National Park Service
U.S. Department of the Interior
Whiskeytown National Recreation Area
California

TRAILS MANAGEMENT PLAN
ENVIRONMENTAL ASSESSMENT
FEBRUARY 2022

This page intentionally left blank.

CONTENTS

FIGURES

TABLES

This page intentionally left blank.

CHAPTER 1: PURPOSE AND NEED

BACKGROUND

Whiskeytown National Recreation Area (WHIS) is one of 18 national recreation areas managed by the National Park Service, U.S. Department of the Interior. WHIS is a 42,000-acre recreation area nestled within the Klamath Mountains in Northern California eight miles from downtown Redding. The 3,200-acre Whiskeytown Lake is a dominant feature of the park. (See figure 1). The term national recreation area (or NRA) is used interchangeably with park throughout this document. WHIS is characterized by steep and rugged terrain. Winter rains, long dry summers and frequent wildfires create diverse habitats, from old-growth forests to oak woodlands and chaparral.

Acorns, fish, deer, and other plants and animals provided a means for American Indians to sustain their way of life for thousands of years. The discovery of gold nearby in 1848, only months after it was found farther south at Sutter's mill, brought fortune hunters known as "49'ers." Today, visitors value this area's water, wildlife habitat, recreational opportunities, and the power-generating facilities of the Central Valley Water project.

President John F. Kennedy dedicated Whiskeytown Dam in 1963, noting that when "we set aside recreational areas, we can be sure they will be used." While the primary focus for Whiskeytown visitors is water-based recreation (Whiskeytown Lake comprises about 10% of the park's acreage), the park also contains rugged canyons, forests, streams, and waterfalls. The land surrounding Whiskeytown Lake provides many opportunities for visitor enjoyment including hiking, mountain biking, and horseback riding.

This Trails Management Plan Environmental Assessment has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, = the Update to Regulations Implementing the Procedural Provisions of the National Environmental Policy Act (2020), 40 Code of Federal Regulations (CFR) Parts 1500–1508, and Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making (NPS 2011) and its accompanying handbook (NPS 2015).

THE PROPOSED ACTION

The National Park Service (NPS) is proposing to improve and expand the existing trail system and offer more diverse trail experience opportunities in the national recreation area. Specifically, the park proposes to construct new trails and remove and/or reroute underutilized or unsustainable trails. The planning process is being conducted in compliance with NPS general regulations regarding bicycle use.

NEED FOR ACTION

Whiskeytown provides numerous recreational opportunities for its visitors. While water-based recreation is the primary focus for many visitors on Whiskeytown Lake, the reservoir comprises less than 10% of the park's acreage. The vast majority of the park is the surrounding forested land. Hiking, mountain biking, and horseback riding are all common land-based recreation activities at the park.

The current trail system is comprised of approximately 66 miles of trails, mostly located to the south, east, and west of Whiskeytown Lake. The trail system is primarily based upon old logging and mining infrastructure that currently range from asphalt walkways to engineered dirt trails, including a historic ditch system throughout the national recreation area. Very few trails connect to other areas outside the park. The main trail user groups are hikers, runners, mountain bikers, and equestrian users. The park has never had a comprehensive document that guides decisions on trail type, use and maintenance, and action is necessary to lay out a plan for the trail system into the future. The park would also like to provide a more diverse visitor experience and formalize trail routes for specific uses such as hiking, equestrian use and bicycle use.

Mountain biking has occurred at WHIS since the 1980s and is extremely popular in the national recreation area. Environmental compliance requirements for authorizing the use of bikes in the park have never been completed and need to be addressed in this document to satisfy NEPA and NPS general regulations.

On July 23, 2018 the Carr Fire was reported near the intersection of Highway 299 and Carr Powerhouse Road. The fire spread quickly to other parts of Whiskeytown, eventually burning 39,000 of the park's 42,000 acres. At this writing, it was the most destructive fire in the history of the National Park System. In recent years, park staff have diverted funding and staff time typically dedicated to trail maintenance to devoting time clearing hazard trees and stabilizing soils to keep trails safe, open and passable. However, the changed landscape has also resulted in a greater and more immediate need for long term solutions such as properly designed and/or rerouted trails. In addition, a few heavily damaged trails will be decommissioned due to redundancy and sustainability issues.

Most of the park's soil types were erosive before the changed landscape created a more unstable environment. Park staff have identified trails in highly or moderately erosive areas that should be rerouted as part of this plan. Additional trail miles, built to sustainable standards, are also needed to improve connectivity to park features. Some decommissioned trails or trail segments need to be restored to natural conditions. There is also the need to formalize or restore trails to meet sustainability guidelines. Trail structure maintenance activities would comply with the NPS *Guide to Sustainable Mountain Trails* (2007); the USFS *Trail Construction and Maintenance Notebook* (2007); and the California State Parks *Resources Agency Department of Parks and Recreation Trail Handbook* (1991). See Appendix D (Trail Maintenance Handbook) for more details.

OBJECTIVES IN TAKING ACTION

The objectives for the trail management plan are to:

- Restore popular trails and reroute underutilized or unsustainable social (i.e., user-created) trails.
- Establish visitor use management guidelines for the trail system, including a long-term monitoring framework and an assessment of visitor capacity.
- Establish sustainable trail design standards and guidelines for management, special uses, and operations.

- Integrate allowable bike types into the trail system and satisfy compliance requirements for authorizing the use of bikes in the park.
- Establish new trail routes and connections to disperse users and offer a greater diversity of visitor experiences.

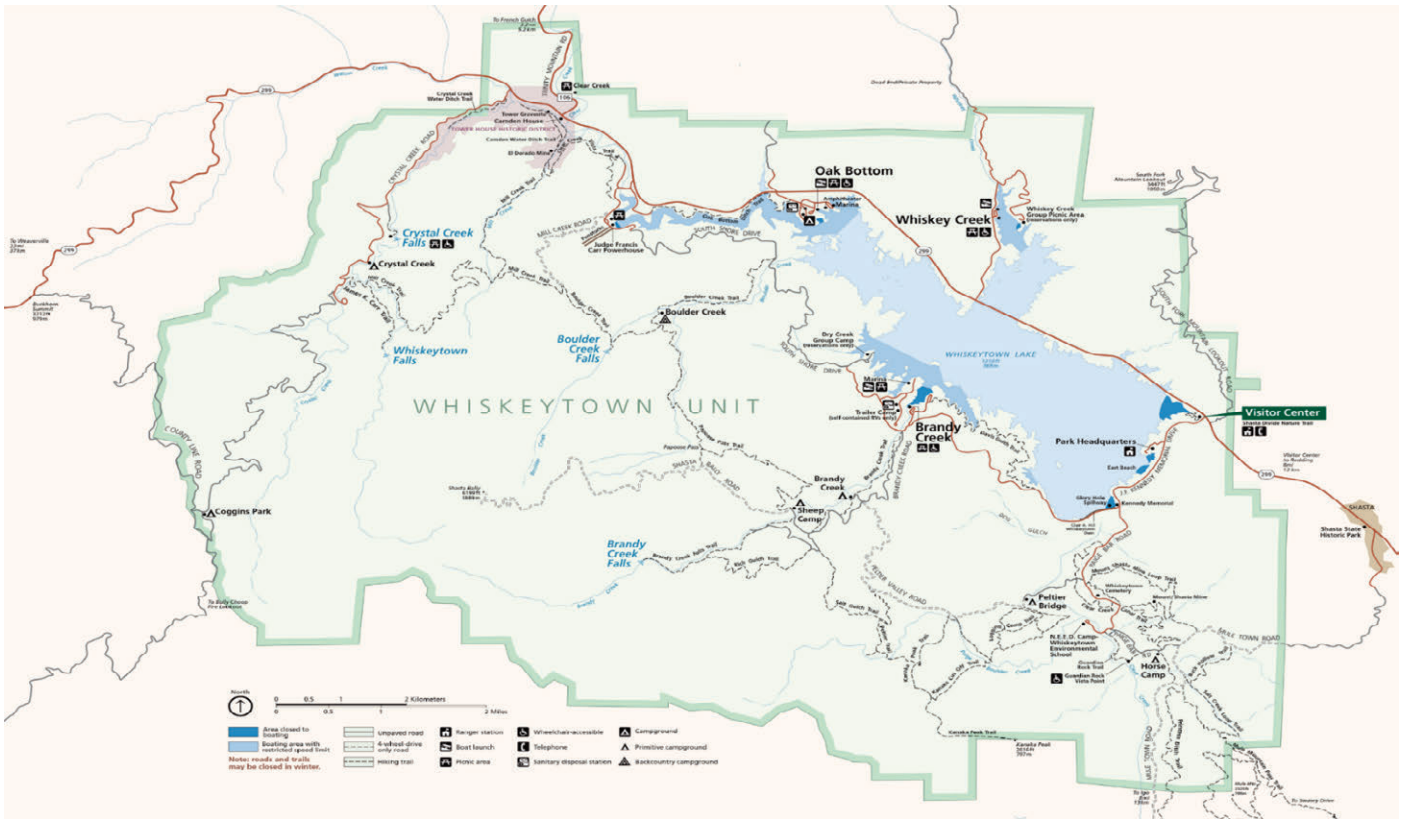


Figure 1. Map of Existing Trail System in Whiskeytown National Recreation Area

Impact topics represent resources that could be affected, either beneficially or adversely, by implementing any of the proposed alternatives. The National Park Service used an interdisciplinary review process, existing studies and data, and public comments to determine which resources would likely be affected by this project. The following topics are carried forward for further analysis in this environmental assessment:

- Erosive Soils
- Special Status Species
- Archeology
- Historic Ditches
- Visitor Use and Experience

An important part of effective planning is understanding the consequences of potential beneficial and adverse impacts of taking action. Environmental assessments, such as this document, identify the anticipated impacts of possible actions on resources and on park visitors and resources. Impact topics focus the environmental analysis and ensure the relevance of impact evaluation. The following section summarizes the issue topics that were considered but dismissed from further analysis.

IMPACT TOPICS CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

The following impact topics are not analyzed because they do not exist in the project area, would not be affected by the proposal or the likelihood of impacts are not reasonably expected, through the application of mitigations measures, there would be no potential for significant effects, and were not a big point of contention among the public and other agencies.

Water Quality

Proposed trail work, restoration, rerouting and trail abandonment would contribute to increases in sedimentation within park watersheds and could add to mine contaminant mitigation challenges from historic mining operations. The severity of short-term impacts to water quality from erosion has increased due to the huge loss of vegetation - particularly on higher elevation slopes - from the Carr Fire. However, in comparison to erosion and sedimentation impacts that occur from heavy rain events among the hundreds of miles of former logging and mining roads within the park, erosion impacts from recreational uses throughout Whiskeytown's designated trail system are minor, if not negligible. Similarly, past and continuing maintenance of Western Area Power Association (WAPA), Pacific Gas & Electric (PG&E) and California Department of Transportation (Caltrans) rights-of-way for roads and transmission lines and continuing construction and maintenance of firebreaks for prescribed fires would continue to result in varying, but relatively minor levels of sediment transport and soil erosion into drainages throughout the park. These occurrences would increase turbidity in park drainages and would have short-term impacts to water quality.

The preferred alternative would have beneficial effects on park drainages' water quality as well. For example, the removal and restoration or reroutes of 15.3 miles of unsustainable trails would reduce soil erosion and turbidity, beneficially affecting water quality in various drainages. Reestablishing the tread on various trails, installing water bars and other erosion control measures would decrease transport of sediments. Consequently, mitigation measures cited above would reduce turbidity to minor, if not negligible levels. Therefore, water quality has been dismissed from detailed analysis.

Vegetation

Most of Whiskeytown's forested landscape and other types of vegetative cover were cleared or highly impacted by land use practices, such as mining, logging and roadbuilding over time. These activities – many of which occurred before the park was established – created most of the ditches that underlay the existing trails discussed in this plan. Where new trails and trail segments are proposed, trail construction activity would be confined to the minimum area required for construction[1]. Of the 42,000 acres within WHIS's boundary and assuming an average four-foot tread width for new and rerouted trails, a total of 11.7 acres of trailside vegetation (0.028% of the recreation area) would be removed under the preferred alternative. Best management practices, such as limiting removal of

1. The park incorporates a 4' minimum width to allow for horse and a 10' vegetation clearing height for new trails.

native vegetation adjacent to trails, would be used as much as possible to protect native plants and to prevent the spread of nonnative species. Cleaning tools, equipment, and vehicles before entering and leaving a work site as well as several other best management practices suggested by the California Invasive Plant Council (2012) could also be incorporated during trail management activities proposed in this plan. In addition, revegetation efforts would strive to reconstruct the natural spacing, abundance, and diversity of native plant species along the trails. Visitor created, non-designated trails would continue to cause erosion and damage vegetation but would not have noticeable or substantive impacts to park vegetation across the national recreation area (Impacts to Whiskeytown's erosive and more vulnerable vegetation is discussed in the "erosive soils" impact topic).

Construction activities would also have the potential to help spread nonnative plant species. Mitigation measures such as confining construction to the minimum area needed, conducting invasive plant monitoring and treatment prior to and following construction, and daily checks of project personnel apparel and pressure washing equipment prior to entering the park would all help reduce the likelihood of nonnatives spreading during construction activities. While increased use by visitors may result in trampling of native species, after completing construction, local litter and duff mulch will be used to cover bare soil to provide a source of seeds to reestablish native vegetation and reduce the risk of non-native seeds germinating. These mitigation measures would be expected to control the spread of non-native species to a level where they would not measurably impact native vegetation. Therefore, vegetation has been dismissed from detailed analysis.

Wildlife

Equipment noise and the presence of construction workers related to the removal or rerouting and restoration of 15.3 miles of unsustainable trails would initially disturb some wildlife. The construction and use of 32.8 miles of new trails by visitors would result in the loss of additional wildlife habitat and could potentially fragment some wildlife habitat and populations. However, long-term impacts to wildlife would be negligible. Most trail improvements are proposed within previously disturbed areas and in areas that currently experience higher concentrations of visitors, with the remainder of improvements located in areas that are not expected to impact wildlife. One notable exception is the proposed Whiskeytown Lake Trail, which would be constructed through mostly undeveloped corridors on the west side of the lake. Construction activities would be scheduled to minimize construction-related impacts on wildlife, such as nesting birds and black bears.

