park would continue to truck water as needed when the current system is inoperable. Spoils material from the test wells would be collected and hauled off site or placed at a designated re-use site within the park.

The well drilling equipment would navigate approximately 450 feet off Highway 89 to the project site, maneuvering around or relocating large and fallen trees, traversing some vegetation, and crossing the route of the Nobles Emigrant Trail before reaching the test well location (Figure 3). The temporary road would be constructed by clearing brush and ground litter and using matting, instead of bringing in fill or aggregate base material. Though designed to minimize disturbance, approximately 5-10 small (2-6 inches dbh) lodgepole pine trees and shrubs may be removed to construct the access road. The road would be designed to accommodate a 75,000-lb. drilling truck.

If well drilling finds water, the temporary access road (450 x 10 feet) would be reconstructed from Highway 89 to the proposed location. If the road is needed for continued access, it would be improved and gated.

[3] Based on state standards, adequate water supply is dependent on the results of yield and drawdown testing when a 72-hour test results in 25% of the test production rate, or a 10-day continuous test results in 50% of the production rate.

Groundwater Well Infrastructure: At the most suitable location where adequate water yield exists, the 5-inch test well bore would be re-drilled to 10-inches in diameter and then a 6-inch? diameter well casing and well screen would be installed in the borehole along with suitable filter pack material to pump groundwater from the well.

If developed as an operable well, the wellhead would require a 3-foot x 3-foot concrete pad with an above ground steel casing that would extend approximately 3-feet above the pad surface. A lockable well cap would be installed on the well casing.

Approximately 900 linear feet of water distribution lines would be constructed to cross under California State Highway 89 and connect with the existing distribution lines to the Volcano Adventure Camp and the Lost Creek Campground.

A 10-foot x 10-foot x 8-foot well house would be constructed approximately 25 feet from the well casing to house pump controls, chemical treatment, and filtration equipment. Water from the well would be directed via a pitless adapter that allows for a supply line to be buried below the frost line to the well house.

A 20,000-gallon (13.75-foot diameter x 20.2-foot high) water storage tank (painted to match the surrounding landscape) would also be located in the vicinity, approximately 1,200 feet from the well house on a concrete slab. Wiring for the 12-volt power sources for the pump would run underground between the well house and the well casing in a trench approximately 12 inches wide x 26-inches deep. Trenching for distribution lines (30-inches wide x 36-inches deep) would connect the treatment and filtration equipment to the campground. Utility trenches would first be backfilled with 8-inches of screened material not to exceed 0.75-inch in diameter, then the remainder of the trench would be backfilled with non-screened material excavated from the trench.

In addition, a berm for wellhead protection would be constructed around the well. This berm and a wellhead protection plan, if needed, would protect the well from any adjacent contamination issues due to nonnative invasive plant treatment in the vicinity or other runoff.

Rehabilitation of Existing Surface Water Intake: If the proposed well site can be developed for groundwater, the existing surface water intake at Lost Creek would be decommissioned and infiltration gallery infrastructure removed where it would not cause additional resource damage. Where infrastructure is removed, existing buried water lines would be unearthed and the associated intake structures and equipment would be reused, if possible. Concrete foundations would be dismantled. Materials unfit for reuse would be disposed of at an authorized disposal facility.

B. Mitigation Measures Incorporated into the Action Alternative

- Wells would be drilled, protected and sealed per State of California statute to prevent wildlife entrapment.

- The test drilling site is approximately 580 feet from a historically used California spotted owl nest. (California spotted owls are not listed under the Endangered Species Act.) This nest has not been used in approximately 10 years and this project would not affect the formerly used nest tree. Surveys conducted annually would continue. If the park wildlife staff finds that a pair has moved into the historic site a Limited Operating Period (LOP) would be placed for the area around the nest. The LOP is a ¼-mile circle around the nest in which no activity that would disturb the owls is allowed from March 1-August 31.

C. List of Alternatives and Actions Considered but Eliminated from Detailed Study

- Construct a 3.5-mile Water Transmission Line from the Manzanita Lake Municipal Water System

The NPS explored this concept in preliminary analysis. Manzanita Creek currently has municipal water storage and treatment facilities which service park housing and other administrative facilities, a visitor center, and a 100-site campground. The Manzanita Lake facility has the capacity to provide water to the Lost Creek and Volcano Adventure campgrounds but would require a 3.5-mile water distribution system. Constructing this distribution system would have potential adverse effects on soils, vegetation, and cultural resources. It would also be prohibitively expensive to maintain and require a booster pump to meet water pressure needs for the campgrounds.

- Contract a Water Hauling Company to Provide Potable Water to the Lost Creek Campground and Volcano Adventure Camp Storage Facility When Needed

The NPS considered but dismissed an alternative that would contracting with a water hauling company to provide potable water to the campgrounds as needed. This would be more costly than using a park employee to transport water. In addition, these contracted services are often unavailable during the wildfire season in California, which has become longer in recent years and overlaps with the busy visitor use season at the park.

- Construct a Larger Water Storage Tank at Lost Creek to Supply the Camps when the Water Turbidity is too High to Meet State and Federal Drinking Water Requirements.

This alternative was considered but dismissed because of the uncertainty associated with how long the water would need to be stored and the difficulties in storing raw or treated drinking water for long periods. Occasionally, poor water quality in Lost Creek results in a month-long shut down, which would require a 30,000-gallon water storage tank, three times larger than the existing tank. The tank could be constructed and maintained but allowing chlorinated water to stay in the tank for long periods would affect the amount of chlorine in the water and some chlorinated water would need to be wasted to maintain the amount of chlorine residual prescribed by treatment requirements. There is no place to discharge large amounts of chlorinated water because it cannot go back into the creek and the park does not have a sanitary sewer disposal system that would allow it to be treated before being released. Similarly, adding more chlorine to the stored water could result in the formation of unwanted disinfection byproducts that adversely affect drinking water quality.

If the larger tank retained untreated water, there would also need to be some way to easily stop the pumps during higher turbidity and to maintain circulation of the water in the tank, both of which would require a power source and more disturbance to the withdrawal site.

- Modify Slope Leading into Lost Creek Drainage Headwaters to Reduce or Eliminate Potential for Sediment Discharge into Lost Creek

Modifying the slope above the headwaters was considered but dismissed because it is located in wilderness and impacts would occur not for the administration of wilderness, but for the management of visitor facilities, in violation of the Wilderness Act. Further, grading cross-drains on the upper slopes to reduce sediment transport could potentially solve the sedimentation issue, however the sediment discharge location varies unpredictably, changing from one year to the next.