Similarly, impacts from dogs on trails (both on leash and off) can affect wildlife behavior and movements and be disease vectors to native wildlife. Park staff are actively working to mitigate this issue with education and enforcement of leash laws and pet waste disposal requirements. Park managers would further consider the use of temporary or seasonal visitor use restrictions or area closures to protect sensitive wildlife and habitat from trail uses – especially during nesting and breeding season. Precautions would also be taken during final trail design to locate and modify trail segments around sensitive areas to protect key species.

The long-term revegetation along these trails and visitor use management strategies outlined in this plan would improve wildlife habitat. In addition, proposed trail closures, trail reroutes, and restoration activities would reduce erosion and sedimentation levels, which would benefit sensitive aquatic species like the foothill yellow-legged frog, northwestern pond turtle, and tailed frog. Care would be taken to avoid or minimize disturbance of sensitive wildlife species found nesting,

hibernating, foraging, or otherwise living in or immediately nearby the worksites. For all trail construction activities park staff would apply sustainable practices to minimize potential environmental impacts. Trail construction and maintenance activities would not compete with or dominate natural processes, such as the seasonal migration of wildlife. Therefore, wildlife has been dismissed from detailed analysis.

Cultural Landscapes and Historic Districts

The historic integrity, setting and feeling of the Tower House Historic and Archaeological Districts would not be impacted by the preferred alternative of the trail management plan. Under this alternative, the existing trails in the district -including the Camden Water Ditch Trail and Tower Grave Trail - would remain class 3 trails. (Trail classes are identified and defined in chapter 2.) The proposed new trails within the district (the Camden Water Ditch Trail Extension and the Clear Creek Picnic Trail), would also be class 3 trails. Although the Camden Water Ditch Trail Extension would require the construction of a bridge to accommodate visitors crossing Crystal Creek, this would be designed to be compatible with the natural and historic surroundings and meet the Secretary of the Interior's Standards in consultation with the State Historic Preservation Office (SHPO). The proposed project would therefore not adversely affect the historic district or the overlapping cultural landscapes. No historic features on any of these trails would be removed.

Ethnographic Resources

Ongoing consultation between the park and tribes would continue to take place to ensure that ethnographic resources or resources of significance would not be impacted by the action preferred alternative of the trail management plan. The proposed new trails or reroutes under the preferred action alternative would not impact known ethnographic resources or impede tribes' ability to utilize Whiskeytown for traditional purposes. The proposed new trails or existing trail reroutes would be designed to avoid known ethnographic resources in consultation with tribes. All tribal consultation will take place in accordance with Section 106 of the National Historic Preservation Act under 36 CFR Part 800.

Historic Structures

Historic structures at WHIS consist primarily of structures in the Tower House Historic District that encompass the period from about 1850 to 1933. Both the Camden Water Ditch Trail Extension and the Clear Creek Picnic Trail (the two new trails built in the district under the preferred alternative of the trail management plan) would be near the district's individual structures, but would not have a direct effect on them. Other historic structures at the Whiskeytown Environmental School (WES) would be similarly unaffected. None of the new trails proposed under the preferred alternative are near WES. Use of the two trails that are already in the vicinity of WES, the Ladybug Lane Trail and Martha's Ditch Trail, would remain permitted only for those at the school and the two trails would retain their existing trail classes of 2 and 3 respectively.

Environmental Justice

Environmental justice is dismissed as an impact topic for this plan because the actions proposed would not have disproportionately high and adverse human health or environmental effects on minority and low-income populations. Benefits of this plan include increased and improved recreational opportunities for all within the park boundary. The risks associated with this plan and the impact to the local community would not be disproportionately felt by minority and low-income populations.

This page intentionally left blank.

CHAPTER 2: ALTERNATIVES

INTRODUCTION

This environmental assessment analyzes a no-action alternative and one action alternative for trail management. The elements of these alternatives are described in detail in this chapter. The no-action alternative would continue current management and provide a basis for comparing the effects of the action alternative. The action alternative presents a different approach to address the plan's purpose and need as described in Chapter 1 and is the NPS preferred alternative. The action alternative presented in this section was created based on recommendations of an interdisciplinary planning team, environmental impact analysis, and public feedback. This chapter also includes visitor use management actions, mitigation measures common to the action alternative and alternatives considered but dismissed from further consideration.

NPS Bicycle Rule

Both alternatives must comply with 36 CFR 4.30 (the Bicycle Rule), which contains regulations that manage bicycle use with national park system units. In 1987, the National Park Service promulgated regulations establishing a management framework for the use of bicycles in park areas. In 2012, the National Park Service revised the process in the regulations for allowing bicycles to focus on park planning and environmental compliance under the National Environmental Policy Act. See 77 FR 39927. The National Park Service acknowledges that the use of bicycles at WHIS has not been authorized in accordance with the Bicycle Rule, and continuation of the use described in the no-action alternative without complying with the Bicycle Rule is not legally tenable in the long term.

The Bicycle Rule establishes different procedures for authorizing bicycle use on existing trails, on new trails in developed areas, and on new trails outside of developed areas. Regardless of the scenario, before the superintendent can authorize the use of bicycles, the National Park Service must prepare a planning document that evaluates the effects of bicycle use on the specific trails where bicycles would be allowed. The planning document must evaluate the suitability of trail surfaces and soil conditions for accommodating bicycle use, including any maintenance, minor rehabilitation, or armoring that would be necessary to upgrade the trail to sustainable condition. Lifecycle maintenance costs, safety considerations, strategies to prevent or minimize user conflict, and methods to protect natural and cultural resources and mitigate impacts also must be analyzed.

An environmental assessment or environmental impact statement must be completed that evaluates the effects of bicycle use in the park and on the specific trails where they would be allowed. An environmental assessment must provide for a 30-day comment period. If there is a finding of no significant impact, the superintendent must then complete a written determination stating that the addition of bicycle use on the trails is consistent with the protection of the park area's natural, scenic and aesthetic values, safety considerations, and management objectives and would not disturb wildlife or park resources, and then obtain written approval from the regional director of such determination.

New trails requiring construction activities (such as clearing brush, cutting trees, excavation, or surface treatment) must be developed and constructed in accordance with sustainable trail design principles and guidelines. A special regulation that is promulgated after notice-and-comment rulemaking is required for new trails and for existing trails that require construction or significant

modification to accommodate bicycle use if any portion of those trails is outside a developed area. Bicycle use on new trails entirely within developed areas and on existing trails that do not require construction or significant modification to accommodate bicycles may be authorized without the need for a special regulation.

Although there are some existing trails at the national recreation area that can continue to accommodate bicycles without construction or significant modification, if the National Park Service selects the preferred alternative, the National Park Service will promulgate a special regulation to designate all trails where bicycle use is authorized within the national recreation area after the compliance and planning process is completed. This approach will increase compliance, strengthen enforcement, and decrease public confusion and frustration about where bicycles are allowed. If the National Park Service selects the no-action alternative, rulemaking would not be necessary under the Bicycle Rule. To continue to allow bicycles on the existing trails, however, the superintendent would need to prepare and publish in the Federal Register a written determination that bicycle use on the existing trails is consistent with the protection of the park area's natural, scenic, and aesthetic values, safety considerations and management objectives and will not disturb wildlife or park resources. After a 30-day public review period and consideration of public comments, the NPS regional director would need to provide written approval of such determination. A breakdown of construction and 25-year lifecycle costs are presented in Appendix E.

No-Action Alternative

The no-action alternative describes current management of the trail system carried into the future. This alternative represents current conditions and is also a baseline for comparison of the action alternative (preferred alternative). Under the no-action alternative, the management direction established in the 1999 General Management Plan (GMP) would continue. Current management activities occurring on and relating to the 66-mile trail network and 42.2-mile administrative road network would also continue. No new trails would be constructed. Because of the Carr Fire, temporary closures and minor improvements would continue under the no-action alternative to provide safe trail experiences. Minor repairs and improvements would be initiated with the goal of upgrading existing trails to meet NPS sustainability standards. As safety issues arise, existing trails would be restored to natural conditions or rerouted on a case by case basis. No social trails would be closed for resource preservation. No trails would be rerouted for improving resource conditions or visitor experiences. The park has identified $1.3 million dollars of deferred maintenance on existing trails that would be completed under a separate NEPA pathway. Mountain biking would continue to be allowed within the park, with the Oak Bottom Water Ditch Trail and Brandy Creek Falls Trail continuing to be the most frequently used trails by cyclists.

Trail Classes.

Table 1A shows a comprehensive list of all trails available in the existing trail network. These existing trails would remain unchanged under the no-action alternative. Existing trails are described by their trail class, trail use, and mileage. Additional details on trail classes can be found in appendix D.

Trail Classes are defined as follows:

- Trail Class 1: Minimally Developed (no Class 1 trails exist at Whiskeytown NRA)
- Trail Class 2: Moderately Developed
- Trail Class 3: Developed
- Trail Class 4: Highly Developed
- Trail Class 5: Fully Developed

Trail Uses are defined as follows:

- Pedestrian Only: pedestrians (including hikers, trail runners, and dog walkers) are the only allowed users
- Multiuse: multiple user types are allowed, including but not limited to hikers, equestrian users, and bicyclists (mountain bikers, road cyclists, or gravel cyclists)
- Accessible: this trail type meets Architectural Barriers Act Accessibility Standards (ABAAS) and provides terrain and surfaces appropriate for wheelchair users
- Whiskeytown Environmental School (WES) Only: WES trails are not open for public use

New Trails:

No new trails would be constructed under this alternative.

Trail Reroutes:

Shorter trail reroutes around steep slopes and sensitive resources to improve trail safety that would have minor environmental impacts to resources would continue to occur under the no-action alternative. Reroutes would be limited to less than ¼ mile in complex terrains and less than ½ mile in less complex terrains. Reroutes would be reviewed by the compliance team and mitigation measures would be discussed before approval of the reroute.

Trail Closures:

Trail closures could occur under the no action if the park determines that there is a risk to human health and safety or continued degradation to resources. Closures under this alternative would likely be temporary, and the public would be notified of any permanent closure were necessary.

Table 1A. Existing Trails, Trail Class, Trail Use, and Distance

Trail Name	Trail Class	Trail Use	Length (miles)
Boulder Creek Falls Trail	2	Pedestrian Only	.1
Boulder Creek Trail (segment 1)	3	Multiuse	1
Boulder Creek Trail (segment 2)	4	Multiuse	2.8
Brandy Creek Falls Trail	4	Multiuse	1.5
Brandy Creek Picnic Trail	5	Multiuse	.3
Brandy Creek RV Trail	3	Multiuse	.17
Brandy Creek Trail	4	Multiuse	2
Buck Hollow Trail	3	Multiuse	1

Trail Name	Trail Class	Trail Use	Length (miles)
Camden Water Ditch Trail	3	Multiuse	1.1
Clear Creek Canal Trail	3	Multiuse	4.8
Clear Creek Vista Trail	3	Multiuse	1.8
Crystal Creek Falls Trail	5	Accessible, Multiuse	.5
Crystal Creek Trail	3	Multiuse	2.3
Crystal Creek Water Ditch Trail	4	Pedestrian Only	1
Davis Gulch Trail	4	Pedestrian Only	3.3
Guardian Rock Trail (segment 1)	3	Multiuse	.6
Guardian Rock Trail (segment 2)	5	Accessible, Multiuse	.4
Horsetail Canyon Trail	2	Multiuse, WES Only	.6
Hydraulic Mine Trail	3	Multiuse	.5
James K. Carr Trail	4	Pedestrian Only, Multiuse	1.4
Kanaka Cutoff Trail	3	Multiuse	1.1
Kanaka Peak Trail	3	Multiuse	3.3
Knobcone Trail	3	Multiuse	.3
Ladybug Lane Trail	2	WES Only	.3
Logging Camp Trail	3	Multiuse	1.25
Martha's Ditch Trail	3	WES Only	2.5
Mill Creek Trail (segment 1)	4	Multiuse	4.5
Mill Creek Trail (segment 2)	3	Multiuse	.3
Mill Creek Trail (segment 3)	2	Multiuse	1.9
Mount Shasta Mine Loop Trail	3	Multiuse	3.9
Mule Mountain Loop Trail	3	Multiuse	1.2
Mule Mountain Pass Trail	3	Multiuse	1.2
Oak Bottom Water Ditch Trail	3	Multiuse	2.8
Orofino Trail	3	Multiuse	.1
Papoose Connector Trail	3	Multiuse	.2
Papoose Pass Trail	3	Multiuse	2.6
Peltier Trail	3	Multiuse	1.75
Princess Ditch Trail	3	Multiuse	1.9
Prospect Trail	3	Multiuse	.4

Trail Name	Trail Class	Trail Use	Length (miles)
Rich Gulch Trail	3	Multiuse	1.8
Ridge Trail	3	WES Only	1.8
Salt Creek Mine Trail	3	Multiuse	.1
Salt Creek Trail	3	Multiuse	1
Salt Gulch Trail	3	Multiuse	1.6
Shasta Divide Nature Trail	3	Pedestrian Only	.4
Tower Grave Trail	3	Multiuse	.2
WES Emergency Access Road	4	Multiuse	.6
Total	—	—	**66**

Use of E-Bikes:

On November 2, 2020, the National Park Service published 36 CFR 4.30(i) addressing the use of electric bicycles (or e-bikes) in park areas. These regulations authorize the superintendent to allow e-bikes, where appropriate, on park roads, parking areas, and administrative roads and trails that are open to traditional bicycles. A superintendent who decides to allow e-bikes must designate the areas open to e-bikes in the Superintendent's Compendium. A superintendent may limit, restrict, or impose conditions on e-bike use or may close any park road, parking area, administrative road, trail, or portion thereof to e-bikes under certain circumstances. Except where use of motor vehicles by the public is allowed, using the electric motor exclusively to move an e-bike for an extended period of time without pedaling is prohibited. E-bikes are prohibited in locations not designated by the superintendent.

NPS regulations define an "electric bicycle" as a two- or three-wheeled cycle with fully operable pedals and an electric motor of not more than 750 watts that meets the requirements of one of the following three classes:

(1) "Class 1 electric bicycle" shall mean an electric bicycle equipped with a motor that provides assistance only when the rider is pedaling and that ceases to provide assistance when the bicycle reaches the speed of 20 miles per hour (mph).
(2) "Class 2 electric bicycle" shall mean an electric bicycle equipped with a motor that may be used exclusively to propel the bicycle and that is not capable of providing assistance when the bicycle reaches the speed of 20 mph.
(3) "Class 3 electric bicycle" shall mean an electric bicycle equipped with a motor that provides assistance only when the rider is pedaling and that ceases to provide assistance when the bicycle reaches the speed of 28 mph.