Chapter 3: Affected Environment and Environmental Consequences

Introduction

Affected Environment: Information in this section is derived from a comprehensive review of existing information pertaining to the project area within the park. It includes information from the Lassen Volcanic National Park General Management Plan (NPS 1999), *Weed Management Plan and Environmental Assessment* (NPS 2008a), other natural and cultural resources management plans, and park planning documents. Additionally, information presented in this section comes from the professional knowledge and experience of current and previous park staff.

Environmental Consequences: This section analyzes the potential environmental consequences (impacts or effects) that would occur from implementing the alternatives.

Recent regulation changes by the Council on Environmental Quality state that:
The environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration, including the reasonably foreseeable environmental trends and planned actions in the area(s) (40 CFR 1502.15).

The discussion shall include:

> The environmental impacts of the proposed action and reasonable alternatives to the proposed action and the significance of those impacts. The comparisons of the proposed action and reasonable alternatives under § 1502.14 shall be based on this discussion of the impacts (40 CFR 1502.16).

Reasonably foreseeable environmental trends include local effects of global climate change, which may affect the quantity and distribution of precipitation that contributes to surface water and groundwater supplies at the park.

Planned actions in the area include the following:

- Restore Historic Fire Regime and Forest Structure in Northwest Gateway Project Area

This is a planned 900-acre pine restoration project surrounding the Lost Creek project area. This thinning project removes some large overstory trees, small trees only yielding biomass, and restores the opportunity for low intensity fire regimes. This project began in late 2021 and is anticipated to continue through 2023 for the initial phase of thinning and removal of biomass. Fire treatments would begin in 2027 or 2028.

Soils and Geology

A hydrogeologist from the NPS Water Resources Division found that "the complex volcanic geology and discontinuous stratigraphy of the area make subsurface estimations difficult" regarding the presence and thickness of units underlying surficial deposits (NPS WRD 2019).

Notably, the report states, that despite the wet climate and abundance of surface water resources at the park, the area has inherently poor aquifers due to its volcanic geology (NPS, 2019). Developing successful groundwater sources is dependent on the presence and

productivity of small changes in the geology, including "fracturing along fault planes and rubble zones between successive volcanic flows" (NPS WRD 2019). Based on this, the proposed target area for well drilling is approximately 200-250 feet below ground level, where faulting may have disrupted and fractured volcanic layers, which otherwise would not be conducive as aquifers.

According to the report, the stratigraphy under any given location can vary greatly because "numerous distinct geologic units can be present in a relatively small area, vary greatly in thickness, and overlie one another in an unknown fashion" [Clynne, personal communication, Christiansen and others, 2010, Clynne and Muffler, 2002 in (NPS WRD 2019).
To better understand the geologic mapping, WRD scientists consulted with geologists from the U. S. Geological Survey who developed the most recent geologic maps of the area.

Geologic mapping shows the extent of recent pyroclastic material that fills the Lost Creek drainage and provides the fine-grained material that periodically degrades surface water quality. Moving away from Lost Creek, other unconsolidated deposits of glacial till or pyroclastic material overlie volcanic bedrock (NPS, 2019). According to the report, the glacial till near Lost Creek extends to approximately 5,500 feet elevation. With the entrance to Lost Creek Campground about 100 feet higher, the mapped till should be relatively thin, however there may also be other older, unmapped glacial tills present below those exposed at the surface (NPS WRD 2019).

Impacts from Alternative 1

There would be no additional impacts to geology or soils. No well-drilling or additional water development would occur. Existing fine-grained volcanic sediment would continue to be released and would continue to degrade water quality in the Lost Creek water system and affect its availability for the campgrounds.

Impacts from Alternative 2

There would be unnoticeable adverse effects on geology and a range of adverse effects on soils from new well drilling and construction of facilities to support providing potable groundwater to the Lost Creek and Volcano Adventure campgrounds. The wells would affect area stratigraphy in one to two small diameter holes (6-12-inches) as well as a longer-term disruption if usable water is found. This would comprise a discountable footprint of by disrupting subsurface geologic materials by well drilling activities compared to the volume of geologic materials underlying the project area vicinity.

Direct effects on soils would also result from modifications to area facilities, as well as from construction of new facilities. Actions would include soil removal, profile mixing, and compaction from excavation and grading. At the drilling site, immediate and persistent soil disturbance may occur from localized compaction due to overland travel of the drill rig and support equipment, and removal of bore hole soil. During excavation, soils would be mixed, moved and backfilled with native material, and/or imported fill, and compacted.

Excavation of trenches to link the water source to the campgrounds would occur only if adequate water yield was discovered and well construction occurred. If so, trenching from the well site to the roadway to accommodate water lines would affect generally undisturbed soils, while trenching along the roadway would affect a previously disturbed area. Trenching for water transmission lines would encompass approximately 900 linear feet. These transmission line trenches would be approximately 30 inches wide and 26-inches deep. Other utilities could

also be installed in the same trench. The trenches would be backfilled with excavated soil. To ease the associated impacts to the new drilling site, there would be temporary soil disturbance from introducing fill material to cover the existing ground level for temporary road construction. If new road access is not needed, this temporary fill would be removed from the site after test drilling and the area rehabilitated by replacing logs and other vegetative barriers over the access route. There would also be longer term impacts on soils (including loss of native soil and replacement with fill and compaction of native materials in the proposed road area). Loss of some trees and vegetation (see vegetation section), prior to physically reinforcing the permanent access road, would also adversely affect soils.

If test drilling is successful, the planned well house would be a small building approximately 10 x 10-feet (100 square feet). Excavation for the concrete pad/foundation would be approximately 120 square feet. There would be permanent effects on area soils and geology (loss and replacement of native materials in the area) from placement of this small structure.

Disturbance of soils would also cause long-term localized changes in soil profiles, decreased soil productivity, especially where surfaces were hardened or compacted, and vegetation loss – temporary (for utility lines) and long-term where permanent aboveground facilities were constructed. Actions to remove previous surface water collection infrastructure would be beneficial and could improve the area with the removal of the existing Lost Creek water infrastructure (infiltration gallery, well house and water tank).

Impacts from Reasonably Foreseeable Environmental Trends and Planned Actions

Adverse impacts to soils from other planned actions would also include compaction, soil mixing, and soil loss from removal and erosion. In areas immediately adjacent to the proposed project area, soils have been previously disturbed from road and campground development and visitor use as well as from use of the Nobles Emigrant Trail. Localized but distributed impacts include an overall decrease in soil infiltration capacity, where hardening of surfaces (roads, walkways, buildings) has occurred. In the future, additional restoration and development projects (e.g., addition of new visitor service facilities, restoration of old roads or building sites) could occur within the park and project vicinity. Combined, these projects would contribute to beneficial and adverse impacts on soils. Because most of the surrounding area continues to be undisturbed by human impacts and is designated wilderness, the small new area (approximately 0.15 acre) affected by planned actions in the area is not substantial.

When impacts from Alternative 1 are combined with impacts from the above reasonably foreseeable actions, there would continue to be adverse impacts to soils, but most park resources in the vicinity of the proposed action would continue to be preserved. Alternative 2 would contribute another small increment (under 0.25 acre) to the total effects on geology and soils from disturbance of the well testing and potential well construction in the project area.

Impact Avoidance, Minimization and Mitigation Strategies

To avoid, minimize or mitigate soils impacts, the following strategies would be used during or following construction. The NPS and its contractors would:

- Delineate the project construction areas to minimize disturbance outside construction footprints.
- Use existing roads, trails and established pathways to access construction areas where available. Park staff and contractors would install permanent equipment and access

roads only if the NPS locates a new adequate and potable groundwater supply. If no usable water is found, the construction areas would be rehabilitated to pre-existing conditions.

- Provide spill-response materials on site at all times during construction. The NPS and its contractors would ensure that on site workers were trained in spill prevention and response.
- Minimize soil disturbance during construction and use of temporary and permanent facilities; the NPS would commence with reseeding or revegetating disturbed areas as soon as practicable.
- Pressure wash any equipment brought to the site to ensure it is clean of mud, weed, seed, etc.
- Inspect all equipment for compliance with cleaning procedures prior to entering the park, including recommending repeat cleaning at the contractor's expense, if needed.

Conclusion

There would no additional adverse impacts on soils or geology under Alternative 1; existing impacts would continue. Alternative 2 would result in localized adverse impacts to approximately 0.10 acre from drilling operations and slightly more extensive impacts in an area comprising about 0.25 acre from proposed construction and operations.

Water Resources

The surface water currently supplying the Lost Creek Campground and Volcano Adventure Camp is collected approximately 1.5 miles away (straight-line distance) from the campgrounds. The intake collection point (infiltration gallery) within the creek bed supplies facilities at the campgrounds, including water service for spigots, showers, and a kitchen. In a typical high-use month (for example, July 2018) the two campgrounds used approximately 30,000 gallons of water for an average of approximately 970 gallons per day (gpd). According to the draft hydrogeologic report, average demand in 2014 was approximately 800 gpd (sustained by a flow of 3.5 gallons per minute) (Martin 2014). Flow continues year-round downstream from the intake infiltration gallery in Lost Creek. There are currently plans to add four more tent cabins at the Volcano Adventure Camp, which could increase seasonal water demand by up to 30 percent (Mateljak pers. comm). Current water withdrawal comprises less than one tenth of percent of the creek flow. At the weir, Lost Creek has an average daily flow rate of approximately 20 cubic feet per second (cfs) or approximately 9,000 gallons per minute, much greater than the 3.5 gallons per minute needed to supply the campgrounds (see small waterfall in Photo 1).

Photos 1-2: Lost Creek and Lost Creek Infiltration Gallery

Water travels from the creek collection point to a treatment shed with a 10,000-gallon storage tank, approximately 0.5 miles from the Lost Creek intake. This system operates late spring through fall due to campground closures in winter.

Water quality in the park is generally excellent because of the high elevation headwaters in the park and the lack of upstream development that would impact park waters (NPS 1999).

Lost Creek experiences seasonal spring runoff and episodic summer storms that cause periods of high turbidity due to the fine-grained pyroclastic material in the area being washed into the creek from the May 1915 eruption of Lassen Peak. An eroding slope near the intake contributes substantial amounts of this fine-grained material to the creek just upstream of the water system intake. The particulate material clogs the filtration system requiring time-consuming and expensive maintenance and increased treatment to meet water quality standards. During periods when water from Lost Creek cannot be treated adequately to meet drinking water standards for the campgrounds, the NPS imports water from elsewhere via rental trucks.

The current water system for the Manzanita Lake area of the park is located on Manzanita Creek south of the developed area. This system provides for park housing and facilities, a visitor center, and large summertime campground. According to the WRD report, the system is substantially larger than that at Lost Creek. The system intake is an infiltration gallery on Manzanita Creek in a steep, eroding portion of the drainage where there are no problems with production rate or turbidity. In 2021, the park tried to drill a well, but could not find water, even at depths of up to 400 feet. There are two separate treatment and storage systems at Manzanita Lake: one is used in peak-season high-demand periods and one during winter low-demand periods (NPS WRD 2019:6).

The Manzanita Creek system provides an average of approximately 20,390 gpd during the peak season and an average of about 1,590 gpd in the non-peak season. Use for the Lost Creek and Volcano Adventure campgrounds comprises a very small percentage of the daily and annual water use from that site (up to 970 gallons per day) (NPS WRD 2019:7).

Wetlands are a critical resource in the park supporting a high diversity of species. The park's wetlands were first mapped by the National Wetlands Inventory (NWI) in 1989 using color infrared imagery with a scale of 1:58,000. Refinements and additions were made in 2005 by Adamus & Bartlett (2008) (Adamus 2013: 23). Based on several rough estimates for vegetation types, wet meadow and riparian/alder zones total over 2,000 acres in the park. There are hundreds of smaller wetlands throughout the park; many are associated with lakes and ponds and can be found throughout the park's wilderness. The area comprising the infiltration gallery in Lost Creek is considered an upper perennial riverine wetland. Lost Creek has seasonally flooded margins including small pockets of wetlands and scrub-shrub wetlands on the boundary of its riverine and upland habitats.

Impacts from Alternative 1

Water Quantity and Quality: Because the NPS would continue to withdraw surface water from Lost Creek as needed to supply potable water to the two nearby public campgrounds, existing impacts on water quantity would continue from ongoing use of the current surface water collection system either in Lost Creek or from the Manzanita area unless one or both of the campgrounds is expanded beyond the four tent cabins currently projected.

Compared to purchasing and using expensive filtration, it is likely that the NPS would rely on trucking water during these low water quality events more frequently in the future due to increased demand from the four additional units planned for the Volcano Adventure Camp, since treating with additional filtration is not a cost-efficient means to meet municipal water quality standards (the expensive filters clog within a few minutes). The duration of high turbidity episodes is unpredictable and can last from a few days to several weeks. During this time there would be more water withdrawal from the Manzanita Lake area to obtain the same quantity of water (approximately 970 gallons per day) and water would not be withdrawn from Lost Creek until turbidity decreased.

To maintain the Lost Creek intake, the NPS would also continue to comply with the permit from the State Water Resources Control Board, including annual, long-term maintenance to prevent sedimentation at the infiltration gallery. This includes removing sediment from the gallery in the creek bed, an action which is subject to conditions from the WRCB and a water quality certification permit under the Clean Water Act from the Environmental Protection Agency. Sediment piles in the vicinity of the intake, from work associated with the maintenance permit would also cause small impacts to water quality from runoff during storms.