The superintendent of the national recreation area has authorized Class 1 e-bikes on all trails, public roads, and administrative roads within the NRA. Class 2 and Class 3 e-bikes are allowed on all public roads, but not allowed on trails or administrative roads within the NRA

Administrative Road Network:

The NRA allows for the use of class 1 e-bikes on trails where traditional bicycle use occurs, including administrative roads. Table 1B shows a comprehensive list of all administrative roads available in the existing trail network.

Table 1B. Existing Administrative Roads, and Distance

Administrative Road Name	Length (miles)
Brandy Creek Spur Road (Administrative)	0.1
Carr Housing Area Road (Administrative)	0.3
Clear Creek Picnic Area Access Roads (Administrative)	0.3
Coggins Flat North Access Road (Administrative)	0.1
Crystal Creek Camp Access Road and Parking Areas (Administrative)	0.2
Crystal Creek Falls Road (Administrative)	0.4
Dog Gulch Road (Administrative)	0.4
East Beach Access Road (Administrative)	0.1
Grizzly Gulch South Spur Road (Administrative)	0.3
Grizzly Gulch North Spur Road (Administrative)	0.1
Merry Mountain Roads (Administrative)	0.6
Mexican Springs Road (Administrative)	0.2
Mt. Shasta Mine Loop Road (Administrative)	0.1
Monarch Mountain Road (Administrative)	0.6
New York Gulch Area Roads (Administrative)	1.5
PG&E Roads (Administrative)	14.0
Tower House Historic District Road/El Dorado Mine Road (Administrative)	0.5
Transfer Station Road (Administrative)	0.1
WAPA Roads (Administrative)	22.3
Total	**42.2**

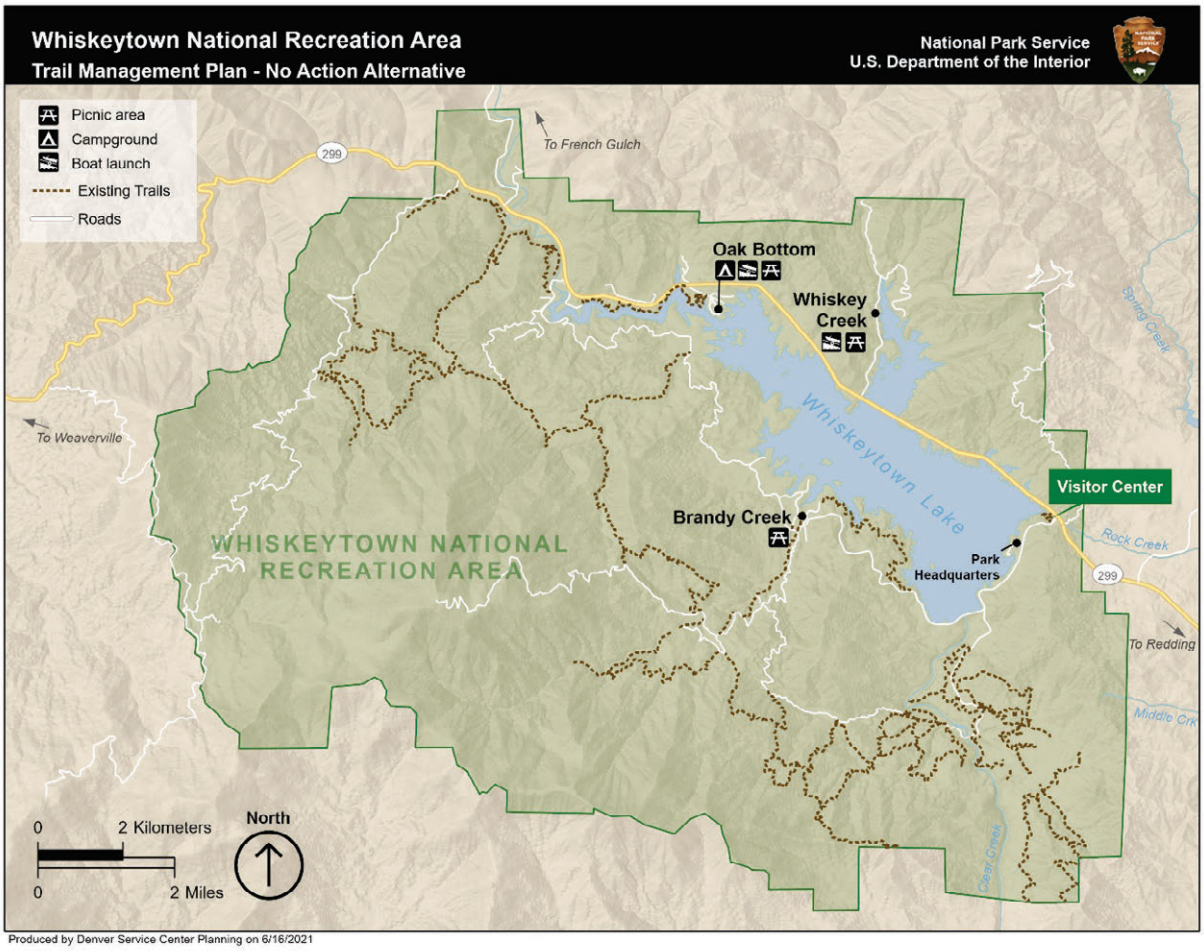


Figure 2. Map of No-Action Alternative

ACTION ALTERNATIVE – NPS PROPOSED ACTION AND PREFERRED ALTERNATIVE

This alternative would provide enhanced experiences within the Whiskeytown National Recreation Area trail system. Under the action alternative (NPS preferred alternative), 79.4 miles (approximately 13.4 additional miles compared to the no action) of total trail would be included in the trail system. All trails would be constructed with a mixture of hand tools, hoisting equipment, chainsaws and motorized equipment, depending on the location, slope and extent of work involved. Motorized equipment may include but are not limited to mini bulldozer, mini excavators, and other related equipment. Trash and pet waste receptacles would be installed at key local locations and trailheads.

Trail Classes:

This alternative uses the established trail classes as defined in the no-action alternative. Trail Classes assigned to new trails are included in table 2.

Trail Construction:

This alternative proposes approximately 32.8 miles of trail construction that includes new trails and rerouted sections of existing trail.

New Trails:

The longest trail, the proposed lakefront trail, would be about 8 miles in length and designed to improve access to the lake. The Whiskeytown Lake Trail would be a multiuse asphalt trail intended for bicycle and pedestrian use. It is likely that the lakefront trail would be established in sections and funded by multiple sources.

This alternative would also establish a new trail along the Shasta Divide at the east side of the park. This trail, covering about 7 miles in the eastern portion of the park, would provide visitors with views of Mount Shasta and the Cascade Range. The trail would be designed to provide a potential new connection with the adjacent BLM trail network at Mule Mountain where mountain biking occurs, which would enhance the visitor use experience of bicyclists. This potential new connection to BLM trails would be established in a separate compliance process.

Included in the new trails calculation is the formalization of social trails. A total of three social or informally visitor-created trails totaling one mile is included within the new trails summation. Table 2 shows a comprehensive list of all new trails proposed in the action alternative. New trails include reroutes of unsustainable trails and are noted in the “Reroute” column. The new trails are designed to connect existing trails for more trail loops, create new visitor experiences in different parts of the park, and increase opportunities for diverse visitor uses. New trails proposed are described by trail class, trail use, and mileage.

Finally, the park would like to pursue the establishment of a water-based trail in the future. A water-based trail with National Water Trail designation would require additional research, consultation, coordination and civic engagement. A water trail will be considered under a separate effort and, if applicable, will tier off of this trails plan.

Trail Reroutes:

A total of seven rerouted trails totaling 11.7 miles are also proposed. All of the proposed trail reroutes would accompany a closed section of trail that has been determined to be unsustainable due

to erosive soils or soil compaction, steep alignment, and undesirable visitor experiences. In total, the action alternative would close approximately 15.3 miles of unsustainable trail. Out of these 15.3 miles of trail, 13.7 miles of trail are being rerouted to more sustainable alignment and use.

Trails Restored to Natural Condition:

In total, 5.1 miles of trail would be closed without a reroute. A mixture of hand tools and motorized equipment would be used to return the trails to natural conditions.

Figure 3. Map of Action Alternative

Table 2. New Trails Proposed in Action Alternative

Trail Name	Trail Class	Trail Use	Reroute	Length (Miles)
Boulder Creek Trail	4	Multiuse	Yes	1.6
James K. Carr Trail Extension	3	Multiuse		.5
Camden Water Ditch Trail Extension	3	Multiuse		.3
Clear Creek Canal Trail	3	Multiuse	Yes	.4
Clear Creek Picnic Trail	5	Multiuse		.3
Davis Gulch Trail	4	Pedestrian Only	Yes	1.1
East Boundary Vista Trail	3	Multiuse		1.4
Guardian Rock Equestrian Trail	3	Multiuse		.3
Horse Camp Trail	3	Multiuse		.4
Mill Creek Trail	3	Multiuse	Yes	2.6
Mount Shasta Mine Loop Trail	3	Multiuse	Yes	2.7
Mule Mountain Pass Trail	3	Multiuse	Yes	.8
Orofino Trail	2	Multiuse		.3
Papoose Pass Trail	3	Multiuse	Yes	2.5
Peltier Bridge Trail	3	Multiuse		.6
Prospect Trail	3	Multiuse		.7
Salt Gulch Trail	3	Multiuse	Yes	2
Shasta Divide Trail	3	Multiuse		7
Whiskeytown Lake Trail	5	Multiuse, No Equestrians		8.3
Total				**32.8**

Descriptions of the proposed action alternative trails are listed below.

Boulder Creek Trail– This trail is a minor reroute of the existing Mill Creek Trail, renamed to connect with the existing Boulder Creek Trail.

James K. Carr Trail Extension – This trail extension would provide a new trailhead for the James K. Carr Trail to Whiskeytown Falls. At this new primary trailhead at Upper Crystal Creek there would be increased opportunities for parking and overnight camping.

Camden Water Ditch Trail Extension – This short extension of the Camden Water Ditch Trail would provide a connection to the Crystal Creek Water Ditch Trail.

Clear Creek Canal Trail – This new trail would be a reroute of the existing Clear Creek Canal Trail. The reroute would realign the trail to avoid the steep slopes on the current trail.

Clear Creek Picnic Trail – This new trail would be a Class 5 multiuse trail and would provide an opportunity for visitors to enjoy this area as a day use picnic site.

Davis Gulch Trail – This new trail would be a reroute of the existing Davis Gulch Trail. The reroute would realign the trail to avoid the steep slopes on the current trail.

East Boundary Vista Trail – This new trail would connect the proposed rerouted Mount Shasta Mine Loop with the proposed new Shasta Divide Trail.

Guardian Rock Equestrian Trail – This new trail would separate user groups on the existing Guardian Rock Trail by providing an alternate route for equestrian users.

Horse Camp Trail – This new trail would provide a connection between the Guardian Rock Equestrian Trail/Guardian Rock Trail and the Clear Creek Canal Trail. This multiuse trail would be accessible by a variety of user groups, including equestrian users coming from/to the Guardian Rock Equestrian Trail.

Mill Creek Trail – This new trail would be a reroute of the existing Mill Creek Trail and former Crystal Creek Trail. The reroute would realign the trail to avoid the steep slopes on the current trail.

Mount Shasta Mine Loop Trail – This trail would include various reroutes to the existing Mount Shasta Mine Loop Trail. The reroutes would replace sections of the trail going up an old road and make these sections more sustainable.

Mule Mountain Pass Trail – This new trail would be a reroute of the existing Mule Mountain Pass Trail. The reroute would realign the trail to avoid the steep slopes on the current trail.

Orofino Trail – The Orofino Trail is comprised of a new trail and the formalization of an existing social trail. The existing social trail segment that would be formalized connects Guardian Rock Trail and Paige Bar Road.

Papoose Pass Trail – This new trail would be a reroute of the existing Papoose Pass trail. The reroute would realign the trail to avoid the steep slopes on the current trail.

Peltier Bridge Trail – The Peltier Bridge Trail would comprise a new trail and the formalization of an existing social trail. The existing social trail segment that would be formalized connects a road segment to the Clear Creek Canal Trail.

Prospect Trail – This new trail would connect the existing Prospect Trail and continue it to intersect with the Buck Hollow trail to the east.

Salt Gulch Trail – This new trail would be a reroute of the existing Salt Gulch trail. The reroute would realign the trail to avoid the steep slopes on the current trail.

Shasta Divide Trail – This new 7-mile trail would provide a longer trail opportunity along the Shasta Divide ridge leading from the Whiskeytown Visitor Center towards Mule Mountain. One portion of this trail would provide a potential connection to the Mule Mountain trail network on BLM land requiring coordination with the Bureau of Land Management. This potential new connection to BLM trails would be established in a separate compliance process.

Whiskeytown Lake Trail – This new 8.3-mile trail would provide a new opportunity to travel along the southern lakeshore of Whiskeytown Lake, which is currently undeveloped. This paved multiuse trail would be designed with the primary use of road bicyclists in mind. Currently, there are no trails

for road bicycling at WHIS. Safety signs would be installed to promote safe passing and shared use of the trail between cyclists and pedestrians. Waysides and rest points would be installed throughout the trail, providing unique points of interest in the park.

MITIGATION MEASURES COMMON TO THE ACTION (NPS PREFERRED) ALTERNATIVE

Congress charged the National Park Service with managing the lands under federal government stewardship "in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations" (NPS Organic Act, 16 USC 1). As a result, NPS staff routinely evaluate and implement mitigation measures whenever conditions occur that could adversely affect the sustainability of NPS resources. Mitigation measures are the practicable and appropriate methods that would be used under the action alternative to avoid and/or minimize harm to park natural and cultural resources, visitors, and the visitor experience.