Wetlands: Because existing impacts from the infiltration gallery in the creek bed of Lost Creek would continue, withdrawal of water from Lost Creek would continue to have adverse effects on riparian/riverine wetlands from maintaining this structure in the creek bed and from reducing the flow of water that would otherwise occur. The intake affects approximately 6,000 square feet of creek bed and has replaced natural creek bed with a concrete weir structure and piping to allow water to be drawn from the Lost Creek water system.

Impacts from Alternative 2

Water Quantity and Quality: Existing impacts on water quantity and water quality described in Alternative 1 would continue. In addition, there would be testing for adequate groundwater resources for seasonal use at the proposed well site. If the NPS does not find adequate water yield, then impacts to groundwater resources would be those encountered during the initial

yield test (1-2 days). No additional construction or sustained use would occur. If the NPS discovers adequate water yield at either proposed site, then long-term seasonal impacts would result from the use of approximately 970 gallons per day (30,000 gallons per month) of groundwater instead of surface water during the peak season. The NPS would draw this groundwater from the new well site as a replacement for water withdrawal from Lost Creek. The NPS anticipates that that groundwater use would be equal to the current surface water use at each campground. Therefore, except for the additional use that would occur if the new cabins were constructed, the withdrawal of groundwater would be approximately equal to the current withdrawal of surface water. It is unknown whether this groundwater withdrawal would affect surface water in Lost Creek, however since the quantity would be the similar, it is unlikely to have more adverse effects. There may also be fewer effects since groundwater would not be subject to the same evaporation that occurs in surface water.

Trenching to install utilities would also have very localized effects from runoff of newly disturbed soils for a few months to a few years, until herbaceous plants and grasses regrow in the disturbed soil. As in Alternative 1, there would also continue to be runoff from the collected sediment piles in the vicinity of the intake.

Wetlands: If the new test well is successful, the NPS would remove the infiltration gallery and dam on Lost Creek. Removing the infiltration gallery, polyvinyl chloride (PVC) piping, and stockpiles of materials would restore an area of approximately 60 by 100 feet (6,000 square feet or 0.14 acres) of upper perennial riverine wetlands and creek bank storage area (Photos 1-2), including former creek bed and former hydrological functions. Doing so would also have short-term adverse effects from removal of the infrastructure but would likely result in long-term beneficial effects on water flow, depending on the influence of groundwater withdrawal in the same watershed (see above), and avoidance of interference with the creek bed.

Impacts from Reasonably Foreseeable Environmental Trends and Planned Actions

Other visitor uses and facilities in the park and project area, primarily roadways, contribute sediment and pollutants, including oil and other contaminants from motor vehicles as well as litter, which can enter drainages and adversely affect water quality. Some restoration and development projects (e.g., addition of new visitor service facilities, restoration of old roads or building sites) could occur within the park and would contribute both beneficial and adverse impacts to water quality. Given the minimal and localized nature of these effects in widely separated developed areas of the park, overall impacts on park waters would continue to be very small. Non-human factors, such as natural erosion of exposed soils can also affect water quality and contribute to the inability to use the source for drinking water, as has been the case at the Lost Creek intake. In addition, it is likely that climate change impacts may affect water distribution and quantity over time, perhaps reducing the season and timing of availability. In this area and at Manzanita Creek, there would continue to be small seasonal, and some long-term (year-round), effects on water quantity from withdrawal of water for park operations.

Impact Avoidance, Minimization and Mitigation Strategies

To avoid, minimize or mitigate soils impacts, the following strategies would be used during or following construction. The NPS and its contractors would:

- Use temporary sediment control devices such as filter fabric fences, or sediment traps as needed during construction.

- Naturalize disturbed areas following project completion by adding rocks, soil, or duff to areas without vegetation or needing restoration.
- Locate staging areas would well away from places where runoff could affect nearby water bodies.
- Use swales, trenches or drains to divert stormwater runoff away from disturbed areas.

Conclusion

Existing long-term adverse impacts from surface water use under Alternative 1 would continue until the system was either abandoned or replaced with groundwater. If replacement occurred, there would also be long-term beneficial effects on the riverine wetland in Lost Creek from restoration of the current water intake facility. Alternative 2 would have short-term adverse impacts on water quality during construction and long-term impacts on water quantity from water use that would continue to be similar to Alternative 1.

Vegetation

Lassen Volcanic National Park covers approximately 166.2 square miles (106,372 acres). Elevations in the park range from 5,300 feet at Warner Valley to 10,457 feet atop Lassen Peak. The park contains a far greater diversity of plant species than its size would suggest. This is partially because the park occupies a geographic zone where three major ecological systems meet: the southern Cascades, the Sierra Nevada, and the Great Basin. Each system contributes a unique floristic element to the park's vegetation. In addition, the park's dynamic history of glaciation and recent volcanic activity creates a suite of diverse substrates ranging from excessively dry volcanic cinders to hydrothermally altered clays. The range of geologic formations and chemically and texturally varied soil types contribute to species diversity as well as many anomalies within each community type.

Four major plant communities occur within the park, including red fir forest, yellow pine forest, subalpine forest and alpine fellfields. Minor plant communities include montane chaparral, herbaceous wet meadows and riparian areas. Community types applicable to the project area and surroundings are described below, in order of abundance within the park.

Red Fir Forest: Red fir forest is the most widespread forest type in the park and is a common upper montane forest type throughout the Sierra Nevada and in the southern Cascades. Red fir forest grows between 6,500 and 8,000 feet and covers approximately one third of the park. In these forests, red fir (*Abies magnifica*) is the dominant canopy tree; however, lodgepole pine (*Pinus contorta* ssp. *murrayana*), mountain hemlock (*Tsuga mertensiana*), western white pine (*Pinus monticola*) and white fir (*Abies concolor*) may also be present. Mature red fir trees are commonly 60 to 120 feet tall and live to be more than 300 years old. Red fir seedling distribution is closely related to exposure to sun; seedlings usually establish in sites with part to full shade. Common shrubs and flowers in red fir forests include wooly mules' ear (*Wyethia mollis*), lupine (*Lupinus* spp.), beardtongue (*Penstemon* spp.), and pinemat manzanita (*Arctostaphylos nevadensis*). This is the predominant vegetation community on the north facing slopes adjacent to and slightly above the project area.

Yellow Pine Forest: This open forest occupies flats and slopes below 6,000 feet and is best developed around Manzanita Lake, Butte Lake, and Lost Creek. The canopy of mature stands consists of scattered large Jeffrey pine (*Pinus jeffreyi*) with or without ponderosa pine (*Pinus ponderosa*). Depending on site conditions and the time since the last fire, the canopy may

include sugar pine (*Pinus lambertiana*), white fir, ponderosa pine, lodgepole pine, western white pine, incense cedar (*Calocedrus decurrens*) and red fir. In the absence of fire, these minor species would gradually fill in and dominate the forest canopy which is the most common condition of the forest immediately around the proposed well site. The soils associated with this forest type have significantly higher potassium, calcium, and magnesium than most other park forest types (Parker 1991). Common understory species include western needlegrass (*Achnatherum occidentale*), bottlebrush squirreltail (*Elymus elymoides*), and greenleaf manzanita (*Arctostaphylos patula*).

Riparian Areas: These woody wetland communities are supported by surface water, and are associated with springs, stream banks, and lake margins throughout the park. The current Lost Creek water intake is within a degraded riparian area. The most common community in these sites is a shrubland dominated by willows and alders. Riparian woodlands of aspen (*Populus tremuloides*) or black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) are rare and scattered in low-elevation wet areas. In addition to the deciduous trees and shrubs, these communities support many showy herbaceous species such as cow parsnip (*Heracleum maximum*), monkeyflower, and arrowleaf ragwort (*Senecio triangularis*).

Although most of the park is vegetated, areas of recent volcanic activity tend to be rocky, exposed and relatively devoid of vegetation. The volcanic eruptions of Lassen Peak destroyed more than three square miles of forests, and the areas affected by the eruption of Cinder Cone 340 years ago are still largely barren.

Two other plant communities not found in the project area are montane chaparral and herbaceous wet meadows.

Impacts from Alternative 1

There would be no additional adverse effects on vegetation from implementing Alternative 1.

Impacts from Alternative 2

There would be short- and long-term adverse effects on vegetation from constructing a temporary and/or permanent roadway to the proposed well site. As noted above, the area is primarily within Yellow Pine Forest and includes a variety of tree species, as well as forest openings with shrubs. There are numerous downed trees along the potential approach route to the well drilling site. As the project area approaches the hillslope where the proposed fault line occurs, the area becomes more densely forested but is bisected by an opening for the Nobles Emigrant Trail route.

Among the trees noted in the area are lodgepole pine, red fir, and sugar pine. Understory plants include seedling trees, pyrola and pipsissewa. Though designed to minimize disturbance, approximately 5-10 small lodgepole pine trees from 2-6 inches dbh and shrubs may be removed to construct the access road. If the road is needed for continued access, it would be improved and gated. This would cause additional impacts from permanent loss of vegetation along a swath approximately 450 feet long and 10 feet wide (0.10 acre). Although the area is sparsely vegetated, construction activities under Alternative 2 would affect seedling and sapling trees, some mature trees, as well as shrubs and seasonal herbs.

Figure 4: Vicinity of Proposed Lost Creek Well

Approximately 11,000 square feet (0.25 acre) of sparsely vegetated area and soils would be affected to construct the access road, well (Figure 4) and well housing and to install the water line to the campgrounds. After the water line is installed, understory vegetation would likely regrow along the roadway, while shrubs and small trees removed at the well site (for tank and treatment building construction) would not return. The vegetation to be removed consists of common species that are widespread adjacent to the area and in other similar habitats in the park.

Other effects on native vegetation include the potential for introduction of invasive plants that could be carried in on construction equipment and in soils, however this risk would be low because all construction equipment is required to be cleaned to remove invasive plants or seeds prior to being used in the park.

Impacts from Reasonably Foreseeable Environmental Trends and Planned Actions

Much of the area surrounding the Lost Creek well site is dominated by a Sierran mixed conifer forest with a predominance of both ponderosa pine and Jeffrey pine. Human activities, particularly fire suppression, have also altered the structure and composition of this forest vegetation. Suppression of fire in these areas has led to an increase in the number of stems per acre and has resulted in a shift in the vegetation community to include many more shade

tolerant species such as white fir. In addition to broad scale changes in vegetation characteristics, relatively small patches and corridors of habitat have been lost in the park in areas that have been developed for facilities, trails, and roads.

Impact Avoidance, Minimization and Mitigation Strategies

To avoid, minimize or mitigate vegetation impacts, the following strategies would be used during or following construction. The NPS and its contractors would:

- Establish narrow limits of construction to avoid impacting adjacent vegetation.
- Source all fill materials only from approved sources and inspect all materials prior to importation into the park to avoid inadvertent importation of invasive species.
- Transport and store materials used in project work would be transported and stored so as not to acquire noxious weed seeds from adjacent areas.
- Monitor the project area for undesirable plant species (exotics) and control strategies implemented if such species occur.
- Use only native species, appropriate to the site, during revegetation.
- Construct a berm around the well head, to avoid impacts when treating nonnative species in the vicinity of the well.

Conclusion

No new vegetation impacts would result from Alternative 1. Alternative 2 would have a range of small-scale vegetation impacts, including removal of small trees and downed logs, trampling, excavation, and clearing of vegetation for construction of the concrete pads for the pump house, and storage tank, and the well housing.

Cultural Resources, including Archeological Resources and Cultural Landscapes

The Area of Potential Effect (APE) is an area within the boundary of Lassen Volcanic National Park, Tehama County, California in which cultural resources might be affected. It is located near Lost Creek Campground and encompasses an 8.77-acre area between the park highway and the Nobles Emigrant Trail. The NPS has delineated this area to include consideration of indirect, and temporary effects (access roads), extending the vertical APE to 400 feet below grade, rather than just taking into account surface materials and shallowly located trenches. There are no historic structures within or near the APE.

Prehistoric Archeological Resources

Little is known of the early part of the prehistoric chronology of Lassen Volcanic National Park. Part of this may be, as Treganza (1963:14) suggests, because large areas suitable for use as seasonal campsites have been covered by the eruptions of Lassen Peak during and prior to the early 20th century. As noted by Journey (1970:31), there appears to be more evidence of use in the southern part of the park (most likely due to the volcanic disturbance in the north). These southern sites are generally low in elevation (often in the open valleys), near fresh water, and in areas that support game and other wild resources. The lack of early sites represented in the archeological record also appears to be partly due to the limited numbers of cultural resource inventories and test excavations conducted in the area. Many archeological sites, because of their seasonal, high elevation nature, have limited deposits. In general, the high elevations within the park precluded year-round human occupation. Park lands, however, were an

important area for hunting game and gathering food and other materials for subsistence in lower river valleys.

Archeological sites are distributed throughout the park from about 5,500 feet up to about 7,000 feet. Archeological sites include a large village, lithic scatters (from stone tool manufacture) and evidence of numerous smaller seasonal camps. To date, a total of 202 archeological sites are documented in the park, including 74 prehistoric sites, 22 multicomponent sites, and 106 historic sites. These include prehistoric flaked-stone artifact scatters and habitation sites with midden deposits, historic-period structures, features, and associated artifacts. Prehistoric site density varies within the park as a result of past volcanic activities. Volcanic tephra deposits cover much of the northern half of the park burying signs of early human activities in the park under layers of volcanic ash and lapilli. Recorded prehistoric sites are sparse in the northern portion of the park with many of the documented sites located in the Warner Valley or Sulphur Creek areas in the southern portion of the park.