The following mitigation measures have been developed to minimize the degree and/or severity of adverse effects and would be implemented, as needed, during construction activities proposed in the action (NPS preferred) alternative, as well as long-term maintenance of trails:

General

- Resource management staff would provide all contractor employees with an orientation/briefing that would appraise them of and sensitize them to relevant natural resource issues and the importance of minimizing impacts. Trail crews would be educated about the importance of avoiding impacts on sensitive resources that have been flagged for avoidance, which may include natural and cultural resources. The resource management division would be notified and consulted when wildlife must be disturbed or handled.
- According to NPS *Management Policies 2006*, for all trail construction activities park staff would apply sustainable practices to minimize potential environmental impacts. New or rerouted trails would not compete with or dominate park features or interfere with natural processes, such as the seasonal migration of wildlife, forest regeneration, hydrologic activity, and geological processes. All trail work would emphasize environmentally sensitive construction, use of nontoxic materials, resource conservation, and recycling.
- Construction zones for rerouted and new trails, as well as staging areas and work zones, would be identified and demarcated with construction tape or some similar material prior to any construction activities. The tape would define the zones and confine the activity to the minimum area needed for the trail work. No disturbance would occur beyond these limits other than protection measures for erosion/sediment control.
- Construction and maintenance activities would be scheduled to minimize construction-related impacts on visitation and wildlife behavior. Areas not under construction would remain accessible to visitors as much as is safely possible.
- All staging and stockpiling areas would utilize existing disturbed lands to the extent possible and be rehabilitated to natural conditions following trail construction work.
- All tools, equipment, surplus materials, and rubbish would be removed from the project area upon project completion. Construction debris would be hauled from the park to an appropriate disposal location.

Natural Resources

- Per NPS standards, National Park Service managers would coordinate and supervise any trail construction or maintenance. Specifically, park staff would monitor and/or direct water bar placement, drainage placement, brushing and clearing, revegetation, where to obtain fill and other materials for trails, and how to apply fill materials such as soil, gravel, and rocks. Park staff would be responsible for ensuring that crews perform the necessary work in accordance with NPS instructions and standards.
- New and rerouted trails would be installed at low grades and out-sloped to avoid excessively steep slopes and minimize erosion.
- To provide for soil stability and prevent movement of soils, erosion control features such as rock walls and rolling dips would be used where appropriate.
- Soils and other materials would not be placed within drainages to avoid potential sedimentation during rain events.
- Ground-disturbing work would be scheduled to occur outside of anticipated heavy rain events. Erosion control devices would be used as necessary.
- If earthwork is needed, standard erosion control measures would be followed, such as silt fencing.
- Soil erosion would be minimized by limiting the time soil is left exposed and by applying erosion control measures such as erosion matting and silt fencing, in construction areas to reduce erosion, surface scouring, and discharge to drainages.
- Topsoil would be returned to the original location as possible, and supplemented with scarification, mulching, seeding, and/or planting with species native to the immediate area. Conserving native topsoil would minimize vegetation impacts and potential compaction and erosion of bare soils. The use of conserved topsoil would help preserve microorganisms and seeds of native plants.
- Removal of, or impact on, native vegetation adjacent to trails would be minimized as much as possible to protect native plants and to prevent the spread of nonnative species. Trail construction activity would be confined to the minimum area required for construction.
- Any required fill, rock, topsoil, or other earth materials would be sourced from park approved sites in or outside of the park. To avoid introduction of nonnative plant species, local duff, which contains a native seed source, would be gathered for erosion control. No foreign materials with the potential to introduce invasive plant species would be brought into the area. Any proposed materials would be reviewed on a case-by-case basis.
- For trails being rerouted, the original trail footprint would be reclaimed and revegetated. The revegetation efforts would strive to reconstruct the natural spacing, abundance, and diversity of native plant species along the trails. Revegetation plantings would use native species from genetic stocks originating in the park. Monitoring of revegetated areas following construction would be conducted to ensure successful revegetation, maintain plantings, and replace plants that do not survive.
- New and rerouted trails would be aligned to avoid the removal of large trees (≥ 18" dbh). Necessary tree trimming would be accomplished using accepted techniques that minimize long-term impacts to individual trees (e.g., limbs would be removed at the limb collar).
- Invasive plant monitoring and treatment would be conducted prior to and following construction, and native topsoil and plant materials would be salvaged and reused during construction.

- Project personnel would make daily checks of clothing, boots, laces, and gear to ensure no exotic plant propagules are transported to the work site.
- All equipment entering the park would be cleaned and pressure washed to remove foreign soil, vegetation, and other materials that may contain nonnative seeds or vegetation.
- Impacted bare areas (e.g., old trail sections that have been realigned, impacted areas along trails) would be scarified and regraded to reestablish the original surface contours and allowed to naturally revegetate or be planted and/or seeded with native species to minimize erosion. Determination of treatment (natural revegetation or seeding) would be done on a case-by-case basis, and would seek to reconstruct the natural spacing, abundance, and diversity of native plant species as much as possible.
- Plant and wildlife surveys would be conducted by qualified biologists prior to ground disturbance to ensure reroutes and new trail routes do not destroy or alter special or rare vegetation, plant communities, sensitive wildlife, and important wildlife habitat. If federally listed or other special status plants are located, they would be clearly flagged and avoided when possible. If avoidance is impossible, park managers would consult with experts and measures would be examined to avoid or minimize impacts, such as transplantations.
- Care would be taken to avoid or minimize disturbance of sensitive wildlife species found nesting, hibernating, foraging, or otherwise living in or immediately nearby the worksites. Timing of construction activities outside of nesting season, for example, could mitigate impacts and may eliminate the need for nesting bird surveys. Resource management personnel would be notified/consulted when wildlife must be disturbed or handled.
- Where possible, natural features with obvious high value to wildlife would be preserved.
- Where trails cross streams that drain to anadromous fish habitat, water bars and check bars may be constructed in the vicinity of the crossing to slow velocity of stormwater and minimize sedimentation during runoff events. These measures would apply to the Lower Creek and Paige Boulder Trail Complexes. Conditions to maintain effective upstream and downstream fish passage would be maintained at all times. Trail work would not occur during times when spawning or rearing fish are present.
- For trail routes proposed near Whiskeytown Lake a buffer of at least 660 feet would be maintained between the trail and current or historic bald eagle nest sites if the nest is visible from the trail, or a buffer of at least 330 feet if the trail is not visible from the nest, with all clearing, external construction and landscaping activities within 660 feet of the nest occurring outside the nesting season.
- To avoid impacts to Pacific fisher and its habitat, whenever possible new trails and rerouted trails would be located to avoid large trees (greater than 18 dbh), snags, denning sites and riparian habitat.
- Trash and food wastes would be removed daily from worksites to reduce the attraction of wildlife.
- If and when necessary, park managers would use temporary or seasonal visitor use restrictions or area closures to protect sensitive wildlife habitat and sensitive wildlife behavior or life stages from trail use.
- All construction motor vehicles and equipment would have mufflers conforming to original manufacturer specifications that are in good working order to prevent excessive or unusual noise, fumes, or smoke.
- To reduce noise and emissions, construction equipment would not be permitted to idle for longer than two minutes when not in use.

- Activities that increase erosion potential within the Lower Clear Creek watershed will be limited to May 1 to October 31, when the potential for rainfall events to transport sediment to surface waters is lowest.
- All work will cease among any trails near Clear Creek, and its tributaries during rain.
- No lights will be near Clear Creek, even for security purposes.
- Best Management Practices (BMPs) will be in place for the duration of the project to minimize or prevent sediment of other construction-related materials from entering the water. BMPs include installation of rock walls, rolling dips, slope breaks, silt fencing for any earthwork needed, erosion matting and wattles, and mulching to control exposed soil on slopes and ditches to limit sediment from reaching waterways. Any silt fencing or monofilament materials will be removed promptly at project completion. No plastic monofilament wattles will be used, only biodegradable materials.
- Installation of BMPs will occur only during dry periods. Prior to storm events, all construction activities shall cease and appropriate erosion control measures will be implemented. Prior to initiation of any waterside work, erosion control measures will be utilized throughout all phases of operation where silt and/or earthen fill threaten to enter waters of the U.S. and/ or state, limiting or preventing turbidity in the waterways of concern.
- New and rerouted trails will be installed at low grades and will be out-sloped.
- Removal of native vegetation adjacent to trails will be minimized, and removal of large trees will be avoided.
- Soil, silt, or other organic materials will not be placed, stockpiled, or stored where such materials could pass into surface water or surface water drainages during unexpected rain events.
- Hazardous materials will be stored in a location where there is no potential to enter any waterway or aquatic resource. All hazardous materials will be stored in secondary containment (e.g., by a prefabricated temporary containment mat, a temporary earthen berm, or other measure) and covered when rain is forecast or during wet weather.
- Any spills will be immediately contained and cleaned up (e.g., with absorbent materials or affected soil dug up and properly disposed of). If the spill occurs during rain, the impacted area will be covered to avoid runoff, and appropriate clean-up steps will be taken after precipitation has ceased. For spills of federal reportable quantities, the National Response Center will be notified.
- Refueling of vehicles and equipment will occur at least 100 feet away from waterways
- Work is expected to take up to 10 years due to funding, and the NPS will send NMFS a report on project progress and expectations every 5 years.
- NPS is to stay aware of ESA species status and needs during the project length and is to reinitiate consultation if any changes are made to ESA listed species in the action area.
- NPS is installing salmon informative exhibits in the action area.

Cultural Resources

- Prior to a proposed action an archaeological inventory and evaluation of impacts to identified resources would be conducted in accordance with the National Historic Preservation Act, as amended (36 CFR Part 800).
- Park managers would consult with associated American Indian tribes to ensure that project actions are conducted in a way that respects the beliefs, traditions, and other cultural values of the tribes who have ancestral ties to park lands. Sensitive, sacred, or traditional use areas

would be protected to the greatest extent possible by avoiding or mitigating adverse impacts to ethnographic resources, retaining site confidentiality as appropriate, and continuing to provide tribal access to resources and places of cultural importance.

- All proposed actions on or within historic properties will be in accordance with Secretary of Interior Standards for the treatment of historic properties.
- NPS staff would continue to inform visitors and others of the importance of protecting and not disturbing archeological resources and historic resources. Visitors would be informed (through NPS educational and interpretive programs, interpretive media products, and/or ranger contacts) of the penalties for illegally collecting artifacts or otherwise causing resource damage.
- Should construction unearth previously undiscovered cultural resources, work would be stopped in the area of discovery, and park managers would consult with the state historic preservation officer and the Advisory Council on Historic Preservation, as necessary, according to 36 CFR 800.13. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 and related implementing regulations at 43 CFR would be followed.
- Known archeological sites would be routinely monitored to assess and document the effects of natural processes and human activities on the resources. Archeological resources would be left undisturbed and preserved in a stable condition to prevent degradation and loss of research values unless intervention could be justified based on compelling research, interpretation, site protection, or park development needs. Recovered archeological materials and associated records would be treated in accordance with NPS *Management Policies 2006*, NPS Museum Handbook, and 36 CFR Part 79.
- To protect known or unknown archeological or historic resources, trees and other woody vegetation would be stump cut flush to the ground with stump grinding utilized where appropriate to reduce the stump at grade.

Visitor Safety

- NPS staff would implement measures to reduce adverse effects of construction on visitor safety and experiences. Measures may include, but are not limited to, noise abatement, visual screening, and directional signs that aid visitors in avoiding construction activities.
- Appropriate barriers and barricades would be used to clearly delineate work areas and provide for safe visitor travel near construction areas.
- Barriers, signs, and/or vegetation would be used to deter visitor travel on trails being rerouted to allow restoration of these areas.
- Install signs to inform visitors where bicycles are allowed to reduce potential for visitor conflicts.
- Install dog waste bags at the most heavily used trailheads to reduce fecal loading of nearby waterways and improve the visitor experience.
- Install signs to inform visitors when entering multi-use trails to reduce user group conflicts (i.e., hikers and pedestrians).
- See Appendix A Indicators and Thresholds, and Appendix B Visitor Capacity for additional mitigation measures related to visitor use and experience mitigation.

ALTERNATIVES AND ACTIONS CONSIDERED BUT DISMISSED FROM DETAILED EVALUATION

No Bicycles

Bicycles are currently used at WHIS on some multiuse trails. This decades-long tradition at the national recreation area predates the promulgation of NPS bicycles regulations in 1987 that provided for the use of bicycles. The use of bicycles at WHIS has yet to be codified, as per the NPS Bicycle Rule (36 CFR § 4.3). Since bicycles are currently being used, the existing condition under the no-action alternative is not in compliance with NPS regulations. If a "No Bicycles" alternative were selected, then bicycle use would be a discontinued use and the park would not need a bicycle rule.

The No Bicycles alternative was dismissed in this Trails Management Plan for a variety of reasons. First, this alternative would not resolve the purpose and need for taking action, which states that "The park would also like to provide a more diverse visitor experience and formalize specific uses such as hiking, equestrian use and bicycle use." Discontinuing bike use would not help to provide a more diverse visitor experience that the Need for Action calls for. Second, bike use is a very popular activity in the national recreation area and could be managed well under existing conditions. An alternative where there is no bicycle use at the national recreation area would not be feasible: a complete prohibition on bicycle use would be highly controversial and practically unenforceable. For these reasons, the "no bicycles" alternative was dismissed from further consideration.

This page intentionally blank.

CHAPTER 3: AFFECTED ENVIRONMENT AND IMPACT ANALYSIS

INTRODUCTION

The National Environmental Policy Act requires that environmental documents discuss the environmental impacts of a proposed federal action, feasible alternatives to that action, and any adverse environmental impacts that cannot be avoided if an action is implemented. This chapter begins with an explanation of methods, describes the existing conditions including existing resource trends and planned activities (affected environment) and analyzes the potential environmental consequences (impacts or effects) that would occur as a result of implementing the alternatives. This chapter assesses the potential impacts on erosive soils, special status species, archeology, historic ditches, and visitor use and experience.

EROSIVE SOILS

Affected Environment (Current and Expected Future Conditions of Resources)

Erosive soils and soil formations, such as those along former logging and mining roads, underlie the entire national recreation area. These roads typically were not built to grade and were not designed to minimize soil erosion. As noted in table 3, these soils present "moderate" to "very" high erosion hazards. Parent soil material within Whiskeytown NRA are typical of soil formation within the Eastern Klamath Metamorphic Belt of the Klamath Geologic Province, except for soils formed on the Shasta Bally batholith. The general great soil groups in Whiskeytown NRA, as defined by the Natural Resource Conservation Service (formerly the Soil Conservation Service), consist of entisols, inceptisols, spodosols, alfisols, and limited mollisols (NPS 2014). More specific soil descriptions vary depending on localized conditions – this section focuses primarily on soils that exhibit erosion hazards.