Historic Archeological Resources

Peter Lassen and William H. Nobles founded the "Nobles Trail" to take emigrants into northern California. This trail, which passes through the park, is listed on the National Register of Historic Places. As a result, historic-period archeological sites in the park include features related to early emigration to California, homesteading, ranching, early use of the park area for recreation, and park administration and development. Other historic-period features include cabins, corrals, fence lines, old telephone lines, and related historical debris that have been documented in the park as archeological sites or are referenced in literature and historical records. The park Historic Resources Study (2003) provides an in-depth review of the park's history.

There is one historic archeological site within the APE. Site CA-LAS-2495H is a section of the Nobles Emigrant Trail and is listed on the National Register. This linear site crosses several state lines and multiple counties in California. Within Lassen Volcanic National Park, the site passes through both Lassen County and Shasta County. The section of the site that is within the test well APE is located on the eastern flank of Table Mountain and adjacent to a dry drainage proceeding from Sunflower Flat and Nobles Pass. This short section was recorded in 2015 and represents one of the few locations within the park that still retains integrity. It is about 1,600 feet long and has variable widths and a "Y" shape; the alignment runs straight up a steep slope, a common feature of two track wagon roads due to the increased side-to-side balance gained from climbing up a hill rather than traversing the side slope.

Lassen Volcanic National Park Highway Historic District

The Lassen Volcanic National Park Highway Historic District (Lassen Loop Highway / Lassen Peak Highway) was nominated and accepted on to the National Register of Historic Places in 2006 (No. 06000527). The following is from the National Register nomination form summarizing the main reasons the park highway was listed on the National Register:

> The road, a designed landscape, is eligible for listing in the National Register of Historic Places for its direct and significant association with National Park Service administration of the park and with development of the northern California tourism industry (criterion A) and for its association with Rustic architecture as developed by the National Park

> Service (criterion C). The period of significance covers two eras: 1925, when the National Park Service initiated construction, until 1941, when the CCC terminated construction efforts; and 1948 to 1951, a period when the road was modified to its current design standards. (NPS 2006)

The portion of the Lassen Volcanic National Park Highway in the APE is Section 4 - Old Boundary Springs to the Northwest Entrance. The alignment of the highway within the APE is in its original alignment from initial construction in the 1920s and 1930s. The test well and its potential additional development into a production well would have physical and visual impacts to the highway.

Site Specific Archeological Surveys
The APE for the well drilling site has been surveyed twice, once in 1993 and again in 2015. There is one historic-era archeological site within the vicinity of the test well location – the Nobles Emigrant Trail.

A segment of the Nobles Emigrant Trail wagon road associated with European emigrants is adjacent to the proposed well site and as noted above, the Lassen Volcanic National Park highway is adjacent to the road that would provide access to the site for well drilling and well development if well drilling is successful.

Impacts from Alternative 1
There would be no effect on archeological resources from continued implementation of Alternative 1.

Impacts from Alternative 2
Under Alternative 2, the NPS or its contractors would drill a test well and potentially a permanent production well Drilling would occur within the boundary of the 2015 survey. Because of the proximity of the 2015 survey edge, however, it was important that the consulting NPS archeologist review the maps and survey. As a result, areas adjacent to the boundary were reviewed and the archeologist has determined that the area just outside of the boundary of the 2015 survey is unlikely to hold resources due to the rocky and steep terrain (average of 13% slope). The NPS has not identified any other archeological sites within 600 meters of the proposed project area. The reviewing NPS archeologist assumes that the conditions described in the survey apply to immediately adjacent lands. Except for the Nobles Emigrant Trail that would be crossed by the proposed access road and waterline and the Lassen Volcanic National Park Highway, there are no other historic properties that would be affected within the APE for this site.

The access route to the proposed test well would begin from the historic Lassen Volcanic National Park Highway. This temporary impact would not affect the integrity of the Lassen Volcanic National Park Highway.

Similarly, the access route to the test well site must cross or run along the wide Nobles Emigrant Trail. Because that access would initially be a route, it would not diminish characteristics qualifying the Nobles Emigrant Trail for inclusion in the National Register. There would be no changes to the surfacing or alignment of the Nobles Emigrant Trail from access to the test well site.

For long-term objectives, if the test well drilling finds a productive well, then the access route from the Lassen Volcanic National Park Highway would be improved and gated to prevent public access. A water line would also then extend from the well site under the trail and access road to Volcano Adventure Camp and Lost Creek Campground. Proposed road and trail improvements would retain the existing area surfacing but would likely be reinforced with road base under existing topsoil. Upon reaching the Nobles Emigrant Trail, the road would be converted to a route that follows that wide trail to the test site. Surfacing material would not change and no visible physical changes to the trail alignment would be implemented. Therefore, there would be no adverse effect on the highway or the trail from actions to implement the proposed action. There are numerous access routes off the highway and in several locations in the park, the Nobles Emigrant Trail provides administrative access to park vehicles to reach operational features. This is currently true of the existing access to the Lost Creek infiltration gallery. The road to Lost Creek also spurs from the Lassen Volcanic National Park Highway and is itself a segment of the Nobles Emigrant Trail.

Impacts from Reasonably Foreseeable Environmental Trends and Planned Actions

Archeological resources in Lassen Volcanic National Park have been impacted to varying degrees from past construction-related disturbances (prior to the advent of archeological resources protection laws); visitor impacts and vandalism; and erosion and other natural processes.

Early explorers and visitors likely impacted known sites, especially in the vicinity of high public use areas such as campsites, roads and trails. Human effects on natural processes have also likely affected archeological sites. Road and facility construction may have resulted in adverse impacts on cultural resources, including archeological and historic resources. For instance, the road access to the current Lost Creek water intake is via a section of the Nobles Emigrant Trail.

Reasonably foreseeable actions would also have the potential to affect known and unknown archeological resources, but with implementation of mitigation measures would avoid known sites.

Impact Avoidance, Minimization and Mitigation Strategies

- Consult with tribes and groups regarding monument undertakings with the potential to affect resources of cultural and religious significance to ensure tribal perspectives are understood, and adverse effects are avoided or minimized.
- Identify tribal monitoring requirements (if any) during consultation.
- Monitor archeological resources during ground disturbance. Modify actions , if needed, to avoid impacts to previously unknown resources (see next bullet).
- Should unknown archeological resources be uncovered during construction, work would be halted in the discovery area, including within a boundary of approximately 200 feet, a cultural resources specialist contacted, the site secured, and an Inadvertent Discovery Plan implemented, including consult with SHPO and tribal entities according to 36 CFR 800.11, and, as appropriate, implementing provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990.
- Relocate work if necessary or possible, to a non-sensitive area when unknown archeological resources are located. Relocation would occur to enable more site testing and documentation. Every effort would be made to avoid further disturbance to the site.