Past and continuing maintenance of Western Area Power Administration (WAPA) and Pacific Gas & Electric (PG&E), and California Department of Transportation (Caltrans) rights-of-way for roads and transmission lines and continuing construction and NPS maintenance of firebreaks for prescribed fires will continue to result in varying levels of soil erosion and rights-of-way vegetation clearing and disturbance throughout the park.

Approximately 80% of the park's existing trail system lays within such erosive soil types and formations, according to GIS analysis prepared for this plan. Adding to the park's erosive geology, steep slopes (greater than 30% grade) in the higher elevations of the recreation area have poorly developed soils. Most soils within the park's high elevations, especially those on the south side of the park can be described as having erosive soils. Most landscape coverage within these upper elevations have no soil horizons, except for areas with laying on top of the decomposed granite. Less steep slopes exhibit a higher degree of soil formation and typically include a mix of organic material that exhibits weak horizon formation. The lower elevations of the park tend to have less steep slopes (less than 30% grade) with a variety of conifer species, oak woodlands, and chaparral. Here, soils have greater horizon formation.

The 2018 Carr Fire burned more than 90% of the park, including approximately 75% overstory tree mortality (NPS 2020a). The fire burned concentrated patches of understory growth as well, leaving bare soil and stands of dead trees and shrubs. Loss of understory vegetation increases erosion from runoff and trail uses in these highly erosive areas.

Table 3. Soil erosion hazards in Whiskeytown National Recreation Area

Parent Material	Soil Erosion Hazard
Shasta Bally Batholith (Intrusive, granodiorite to quartz diorite)	High to extreme
Bragdon Formation (Sedimentary, mostly slate and shale)	Moderate to high
Copley Greenstone (Extrusive meta-volcanic)	Moderate to high
Balaklala Rhyolite (Extrusive, rhyolite)	Moderate to high
Mule Mountain Stock (Intrusive, altered granite)	Moderate to high

***Source*: USDA-SCS 1973**

Although the park staff does not have quantitative data on the level of soil loss occurring along the recreation area's trails, anecdotal observations indicate soil erosion is occurring on many trails. Slope instability and erosion have made it necessary to periodically reduce access to trails and roads in the recreation area (NPS 2007). Examples of poorly constructed trails on old roadbeds include the Mt. Shasta Mine Loop, Lower Brandy Creek, and the James K. Carr trails.

In addition to poorly constructed trails, social trails are a problematic source of soil erosion. Some soil erosion is likely occurring due to mountain bikes riding outside trail treads, widening trails. In the southeastern part of the recreation area equestrian use on trails also is likely contributing to soil erosion, particularly on steep trails.

Soil erosion and compaction occur due to hiking, running, mountain biking and equestrians uses. This is particularly true on old steep trails that were not designed for the use they receive. Visitors also widen some trails that are wet, and create unofficial trails to some areas, causing additional trail erosion. The level of soil loss and soil disturbance varies from trail to trail, depending on such factors as the level of use, types of soil (e.g., soils on the Shasta Bally batholith are very susceptible to erosion), slope, plant community, design of the trails, presence of erosion control features, intensity of storms, and level of maintenance. Soil impacts are minimal on some trails and substantial on other poorly designed trails, such as the Mount Shasta Mine Loop and Lower Brandy Creek trails. There is also ongoing loss and damage to native trailside vegetation due to soil erosion from visitors trampling and crushing vegetation along sides of trails. Some rare plants are trampled or damaged by visitors (see Special Status Species in the Affected Environment). As visitation increases, the chances of visitors inadvertently introducing and spreading nonnative plants in the park increases, which displaces native vegetation, degrades wildlife habitat, and diminishes the quality of the visitor experience.

Impacts on Erosive Soils

No-Action Alternative. Under the no-action alternative, the condition of erosive soils would remain the same as described in the affected environment. The current resource threats and impacts to erosive soils would continue to occur.

Continuing the current level of trail design, use, maintenance and management effort on park trails, including minor repairs, minor trail closures, and reroutes, it is likely that soil erosion and compaction would continue from ongoing hiking, running, mountain biking and equestrians uses. This would be particularly true on old steep trails that were not designed for the use they receive. Visitors would also likely continue to widen some trails that are wet, and create unofficial trails to some areas, causing additional trail erosion. The level of soil loss and soil disturbance would vary from trail to trail, depending on such factors as the level of use, types of soil, slope, plant community, design of the trails, presence of erosion control features, intensity of storms, and level of maintenance — soil impacts would vary on some trails and substantial on other poorly designed trails, such as the Mount Shasta Mine Loop and Lower Brandy Creek trails. Although park managers would be expected to take action to correct some of the problem areas, others would not be addressed. Some adverse impacts to soils and trailside vegetation would likely continue, such as the frequent use of the Mule Mountain Pass Trail by mountain bikers, and from equestrian trail use in the southeastern part of the park.

Combined with soil disturbance, there would continue to be some loss and damage to native trailside vegetation due to soil erosion from visitors trampling and crushing vegetation along sides of trails. Continued establishment of visitor-created trails in steep areas, wet areas, and exploration of new areas would likely continue under the no-action alternative. Some rare plants could be trampled or damaged by visitors (see Special Status Species in the Affected Environment). In addition, with increasing numbers of visitors, there would be the potential for visitors inadvertently introducing and spreading nonnative plants in the park, which could displace native vegetation, degrade wildlife habitat, and diminish the quality of the visitor experience. However, it is not possible to determine the severity of nonnative and invasive plant infestations, given uncertainties on the frequency of introductions, where the nonnative plants are spread, and what species are spread.

Action Alternative – NPS Proposed Action and Preferred Alternative. The Action Alternative would have both beneficial and adverse effects on the park's soils. Compared to the approximately 56 miles of trails within erosive geology in the no-action alternative, the action alternative would add approximately 16 miles of trails within erosive soils. This equates to approximately 72 miles within erosive geology of the 86 total park trail miles indicated in the action alternative. For comparison, the total percentage of trails within erosive geology (83%) in the action alternative is only slightly higher than the total percentage of trails within erosive geology (80%) in the no-action alternative, according to GIS analysis prepared for this plan. The removal and restoration or reroutes of 15.3 miles of unstainable trails, such as the Kanak cutoff, Papoose Pass, Salt Gulch, and Salt Creek Trails, and the closure of a portion of the Mill Creek Trail and formalization of the Ranger Trail as an alternative route, would beneficially affect park soils, reducing soil erosion and increasing native vegetation in these areas. Other beneficial impacts would occur to soils by reestablishing the tread on various trails, installing water bars and drainage features, and installing erosion control measures. The establishment of visitor capacities for the trails, and monitoring selected natural resource indicators, would also enable park managers to take proactive measures to avoid or minimize impacts to erosive soils if conditions were approaching visitor capacity thresholds.

On the other hand, trail rerouting would result in the loss of some topsoil and temporarily increase erosion on steep slopes, leading to longer periods of time for vegetation to return to some of these areas. Likewise, the construction of 32.8 miles of new trail would result in the loss of soils and trailside vegetation in localized areas. The application of mitigation measures and best management practices for all these actions would help minimize the loss and disturbance of soil on steep slopes and help retain native vegetation. Because the trail along the Shasta Divide would largely follow existing utility access roads and fuel breaks, for example, it is not expected to result in much new clearing of trailside vegetation and soil loss (only 11.7 acres of total trailside vegetation loss in the preferred alternative). The development of the Whiskeytown Lakeside Trail would result in the loss of soil and trailside vegetation, but the overall impact is not expect to contribute to long term erosion outside of the paved trail prism, and would be minimized based on the proposed location of the trail, its mainly low grade (i.e., slope), soil types and plant communities the trail would pass through. Visitors may also walk off the proposed trail to get to the lake, creating unofficial trails, which would result in additional soil erosion, disturbance and loss.

Conclusion. The proposed action would result in both beneficial and adverse effects to Whiskeytown's erosive soils. Beneficial effects would result from the closure and revegetation of some trails, and the rerouting of other unsustainable trails that are experiencing substantial soil erosion. On the other hand, the rerouting of trails and the development of new trails would result in the short-term loss and disturbance of soil and removal of trailside vegetation in localized areas.

SPECIAL STATUS SPECIES

Affected Environment (Current and Expected Future Conditions of Resources)

Whiskeytown National Recreation Area's diverse habitats support a variety of rare and sensitive aquatic and terrestrial wildlife species. Threatened, endangered, proposed, candidate, rare, and sensitive animals and plants known or suspected to occur in the national recreation area are discussed below. Whiskeytown resource managers, through informal consultation with external biological and ecological specialists, including USFWS and the NOAA Fisheries Service (NMFS) have indicated these species do not occur in the immediate project area, though indirect impacts from trail construction activities are likely and discussed in the Impacts section.

Past and continuing maintenance of WAPA and PG&E and rights-of-way for roads and transmission lines and continuing NPS construction and maintenance of firebreaks for prescribed fires continue to result in varying levels of sediments being transported into Lower Clear Creek and other drainages throughout the park. This work increases turbidity and affects fish spawning park drainages. In addition, current and proposed utilities development and maintenance spread invasive plants throughout the recreation area and add to erosion impacts near utility rights-of-ways.

Anadromous Fish. Federally listed fish species known to inhabit the park (including those the project would have the potential to impact) are the Central Valley spring run Chinook salmon *(Oncorhynchus tshawytscha)* and the California Central Valley (Evolutionary Significant Unit) steelhead trout *(Oncorhynchus mykiss)*. Both species are listed as "threatened" under Section 7 of the Endangered Species Act and Lower Clear Creek provides Critical Habitat for these salmonids. The removal of McCormick-Saeltzer Dam on Lower Clear Creek in the fall of 2000 has allowed these species access to the upper reaches of Lower Clear Creek and these anadromous fish are now using portions of Lower Clear Creek within Whiskeytown NRA for spawning. Critical habitat was designated in September of 2005 for the listed species and includes Clear Creek up to the

Whiskeytown dam (50 CFR 226.211). Spring-run chinook salmon (which are also listed as threatened by the State of California) and steelhead trout only occur in Lower Clear Creek as Whiskeytown Dam effectively blocks them from accessing much of their historic spawning habitat. The following table depicts details for the current trails in the Lower Clear Creek Watershed, including their distance from the perennial creek and elevation above lower Clear Creek in meters (m) (Table 3a).

Table 3a. Lower Clear Creek Watershed Trails

Trail Name	Trail Type	Trail Length (miles)	Trail Status	Distance from perennial creek (m)	Elevation above lower Clear Creek (m)
Buck Hollow Trail	Multi-use	1	Current	800 m from Clear Creek	> 60 m
Clear Creek Canal Trail	Multi-use	4.8	Current**	Crosses Orofino Creek at one location	46 m
Guardian Rock Trail	Multi-use*	1	Current	60 m (except short creek access trail)	3 m at trailhead, but generally 18 m
Hydraulic Mine Trail	Multi-use	0.5	Current	10 m at Peltier Bridge Campground	4 m
Kanaka Peak Trail	Multi-use	3.3	Current	Crosses Paige Boulder Creek at one location	> 200 m
Ladybug Lane Trail	Pedestrian Only	0.3	Current	250 m from Paige Boulder Creek	> 35 m
Logging Camp Trail	Multi-use	1.25	Current	250 m from Clear Creek	20 m
Martha's Ditch Trail	Pedestrian Only	2.5	Current	Crosses Paige Boulder Creek at one location	> 8 m
Princess Ditch Trail	Multi-use	1.9	Current**	350 m from Clear Creek	> 90 m
Ridge Trail	Pedestrian Only	1.8	Current	125 m from Clear Creek	> 8 m

**Trail follows an abandoned water ditch.

Several restoration efforts within the Lower Clear Creek watershed have increased the productivity of this stream (NPS and BLM 2008). Past erosion of both maintained and unmaintained trails and roads has resulted in increased sediment loads in drainages in the Lower Clear Creek watershed, degrading water quality and salmonid habitat. The objectives of the restoration projects are to reduce erosion and sedimentation within the Lower Clear Creek watershed and improve suitable spawning habitat.

The population size of adult spring-run chinook salmon in the recreation area is monitored by the USFWS. While numbers vary from year to year the population is generally improving with ongoing restoration work in Lower Clear Creek (Weatherbee, NPS 2020d). Adult fish migrate upstream

between April and August and then spawn from August to October, with peak spawning occurring in September. Females deposit their eggs in nests in gravel-bottom areas of relatively swift water. After emerging, chinook salmon fry tend to seek shallow, near-shore habitat with slow water velocities. The fry move to progressively deeper, faster water as they grow. Spring-run juveniles frequently reside in freshwater habitat for 12 to 16 months, but many young migrate to the ocean during the spring within five to eight months after hatching.

The population size of steelhead trout within WHIS is not known, but from 2001 to 2007 the adult steelhead population was relatively stable or increasing in Lower Clear Creek (NPS-BLM 2008). This steelhead population typically migrates upstream in fall and winter and spawn within a few weeks to a few months from the time they enter freshwater. Adult migration occurs from July through February, with spawning typically occurring from December through April and possibly in May. Juvenile steelhead typically rear for one to two years before migrating to the ocean, generally in the spring. Erosion and sedimentation occur along steep, poorly designed trails, particularly trails south of the dam (Lower Clear Creek) which adversely affect water quality (turbidity) and fish spawning in the recreation area. However, the levels of turbidity do not prevent or noticeably reduce spawning in the park. Sediments from old logging and mining roads also play a role in affecting turbidity and fish spawning than sediments coming from maintained trails in the recreation area.

Pacific Fisher. Pacific fishers (*Martes pennanti*) are forest-dwelling carnivores that were once abundant throughout Washington, Oregon, and Northern California. Distribution and populations of fishers are not known at Whiskeytown NRA, however numerous observations of fishers have been made throughout the recreation area, dating from the early 1970s to present. It is likely that fishers occur within most habitat types present at Whiskeytown NRA with the exception of areas dominated by dense stands of chaparral (NPS 2005).

Fishers have been extirpated from more than 50% of their previous range and only two native populations survive in California – one near the California-Oregon border (known to occur in Whiskeytown NRA) and one in the southern Sierra Nevada, which does not inhabit the park (NPS 2019). They are known to be among the most habitat-specific mammals in North America, living in landscape mosaics of conifer-dominated forest stands, and avoiding open areas that have no overstory or shrub cover. Late successional mid to low elevation coniferous or mixed forests provide the most suitable habitat because they provide abundant potential den sites and prey. The presence of large deciduous trees such as oaks also appear to be important. Fishers den in a variety of protected cavities, brush piles, logs, or under an upturned tree. Hollow logs, trees, and snags are especially important habitat components. Riparian areas also provide important habitat.

Of the two distinct fisher populations, the Southern Oregon/Northern California Distinct Population Segment (DPS) that occurs in Whiskeytown NRA is not currently eligible for listing under Section 7 of the Endangered Species Act (Federal Register, 5/15/20). Infrequent disturbances of the Pacific Fisher occur due to occasional encounters with trail users or maintenance crews, but do not impact the fisher population.

Northern Spotted Owl. The northern spotted owl (*Strix occidentalis caurina*) is a known inhabitant in the park, which is listed as threatened under Section 7 of the Endangered Species Act. None of the park's existing trails, proposed trails, rerouted trails, or other actions in this plan would occur near activity centers or within suitable habitat for this owl (Weatherbee, NPS 2020d). Existing activities within the recreation and proposed trail improvements in the plan would not affect this owl species.

Bald Eagle. While the bald eagle (*Haliaeetus leucocephalus*) was removed from the federal list of threatened and endangered Species in 2007, they are still protected by multiple federal laws, such as the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, the Lacey Act, and other state and municipal protections. The iconic bird remains listed as endangered under the California Endangered Species Act and is designated as fully protected by the California Department of Fish and Game. Whiskeytown Lake has supported breeding pairs of bald eagles as well as a substantial migratory wintering population (NPS 2005). Bald eagle activity such as perching, foraging, nesting, and roosting is generally limited to the lower elevations of the park and occurs mostly within two miles of Whiskeytown Lake. Visitors on existing park trails do not pass by bald eagles that are nesting by the lake or the migratory winter population that uses the area. Impacts to eagles are avoided by monitoring for nest sites and closing trails on a seasonal basis to avoid human disturbance of nest sites.

Rare Plants. There are several rare plant species, identified by the California Native Plant Society, that potentially occur in areas affected by this plan: Sanborn's onion (*Allium sanbornii var. sanbornii*), Mallory's manzanita (*Arctostaphylos malloryi*), Shasta County arnica (*Arnica venosa*), Kern ceanothus (*Ceanothus pinetorum*), Canyon Creek stonecrop (*Sedum paradisum*), and Oval-leaved viburnum (*Viburnum ellipticum*). In addition to these six plants, there are a few other sensitive plant species to note in this section that also occur in areas affected by this plan that are endemic, unique, or otherwise uncommon (see table 4). Most of these species occur at low to mid elevations, in chaparral, oak woodland, and mixed pine. With the exception of the viburnum, all of these species have been verified as being present in the recreation area. However, park managers have little to no current data on population abundance and trends.

Table 4. Rare Plant Species Potentially Occurring in the Trails Project Area in Whiskeytown NRA

Species Scientific Name	Common Name	Life Form	Habitat in the Recreation Area
Allium sanbornii var. sanbornii	Sanborn's onion	Perennial herb (bulb)	Chaparral, dry low elevation slopes, oak woodland
Arctostaphylos malloryi	Mallory's manzanita	Perennial evergreen shrub	Low to mid elevation chaparral and oak woodland
Arnica venosa	Shasta County arnica	Perennial herb	Low to mid elevation mixed pine, chaparral oak woodland
Cypripedium fasciculatum	Clustered lady's-slipper	Perennial rhizomatous herb	High elevation, mixed conifer
Ceanothus pinetorum	Kern ceanothus	Perennial evergreen shrub	Low to mid elevation chaparral and oak woodland
Trillium ovatum ssp. oettingeri	Salmon Mountains wakerobin	Perennial herb	Mixed conifer forest
Triteleia crocea var. crocea	Yellow triteleia	Perennial herb (bulb)	Mixed conifer (rocky)
Sedum paradisum	Canyon Creek stonecrop	Perennial herb	Low to mid elevation chaparral (rock outcrops) and oak woodland

Species Scientific Name	Common Name	Life Form	Habitat in the Recreation Area
Viburnum ellipticum	Oval-leaved viburnum	Perennial deciduous shrub	Low to mid elevation mixed pine, chaparral oak woodland
Cupressus macnabiana	McNab cyprus	Perennial evergreen shrub	Low to mid elevation rocky slopes and ravines in chaparral oak woodland
Cypripedium fasciculatum	Clustered lady's slipper	Perennial orchid	Lower montane coniferous forest
Trillium ovatum	Salmon Mountains wakerobin	Perennial herb	Mid elevation montane and coniferous forest
Triteleia crocea	Yellow triteleia	Perennial herb	Open coniferous forest

Sanborn's onion is an uncommon perennial herb that is native to California and Oregon. It has a limited distribution in California. The plant is commonly found in chaparral and low elevation woodlands within the park and has been found in areas where brush has been thinned (NPS 2014).

Mallory's manzanita is a rare perennial shrub, which is endemic to California. It occurs in chaparral and lower montane coniferous forest on volcanic soils between 2,625 and 3,937 feet (800 and 1,200 meters) in elevation (Smithsonian Institute 2018).

Shasta County arnica is known to occur only within a 35-mile radius area around Shasta Lake, Trinity Lake, and Whiskeytown Lake. Several populations are known to occur in the recreation area, including along Shasta Bally Road, Peltier Valley Road (up to about 1,500 feet in elevation), Shasta Divide and the South Fork Mountain Road. National Park Service monitoring from 1992 to 2001 indicated that populations are increasing or remaining stable. The plant seems to prefer disturbed areas like road cuts and fuel breaks with a north or northeast aspect (NPS 2005).

Clustered lady's-slipper occurs in cool, open, moist to dry lower montane coniferous forest, from 0 to 3,200 meters.

Kern ceanothus is endemic to California. This uncommon perennial low-lying shrub grows on rocky, granitic slopes and open pine forests at an elevation of 3,445 to 9,022 feet (1,050 to 2,750 meters) (Burge and Dieter 2020).

Salmon Mountains wakerobin grows in mesic habitat, including mixed montane and conifer forest on moist slopes, at an elevation of between 1,200 and 2,000 meters.

Yellow triteleia grows on open conifer forest, on dry slopes, at elevations between 650 and 2,200 meters.

Canyon Creek stonecrop is another species endemic to California. This rare perennial herb tends to occur on granite outcrops at elevations between 100 and –4,600 feet (http://calscape.org/Sedum-obtusatum-ssp.-paradisum-(Canyon-Creek-Stonecrop)?srchcr=sc583788107b532).

Oval-leaved viburnum grows in in drier open woods, bottom lands, chaparral, or shrub thickets. It grows at an altitude of 705 to 4,593 feet (215 to 1,400 meters). Thirty-eight populations of the species are known (http://www.rareplants.cnps.org/detail/2056.html).

One species of concern in the project area, which is not on the California Native Plant Species rare plant list, is McNab cypress (*Cupressus macnabiana*). This small endemic California tree occurs in a 49,400 acre (200 square kilometer) area. Around 30 groves of the tree remain (http://www.iucnredlist.org/details/42222/0). The recreation area is the northern most extension of and the type location of the species (NPS 2005). McNab cypress occurs in chaparral or woodland associated with knobcone pine and gray pine, and less commonly with oak and manzanita. It grows in groves on rocky slopes and in ravines at an altitude ranging from 300 meters to 1,200 meters. The species is of concern because of its limited range and population decline in the recreation area. A few individual scattered specimens grow in the recreation area. Park managers have been successfully propagating and planting the tree.

Another species of concern is the blue elderberry (*Sambucus Mexicana*). This is a species of concern because it is the host plant for the federally threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). Several elderberry shrubs grow near Trinity Mountain Road along Clear Creek. The National Park Service is required to protect the elderberry in accordance with guidelines provided by the U.S. Fish and Wildlife Service.

In discussing Whiskeytown's rare, native vegetation, it is important to note the widespread nature of nonnative plants, which are common in the recreation area and strain the healthy functionality of native plants. Nonnative species occurrence is largely due to past human activity including logging and mining. An accurate and complete assessment of the abundance and extent of nonnative plants in Whiskeytown was completed in 2003. There are 195 known nonnative plant species growing in the recreation area, accounting for approximately 25 to 30 percent of the plants in the park (NPS 2005). These species occur throughout the recreation area. In 2013, 43% of roads and trails sampled in the recreation area were infested with nonnative species. Many of the nonnative plant species grow at low elevation sites and are short-lived annuals, which are difficult to control. In addition, many of these species occur in developed areas, including campgrounds and trails and along roadsides, which are repeatedly disturbed by park maintenance operations.

Seventeen of the 195 known nonnative species are considered to be invasive, able to out-compete native species, and disrupt native plant communities and processes. The priority invasive species are: tree of heaven (*Ailanthus altissima*) giant reed (*Arundo donax*), yellow star thistle (*Centaurea solstitialis*), diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), puncture vine (*Tribulus terrestris*), bull thistle (*Cirsium vulgare*), Scotch broom (*Cytisus scoparius*), French broom (*Genista monspessulana*), English ivy, (*Hedera helix*), Himalayan blackberry (*Rubus armeniacus*), Spanish broom (*Spartium junceum*), moth mullein (V*erbascum blattaria*), common mullein (*Verbascum thapsus*), sock destroyer (*Torilis arvensis*), and periwinkle (*Vinca major*) (NPS 2014). Park managers conduct ongoing efforts to treat infestations and control the spread of these species.

Although current information is sparse on the presence of the above species in the areas that would be affected by trail work in this plan, it is likely that new or rerouted trails will pass through areas with nonnative species, including star thistle, bull thistle, French broom, Himalayan berry, and common mullein.

Impacts on Special Status Species

No-action Alternative. Under the no-action alternative, the effects to special status species would remain the same as described in the affected environment. The current resource threats and impacts to special status species would continue to occur.

Action Alternative – NPS Proposed Action and Preferred Alternative. The action alternative's proposal for new trails, reroutes, and other improvements would result in varying levels of sediments potentially transported into Lower Clear Creek and other drainages throughout the park (Weatherbee, NPS 2020d). This would result in increased turbidity, which would be a short-term, adverse impact on salmonid habitat and fish spawning in park drainages. The following map depicts the proposed changes to the trail system in the Lower Clear Creek Watershed (Figure 3a). The following table depicts details for the current trails in the Lower Clear Creek Watershed, including their distance from the perennial creek and elevation above lower Clear Creek in meters (m) (Table 4a).

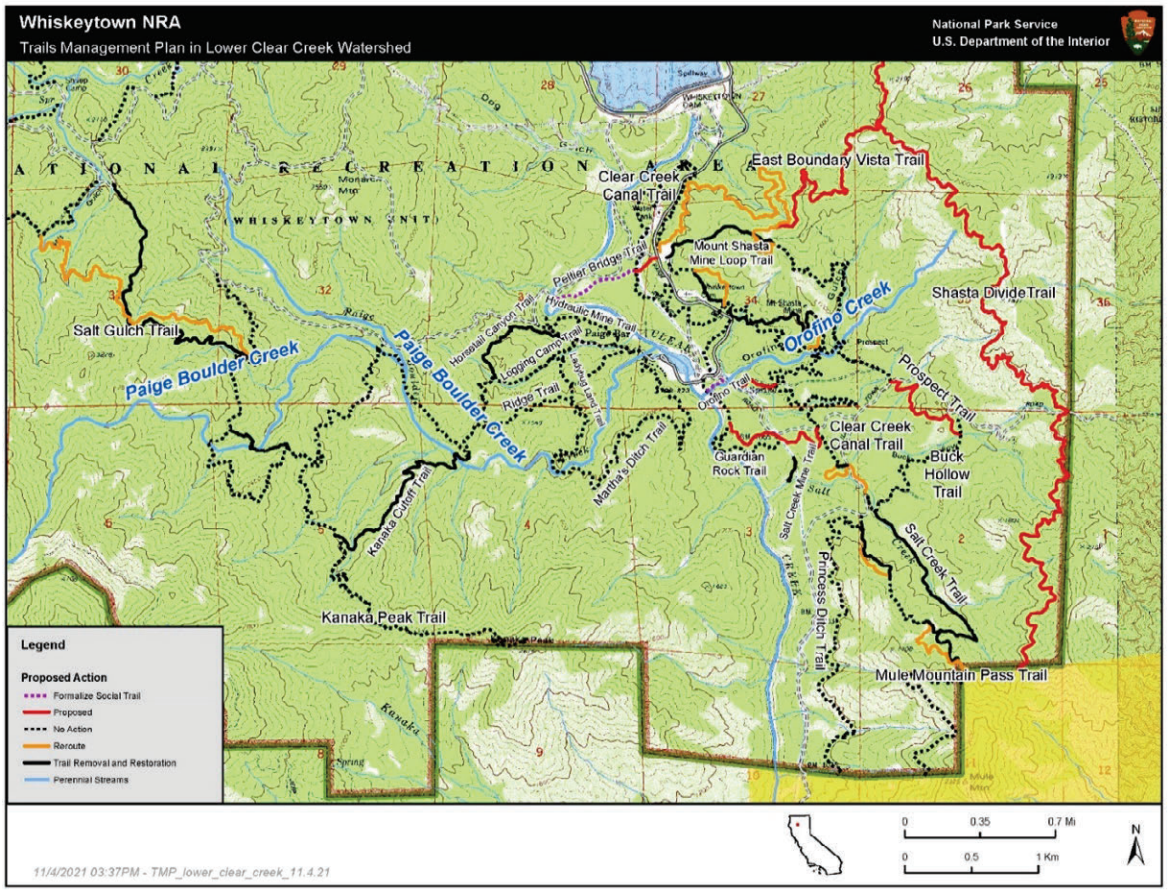


Figure 3a. Map of Lower Clear Creek Watershed

Table 4a. Lower Clear Creek Watershed Trails

Trail Name	Trail Type	Trail Length (miles)	Trail Status	Distance from perennial creek (m)	Elevation above lower Clear Creek (m)
Prospect Trail	Multi-use	0.7	Current with proposed new section	Current trail crosses Orofino Creek at one location	50 m
Salt Gulch Trail	Multi-use	2	Current with proposed reroute	Currently 300 m from Paige Boulder Creek	390 m
Mt. Shasta Mine Loop Trail	Multi-use	3.9	Current with proposed reroutes (2.7 mi.)	One section is currently 5 m from Orofino Creek	> 62 m
Mule Mountain Pass Trail	Multi-use	4.25	Current with proposed reroutes (0.8 mi.)	Currently 740 m from Clear Creek	> 65 m
Clear Creek Canal Trail (new)	Multi-use	0.4	Proposed new section	600 m from Clear Creek	60 m
East Boundary Vista Trail	Multi-use	1.4	Proposed new trail	> 1000 m from Clear Creek and Orofino Creek	> 170 m
Guardian Rock Equestrian Trail	Multi-use	0.3	Proposed new trail***	60 m from Clear Creek	18 m
Shasta Divide Trail	Multi-use	7	Proposed new trail	>100 m from headwaters of Orofino Creek ****	>300 m
Horsetail Canyon Trail	*Multi-use*	*0.6*	*Proposed removal & restoration*	*100 m from Clear Creek*	*> 8 m*
Kanaka Cutoff Trail	*Multi-use*	*1.1*	*Proposed removal & restoration*	*Crosses Paige Boulder Creek at one location*	*120 m*
Salt Creek Mine Trail	*Multi-use*	*0.1*	*Proposed removal & restoration*	*250 m from Clear Creek*	*25 m*
Salt Creek Trail	*Multi-use*	*1*	*Proposed removal & restoration*	*800 m from Clear Creek*	*40 m*
Orofino Trail	Multi-use	0.3	Social trail to be formalized	5 m from Orofino Creek	> 3 m
Peltier Bridge Trail	Multi-use	0.6	Social trail to be formalized	680m to 40 m (at Peltier Bridge)	7 m near Peltier Bridge

*Creek Access portion of trail only used by hikers and not suitable for mountain biking or equestrian use. Approximately 400 meters is paved and ADA accessible.
**Trail follows an abandoned water ditch.