If relocation could not occur, then mitigation would include documentation of the site to appropriate standards based on consultation with the State Historic Preservation Officer and other experts as applicable.

- Notify and consult with concerned tribal representatives for the proper treatment of human remains, funerary, and sacred objects should these be discovered during the project (in compliance with NAGPRA).

Conclusion

There would be no adverse effect on known archeological or historic resources from implementation of the alternatives. Proposed actions would avoid impacting these resources or would be modified in their proposed implementation to avoid impacting the characteristics that make these resources eligible for the national register.

Visitor Experience

Between 2010 and 2020 there were an average of 430,000 park visits annually (NPS 2021). The park is open year-round, however access through the park on the main road is usually only available from June through October due to heavy snowfall. The park's busiest season is from June - September (80 percent of annual visitation).

The Manzanita Lake Entrance to the park is open year-round but only to the Loomis Museum turnaround in winter. The associated campground is the largest in the park and provides more amenities than other areas, including camping cabins. Most park visitors travel from the north or south entrance and pass by Lost Creek Campground and the Volcano Adventure Camp.

Nobles Emigrant Trail: Pioneered by William Nobles, this trail linked the Applegate Trail in Nevada to the northern Sacramento Valley in California. During the 1850s and 60s, several thousand emigrants used this trail in their migration from the eastern United States (National Register of Historic Places in Shasta County, 2012).

The trail within the park starts in the northeast corner, passing the edge of the Cinder Cone and the Fantastic Lava Beds, then skirting Prospect Peak. It crosses Badger Flats and passes through the Devastated Area associated with the May 21, 1915 eruption of Lassen Peak. The trail parallels the Lassen Park Road, then passes between Chaos Crags and Table Mountain, across Sunflower Flat and over Nobles Pass, following the edge of the Chaos Jumbles. The trail leaves the northwest corner of the park near Manzanita Lake (Chappell, 1974)

Lost Creek Campground: This campground has eight group campsites that accommodate 10-25 people per campsite. Campers rely on vault toilets and the existing Lost Creek water intake system for potable water.

Volcano Adventure Camp: This is a youth camping facility, supported by the Lassen Park Foundation, that introduces school-aged visitors to the park. School districts throughout California bring children that may not otherwise have an overnight experience in a natural setting.

Currently, the camp accepts about 1,400 occupants per year over a three-month season. Amenities currently include ten canvas cabins (which are proposed to be expanded to 14) and four tent sites, with vault toilets, and a covered gathering space. This would increase bed space

from 124 per day to 156 or from 11,592 user nights to 14,352 user nights. The maximum capacity, however, is based on group dynamics, which may or may not fill all cabins. Therefore, it is likely that the number of people would expand from 1,499 to 2,000 occupants, or by about 30 percent based on water use.

Impacts from Alternative 1

Without replacement of the water source, Lost Creek Campground and Volcano Adventure Camp would continue to truck water during periods of high turbidity. If trucking water cannot meet the need, reducing operations at the campgrounds is another option. This could have a range of direct and indirect adverse effects on visitors, including potential reduction of camping opportunities in these areas and/or interruptions in service if the water source is not replaced.

Impacts from Alternative 2

Until the water system is replaced, impacts would be similar to Alternative 1. If a viable well is drilled, during construction of the water service facilities (well house, pump, and treatment building), there could be delays in traffic and increased noise and activity related to construction, and possible interruption in use or early closure of facilities served by the water treatment system. To minimize visitor disruption, opportunities for work outside of normal work times, such as on weekends or at night would be by special permission of the superintendent and would be advertised to the public in advance.

Impacts from Reasonably Foreseeable Environmental Trends and Planned Actions

Visitor access and opportunities in the park have largely expanded over the years. For instance, the Kohm Yah-mah-nee Visitor Center is a much better source of information and opportunity for park visitors.

Conclusion: Alternative 1 could have long-term adverse effects from altering how visitors experience the Lost Creek Campground and Volcano Adventure Camps. Alternative 1 could also result in adverse long-term or cumulative impacts on visitor experience if it changed the availability of or facilities in Lost Creek Campground or Volcano Adventure Camp. These impacts could continue to be reduced by trucking in water but would not solve the problem. There would be a range of short-term adverse and long-term beneficial impacts from Alternative 2. There could be some short-term adverse impacts from construction, while long-term beneficial impacts would be realized from maintaining the existing visitor experience by changing the water source.

Impact Avoidance, Minimization and Mitigation Strategies

To avoid, minimize or mitigate visitor experience impacts, the following strategies would be used:

- Inform visitors about conditions in the park through press releases to local media and signs in the park.
- During construction, inform visitors via signs about construction activities, including potential closures or delays.
- Use barriers and barricades, signs and flagging, as necessary or appropriate, to clearly delineate work areas and to provide for safe pedestrian travel through the construction area.

Chapter 4: Persons and Agencies Consulted

This environmental assessment is available for a thirty-day public review period. Notice of it will be mailed or emailed to a list of persons and agencies who have expressed interest in Lassen Volcanic National Park proposed actions and events. This document will also be posted on the park's website located at http://www.nps.gov/lavo and will be available on the NPS Planning, Environment and Public Comment (PEPC) website http://parkplanning.nps.gov/lavo/ (PEPC Project Number 94370).

Comments on this environmental assessment should be entered into PEPC or directed in writing to:

Lassen Volcanic National Park
P.O. Box 100
38050 Highway 36 East
Mineral, California 96063

The NPS will prepare a final decision document based on the public comments and notice of it sent to reviewers. If reviewers do not identify substantial environmental impacts, this EA will be used to prepare a Finding of No Significant Impact (FONSI) and the FONSI will be sent to the Regional Director, NPS Interior Regions 8, 9, 10, and 12 (formerly the Pacific West Region) for signature.

For additional information concerning this environmental assessment, please contact Superintendent Jim Richardson at jim_richardson@nps.gov or (530) 595-6101.

A. Scoping

Internal scoping began in summer 2019. A 30-day civic engagement period was conducted from February 3 to March 5, 2022. No comments were received on the project.

B. Native American Tribes Consulted

Prior to public scoping, the NPS invited Native American Indian tribes affiliated with the park to comment on the proposal. The consultation included the Enterprise Rancheria, Greenville Indian Rancheria, Mooretown Rancheria, Pit River Tribe, Redding Rancheria, Shingle Springs Rancheria, Susanville Indian Rancheria, and United Auburn Indian Community on February 24, 2020. No comments were received. Consultation will continue during the public review period for this EA.