***Proposed new section of Guardian Rock trail, that would divert horseback riders off the existing trail

***Exact location for new trail not yet determined.

However, implementation of trail management planning goals, mitigation measures, and best management practices included in the Trail Maintenance Handbook (see appendix D) would improve existing trails, proposed trails, and reroutes, making them more stable and less prone to erosion; thus having long-term benefits to federally listed salmonid species and other special status species. For spring-run chinook salmon and Central Valley steelhead trout, the closure and rerouting of problem trails would decrease erosion and sedimentation, which have a long-term beneficial effect on the fish spawning in the park. The application of mitigation measures and best management practices would further minimize erosion and sedimentation from trail construction.

None of the park's existing trails, proposed trails, rerouted trails, or other actions in this plan would occur near activity centers or within suitable habitat for northern spotted owl (Weatherbee, NPS 2020d). Existing activities within the recreation and proposed trail improvements in the plan would not affect this owl species.

With regard to bald eagles, the development of the proposed Whiskeytown Lake Trail could affect nesting habitat near Whiskeytown Lake. Human disturbance could cause eagles to abandon nesting attempts. However, potential impacts would be avoided by applying a buffer to this proposed lakeside trail (see chapter 2 mitigation measures).

Infrequent disturbance could occur to Pacific fishers due to occasional encounters with trail users or maintenance crews. However, no changes in the fisher population would be expected. Habitat modification due to trail construction would include habitat components important to fishers such as large (≥ 18" dbh) trees, snags, denning sites, and riparian habitat. However, these habitat components would be retained and some areas restored or otherwise improved by the proposed alternative. Many of the sightings of fishers in the park's wildlife observation database are along existing trails, so it is unlikely that the presence of new trails or trail users would cause fishers to avoid the area.

Rare plant communities are not expected to be disturbed along proposed trails and reroutes due to Whiskeytown's ongoing implementation of mitigation measures and best practices to reduce potentially serious impacts to rare plants from occurring. Areas planned for reroutes longer than 660 linear feet and/or vegetation destruction from new trail construction would be surveyed by resource management staff for rare species (see appendix D for specific trail maintenance measures). If federally listed or other special status plants are located, they would be clearly flagged and avoided during construction activities when possible.

Conclusion. With a reduction in erosion and sediments from park trails under the action alternative, and the application of mitigation measures during the construction of new trails, the action alternative would have a beneficial impact on the federally threatened spring-run chinook salmon and Central Valley steelhead trout that spawn in the park. The action alternative may affect, but would not likely adversely affect (NLAA), the spring-run chinook salmon and Central Valley steelhead trout. However, best management practices and mitigation measures in the preferred alternative would be beneficial, improving trails in the long-term and making them more sustainable

and less prone to erosion. Therefore, full implementation of the preferred alternative would have long-term beneficial impacts to federally listed salmonid species.

The action alternative may affect, but would not likely adversely affect (NLAA), the spring-run chinook salmon and Central Valley steelhead trout due to proposed trail construction activities, as well as past erosion of maintained and unmaintained trails and roads. These prior activities, in particular, resulted in increased sediment loads within drainages of the Lower Clear Creek watershed.

Similarly, with the application of appropriate mitigation measures and best management practices as listed in Chapter 2 of this environmental assessment, the action alternative would not be expected to adversely affect either the Pacific fisher, northern spotted owl, bald eagle, and rare plant communities in the park.

ARCHEOLOGY

Affected Environment (Current and Expected Future Conditions of Resources)

Numerous archeological inventories have been completed covering approximately 21% of Whiskeytown (8,900 acres), with more than 300 archeological sites currently recorded. One precontact archeological district within the park boundaries, the 64-acre Tower House Archeological District, was listed in the National Register of Historic Places in 1985. In addition, the Tower House Historic District and landscape, the El Dorado Historic District and landscape, and the Tower House Irrigation District all contain archeological resources.

Archeological investigations at Whiskeytown have revealed Native American occupation spanning at least 8,000 years (Bevill and Nilsson 2001). Precontact archeological sites at Whiskeytown consist almost exclusively of habitation sites and artifact scatters. These are characterized by the presence of dark midden soil, house-pit depressions, diverse artifact assemblages, faunal remains, and, on occasion, human remains. Whereas habitation sites represent long-term seasonal or permanent use, artifact scatters are typically comprised of flaked stone tools and waste flakes, and sometimes ground stone that probably resulted from one or more occupational episodes. The distribution of precontact archeological sites at Whiskeytown appears to have been influenced by the occurrence of perennial or reliable intermittent water sources, with most sites found in close proximity to these sources. The majority of recorded precontact sites lie between 1000 and 2000 feet in elevation, although this may reflect survey coverage rather than actual settlement preferences.

Historic-era archeological sites identified within Whiskeytown largely revolve around the history of ore mining in the region. This extraction work was initially fueled by the discovery of gold and is reflected by activities that date primarily to the Gold Rush period (1848–1853), the hydraulic mining period (late 1800s), the copper mining period (1884–1919), Great Depression era occupation and mining (1930s), and late historic-period occupation (1940–1960s). The park currently has 154 known mines with hundreds of individual mine features.

Maintaining Caltrans, WAPA, and PG&E rights-of-way for roads and transmission lines comprise approximately 1,140 acres within the park. Construction and NPS maintenance of firebreaks for prescribed fires contributes to erosion impacts throughout the park, which increases the chances of archeological resources being uncovered. In addition, social trailing results in damage to archeological sites, mainly due to erosion and soil compaction, looting and littering. Increasing visitation linked to development surrounding the park creates additional strain on the undesignated

trail system. Archeological sites in these areas are damaged by trampling, vandalism, leaving memorials/offerings, and collecting artifacts. As use levels for hiking, mountain biking, and horseback riding increase, direct, adverse impacts to the physical condition and the integrity of archeological resources occur.

Impacts on Archeology

No-Action Alternative. Under the no-action alternative, the effects to archeological resources would remain the same as described in the affected environment. The current resource threats and impacts to archeology would continue to occur.

Action Alternative – NPS Proposed Action and Preferred Alternative. As proposed in the action alternative, the 32.8 miles of new trails constructed would direct park visitors near areas in Whiskeytown that contain known archeological resources. These include the archeological sites in the Tower House Archeological District as well as sites in the Tower House Historic and Irrigation Districts and the El Dorado Historic District. The proposed new trails within the archeological district, the Camden Water Ditch Trail Extension and the Clear Creek Picnic Trail, would be class 3 trails, allowing multiple uses. While direct impacts to archeological resources from this proposed trail development would be avoided, indirect visitor use impacts (e.g., trampling and collecting artifacts) within the district could potentially increase due to the new trails. The use of the SWECO Trail Dozer, a piece of heavy equipment, to assist with the construction of new trails and the removal of existing trails, could also result in adverse impacts to archeological resources. Survey work would be conducted during the flagging of proposed trails. If archeological resources were found, adjustments would be made to avoid adverse impacts to these resources. Trails that are being rerouted would avoid archeological resources or would mitigate existing impacts to archeological resources through avoidance or rehabilitation. Improvements to existing trails, including minor realignments, are not anticipated to adversely impact archeological resources.

Conclusion. The no-action alternative would not lessen the adverse impact that existing social trails pose to Whiskeytown's archeological resources. Additional impacts to archeological resources are expected to rise commensurate with increases in park visitation. New trail development under the action alternative would avoid direct adverse impacts to archeological sites. Two new trails constructed within the Tower House Archeological District could, however, lead to an increase in indirect visitor use impacts to the district's archeological resources. Any impacts would be mitigated through maintenance activities and would not be adverse.

HISTORIC DITCHES

Affected Environment (Current and Expected Future Conditions of Resources)

Whiskeytown is crisscrossed with water conveyance ditches that were used to divert water from natural streams in order to facilitate the passage of water primarily for mining purposes during the historic mining period (1850-1965) as well as for residential and agricultural use. Whiskeytown's most notable ditches include the Crystal Creek Water Ditch, the Clear Creek Ditch or Canal, which includes upper and lower segments, the Upper Mill Creek Ditch (Clear Creek Vista Trail), the Mill Creek Ditch, Camden Water Ditch (Lower Crystal Creek), Martha's Ditch, and Princess Ditch. For the majority of ditches, the feature is named for the body of water which it diverts, channels, or otherwise modifies. The Princess Ditch was named after the Princess Hydraulic Mining Company, whose employees constructed the ditch in 1896. In addition to the ditches themselves, these sites

include improvements and features such as dams, flumes, siphons, water tanks, culverts, and pipes (Davis-King 2003).

The Crystal Creek Water Ditch was in recent working condition and visible in its entirety prior to the 2018 Carr Fire. It is not currently carrying water and the head gate has been shut due to needed repairs. The Crystal Creek Water Ditch is in fair condition and possesses historical integrity and is listed in the National Register of Historic Places as part of the Tower House Irrigation District. The Crystal Creek Water Ditch Trail is currently in use and open to the public. The Camden (Lower Crystal Creek) and lower Mill Creek ditches are no longer connected to their head gates, are filled in, and are not operational. These two ditches are in fair to poor condition and are in current use as a Class 3 walking trail and open to the public. Both ditches are listed in the National Register of Historic Places as part of the Tower House Historic District.

The Upper Mill Creek Ditch (Clear Creek Vista Trail) extends from its headgate on Mill Creek eastward along the hillslope eventually turning southward and terminating near Carr Powerhouse. This ditch is in fair to poor condition, is completely filled in, and in need of repair due to post-Carr Fire damage. The Upper Mill Creek Ditch is known as the Clear Creek Vista Trail and serves as a hiking trail when open to the public. This ditch is currently being evaluated for the National Register of Historic Places and is likely to be eligible and listed for its association to the Tower House Historic District.

The remnants of the Upper Clear Creek Ditch skirt Whiskeytown Lake's shore and Clear Creek along State Route 299 and make up the Oak Bottom Water Ditch Trail. The ditch trail extends from the Oak Bottom Developed Area to a trailhead near Carr Powerhouse with multiple ditch segments extending beyond the respective trailheads. The ditch is in poor condition and suffers the effects of historic infrastructure development, the cutting of levee holes to drain water, and erosion. These impacts are exacerbated by hikers, bikers, fire, and heavy rains. Vegetation growth has further caused the deterioration of the original levee berm. The Upper Clear Creek Ditch was evaluated in 2016 for the National Register of Historic Places and was determined not eligible for listing. The Lower Clear Creek Ditch includes segments of the canal below Whiskeytown Dam and is unevaluated and in fair to poor condition. The Lower Clear Creek Ditch is in use as a trail and is impacted by cutting levee holes to drain water, social trailing, bike ramp construction, rutting, erosion, and vegetation growth.

The Princess Ditch, which roughly parallels the course of the Lower Clear Creek Ditch at a higher elevation, is in good condition and in current use as a trail. Additional features along this ditch include: siphon abutments, rock retaining walls, cut bedrock channels, as well as rock dams and abutments at a few stream crossings that add an engineering character and quality to this ditch. Visitor impacts include cutting holes in the levee to drain water, bike ramp construction, social trailing, and rutting. Natural impacts to the ditch include vegetation growth, erosion, and fire. The Princess Ditch was determined eligible for the National Register of Historic Places in 2011 with recommendations to retain the ditch unaltered and excluded from use with motorized vehicles.

Martha's Ditch, the western extension of the Princess Ditch, runs along the west side of Clear Creek from the northern extent of the Princess Ditch to its head gate on Boulder Creek above WES Camp. This ditch is used, in part, as a trail exclusively by WES Camp and is not open to the general public. While Martha's Ditch has not been evaluated for the National Register of Historic Places, it's known association with the eligible Princess Ditch indicates that Martha's Ditch may also be eligible for the National Register of Historic Places upon formal evaluation. The ditch's condition is fair to poor and

has been impacted by past bulldozer activities, road construction, natural erosion, vegetation growth, and fire. Visitor impacts are minimal due to reduced visitation.

PG&E poles are currently situated in several of Whiskeytown's ditches, including the Crystal Creek Water Ditch. The park is currently working with utility companies to minimize impacts from right-of-way infrastructure associated with the irrigation features of the Tower House Historic Districts. Visitor activities, including hiking and horseback riding, cause impacts to ditches that serve as existing trails, including Martha's Ditch, Princess Ditch, Upper and Lower Clear Creek Ditches (Oak Bottom Water Ditch), Upper and Lower Mill Creek Ditch, Camden Ditch, and Crystal Creek Water Ditch. Erosion in and around ditches occurs as a result of visitors cutting holes in levee berms and the spread of invasive plant species. The invasive plant species sometimes assist with soil and berm stabilization. whereas erosional impacts that occur as part of natural processes, such as precipitation events, negatively impact berm stabilization.