Enterprise Rancheria
Glenda Nelson, Tribal Chair

Greenville Rancheria
Kyle Self, Tribal Chair

Mooretown Rancheria
Gary Archuleta, Tribal Chair

Pit River Tribe
Morning Star Gali, Tribal Historic Preservation Officer

Redding Rancheria
Jack Potter, Cultural Resources Program
Shingle Springs Rancheria

Nick Fonseca, Tribal Chair

Susanville Indian Rancheria
Melany Johnson, Tribal Historic Preservation Officer

United Auburn Indian Community
Gene Whitehouse, Tribal Chair

C. Public Involvement

With publication of this EA, there will be a 30-day public review period. To facilitate public review, this EA will be posted on the NPS Planning, Environment and Public Comment (PEPC) website (www.nps.gov/parkplanning) and there will be a link to that site on the park's webpage.

D. Agencies Consulted

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 proposed undertaking and the area of potential effects associated with this project (March 3, 2021).

As evaluated herein, proposed actions associated with the proposed action/preferred alternative would have no adverse effect on resources listed or eligible for listing in the National Register of Historic Places or on other historic or cultural resources in the park. SHPO concurrence with this determination of effect for the drilling portion of the project was received on April 16, 2021, NPS_2021_0304_001). Additional consultation occurred once the site was refined and consultation is ongoing. Upon public review of this EA, concurrence with the determination of no adverse effect for the well installation, if test drilling is successful, will be sought.

U.S. Fish and Wildlife Service / National Marine Fisheries Service

In accordance with the Endangered Species Act, the NPS contacted the USFWS database to confirm that no federally listed species and no critical habitat occur. Because there are no federally listed species that occur in the project area, there would be no effect on listed species or their habitat and there is no requirement for additional consultation under the Endangered Species Act.

E. List of Preparers, Persons, Agencies Contacted

NATIONAL PARK SERVICE
Lassen Volcanic National Park

Jim Richardson, Superintendent
Steve Buckley, former Vegetation Ecologist
Shawn Gibson, Cultural Resources Manager
Elizabeth Hale, GIS Specialist
Michael McGraw, former Environmental Compliance Specialist
Jason Mateljak, former Chief, Integrated Resources
Mike Magnuson, Wildlife Biologist
Gary Mott, Facility Manager
Ashley Phillips, former Historical Architect/Section 106 Coordinator

Joshua Strubhar, former Archeological Technician

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Danette Woo, Regional Environmental Coordinator
Nicholas Mitrovich, Regional Environmental Protection Specialist

Klamath Network of Parks
Nate Anderson, Project Engineer, PMP (preparer)

Chapter 5: References

Adamus, P. R., D. C. Odion, G. V. Jones, L. C. Groshong, and R. Reid. 2013. Lassen Volcanic National Park Natural Resource Condition Assessment. Natural Resource Report NPS/NRSS/WRD/NRR—20132/725. National Park Service, Fort Collins, Colorado.

Buckley, Steve. 2019. Personal communication with Lassen Volcanic National Park Vegetation Ecologist, March 11, 2019 based on comments on park review preliminary environmental assessment.

California State Historic Preservation Office (SHPO). 2004. Concurrence with eligibility of Warner Valley Developed Area Historic District eligibility for the National Register of Historic Places (8-18-04).

Caywood, Janene and Ann Emmons, National Register of Historic Places Nomination Form. 2004. Historical Research Associates, Missoula, Montana.

Christiansen,R.L., Clynne, M.A., and Muffler, L.J.P., 2002, Geologic map of the Lassen Peak, Chaos Crags, and Upper Hat Creek area, California: U.S. Geologic Survey Geologic Investigations Series I-2723, scale 1:24,000.

Clynne, M.A., and Muffler, L.J.P., 2010, Geologic map of Lassen Volcanic National Park and vicinity, California: U.S. Geological Survey Scientific Investigations Map 2899, scale 1:50,000.

Cowardin, Lewis M., et al., 1979. Classification of Wetlands and Deepwater Habitats of the *United States.* U.S. Fish and Wildlife Service.

Jimenez, A. 2018. Proposed Leach Field Location Archeological Survey Report.

Johnson, Louise, 2005. Wetlands of the Warner Valley, September 6 *in* NPS LVNP 2008.

Krahe, David L. & Catton, Theodore, Gem of the Cascades: An Administrative History of Lassen Volcanic National Park, On file at Lassen Volcanic National Park, Mineral, CA.

Martin, L., 2014, Assessment of the potential for obtaining a groundwater supply for the Lost Creek and Crags Campgrounds by construction of a water-supply well, NPS Water Resources Division Technical Assistance Report, September 2014, 5p.

McGraw, Michael. 2019. Personal communication with Lassen Volcanic National Park Compliance Specialist based on comments prior to park review of preliminary environmental assessment, February 25, 2019.

National Park Service (NPS). 2006. NPS Management Policies 2006. U.S. Department of the Interior, National Park Service. 180p. https://www.nps.gov/policy/mp/Index2006.htm

National Park Service (NPS) Lassen Volcanic National Park (LVNP), 2008. Comprehensive Site Plan for the Restoration and Preservation of Warner Valley.

NPS, LVNP, 2008a. Lassen Volcanic National Park Weed Management Plan and Environmental Assessment.

NPS, LVNP. 2005. Lassen Volcanic National Park Commercial Services Plan and Environmental Assessment, Lassen Volcanic National Park.

NPS, LVNP. Updated annually. List of Classified Structures.

NPS, LVNP. 1999. Natural and Cultural Resource Management Plan, Volumes I and II.

NPS, LVNP. 2005. Commercial Services Plan and Environmental Assessment.

NPS, LVNP. 1999. Visitor Use Study.

NPS, Pacific West Regional Office (PWRO). 2005. Drakesbad Guest Ranch Cultural Landscape Report.

NPS, PWRO. 2004. Drakesbad Guest Ranch Cultural Landscape Inventory.

NPS, PWRO. 2003. Lassen Volcanic National Park General Management Plan.

NPS, PWRO. 2000. Condition Survey Report – Dream Lake Dam.

Patterson, L. and D.J. Cooper, 2005. Hydrologic Characterization and Restoration of a Mountain Fen Complex, Drakesbad Meadow, Lassen Volcanic National Park, Cascade Range, California [Masters Thesis] *in* NPS LVNP 2008.

White, Gregory C. and California State University, Chico Archaeological Research Program. 2001. Report of Archaeological, Geoarchaeological, and Paleontological Investigations in Lassen Volcanic National Park, California.