Impacts on Historic Ditches

No-Action Alternative. Under the no-action alternative, the effects to historic ditches would remain the same as described in the affected environment. The current resource threats and impacts to historic ditches would continue to occur.

Action Alternative – NPS Proposed Action and Preferred Alternative. Under the action alternative, four new trails, the Camden Water Ditch Trail Extension, the Horse Camp Trail, the Orofino Trail, and the Whiskeytown Lake Trail, would be constructed within 50 meters of a historic ditch. The Camden Water Ditch Trail Extension would connect to the Crystal Creek Water Ditch Trail, which could increase impacts to the latter. The Clear Creek Canal Trail, the Clear Creek Vista Trail, the Mount Shasta Mine Loop Trail, and the Oak Bottom Water Ditch Trail would all be rerouted under the action alternative. All four of these trails are constructed on or within historic ditches and maintaining the trail maintains each ditch's historic character. Reroutes along these existing ditch trails are designed to reduce impacts by increasing sustainability of the trail, while reducing impacts to historic and archaeological resources. This would be accomplished by rerouting the trail out of the ditch channel to the levee berm to reduce channel cutting and rutting and to improve and preserve the levee and control vegetation or to reroute the trail out of an archaeological site and avoid features. Additional trail segments are designed to reduce social trailing, provide visitor access, restore historic circulation footprints/conditions, and reduce impacts to subsurface archaeological resources. It should be noted that use of "heavy" equipment is limited within the historic districts and on ditch trails. All work on trails will be done in coordination with director's order 28 and the cultural landscape report part 2 (which is expected to be completed in 2021).

Conclusion. Visitor-caused impacts to historic ditches would continue under the no-action alternative. New trail development under the action alternative would create four new trails within 50 meters of historic ditches. These new trails would allow multiple uses. One of the new trails, the Camden Water Ditch Trail Extension, would connect with an existing trail, the Crystal Creek Ditch Trail, which could increase erosion-related impacts to both ditches. These impacts would be mitigated through maintenance activities and would not be adverse.

VISITOR USE AND EXPERIENCE

Affected Environment (Current and Expected Future Conditions of Resources)

The Whiskeytown National Recreation Area trail system provides visitors with a variety of opportunities to explore the park. While much of the Whiskeytown NRA visitor experience is focused on water recreation opportunities, the park also offers hiking, trail running, mountain biking and horseback riding opportunities on its numerous trails. The trail system allows visitors to experience a variety of forested terrain from day hikes to mountain summits and overnight camping and allows visitors to access Whiskeytown Lake for lake-side hikes, picnicking, camping, and water sports (swimming, boating, water skiing, sailing, kayaking, and canoeing). Depending on where a visitor engages with this trail system, they can immerse themselves in solitude or a highly social environment.

PG&E maintenance activities can temporarily increase congestion on related roads and at nearby parking lots for the duration of the work due to workers being present in the area. In addition, the use of mechanized equipment temporarily impacts visitors' opportunities for contemplation due to the introduction of machines to the natural soundscape. WAPA tower replacement activities result in increased crowding and congestion along South Shore Drive due to the use of mechanics for the duration of the pole replacement but does not have long lasting impacts.

Visitation Trends. Park visitation has fluctuated over time since 2000 to today. The overall increase in visitation shows an increase in popularity of Whiskeytown NRA. The overall increase is impacted by two substantial drops in visitation occurring in 2008 and 2018 due to wildfires. In 2000, there were 702,883 annual visitors to Whiskeytown. By 2016, visitation increased by 25%, reaching a total of 875,565 annual visitors. In 2018, annual visitation was dramatically lower – only 585,768 – largely due to the Carr Fire and associated closures. In 2019, park visitation rebounded somewhat, reaching 687,160 annual visitors, though this level was still markedly lower than pre-Carr Fire levels. Park visitation continued to increase in 2020 and were comparable to pre-Carr Fire levels. The population in Shasta County has increased by one percent annually and is expected to continue this growth pattern into 2050 (2017 Census). Visitation at the park is therefore expected to continue to increase over time, as the surrounding metropolitan areas become more densely populated.

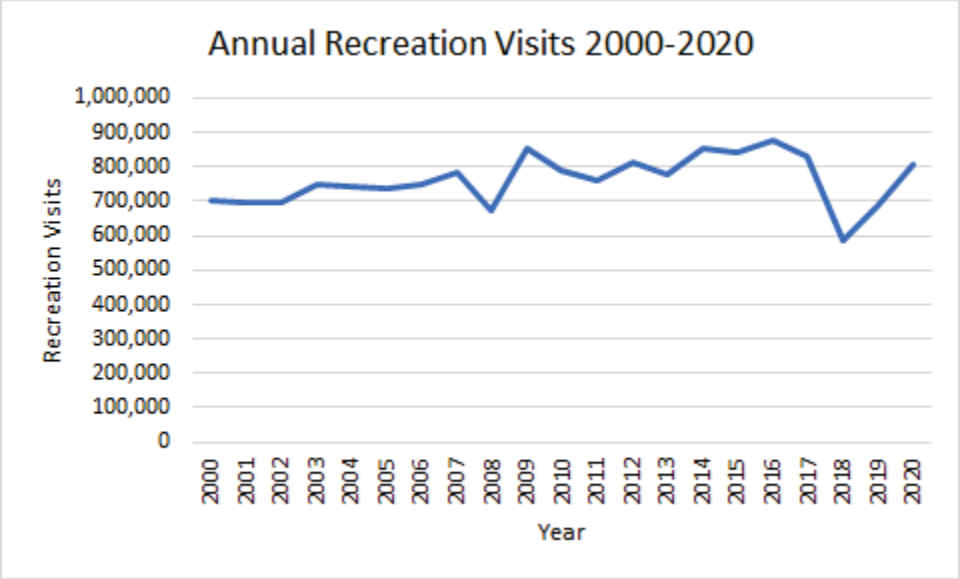


Figure 4. Annual Recreation Visits to Whiskeytown NRA (2000–2020)

Visitation to Whiskeytown NRA is highly seasonal in nature, with summer being the busiest season. Over the past 10 years, monthly visitation during the summer months of June through August averaged between 95,000 and 136,000 while the monthly visitation during the winter months of October through February averaged around 30,000 monthly visitors. Monthly visitation during the shoulder season of March through May averages around 60,000.

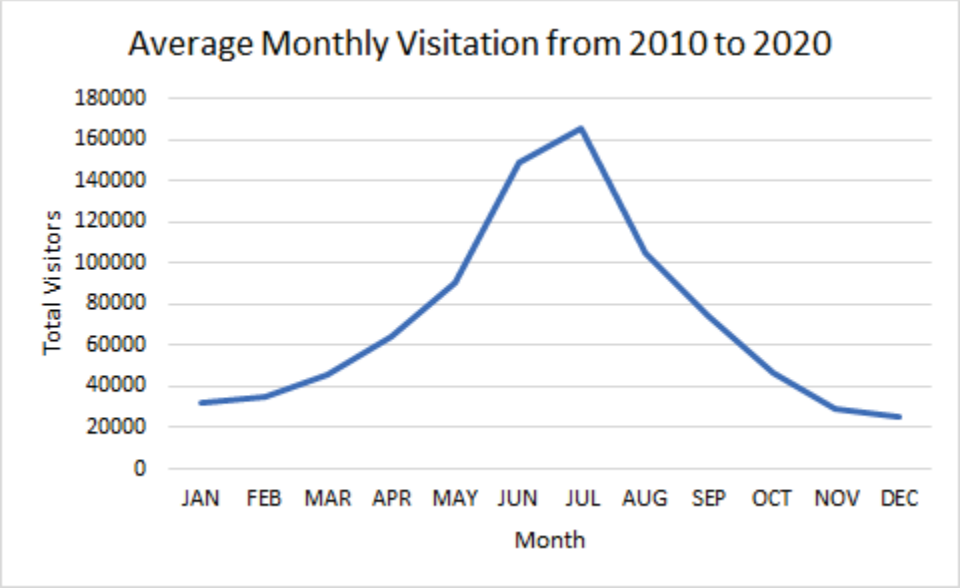


Figure 5. Average Monthly Recreation Visits to Whiskeytown NRA, 2010–2020

Visitor Access and Circulation. The primary way that visitors access Whiskeytown NRA is by personal vehicle. The recreation area can be accessed from three locations: Highway 299 from Weaverville (to the Northwest), Highway 106 from French Gulch (to the North), and Highway 299

from Shasta (to the South). Within the park, visitors drive along Highway 299 to transverse the park east and west. To explore south of the lake, visitors drive along J.F. Kennedy Memorial Drive to visit points of interest including the Glory Hole Spillway, Mount Shasta Mine trails, Whiskeytown Environmental School (WES), and Brandy Creek Marina. To explore west of the lake, visitors drive along Crystal Creek Road to visit Crystal Creek Falls. In addition to these main vehicular corridors, there are several unpaved and 4-wheel-drive-only roads that provide access to more amenities and recreational opportunities throughout the park.

From April 2017 to April 2018, the park implemented a trail monitoring program using three methods: trail monitoring by NPS employees; trail cameras on earthen trails; and special use permits. This trail monitoring program included 65 miles of trail in the park. The park excluded Horsetail Canyon, Kanaka Cutoff, Knobcone, Martha's Ditch, Orofino, and Salt Creek Loop trails because they are either WES trails or the park intends to remove the trails from the system. The park also excluded Mule Mountain Loop Trail and all paved trails from this monitoring program. The locations, date, and time of trail observations were picked randomly from each category giving highest priority (most visits) to the High Use category and lowest priority to the Low Use sites. Monitoring points were fixed locations including trail heads, roads, and parking lots throughout the park. This program resulted in a total of 2,923 observations, and observations occurred between the hours of 8 am and 8 pm. The results from this monitoring program are documented in the 2018 Whiskeytown Trail Use Survey.

The Trail Use Survey provides estimated visitors per year for each trail surveyed, for all user groups. According to this survey, James K. Carr Trail to Whiskeytown Falls shows the highest-use, Shasta Bally Trail shows the lowest use, and Clear Creek Canal is an example of a moderate-use trail. Trail-by-trail visitor observations may be viewed in the following graph.

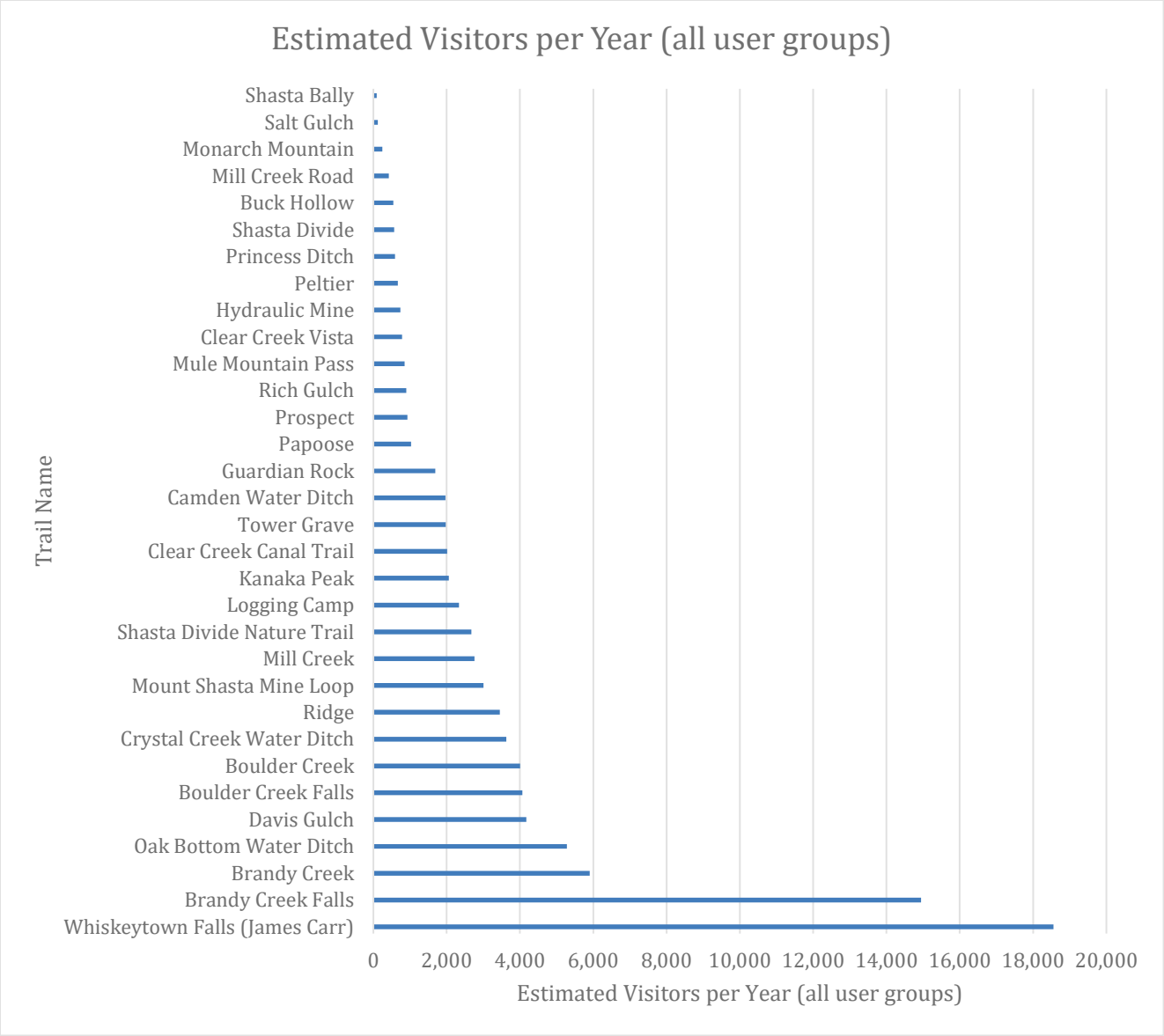


Figure 6. Estimated Visitors Per Year (all user groups), 2017–2018.

Appendix I of the Whiskeytown Trail Use Survey provides predicted trail use categories. Within these categories, approximately 20% of the trails fall within the high-use category, 60% of the trails in the moderate-use category, and 20% in the low-use category. These predicted trail use categories were updated based on the 2018 survey results of observed visitation trends. The following trail use categories are based on observed trail use. Trails which were not included in the 2018 Trail Use Survey and proposed trails in the action alternative were categorized into trail use categories based on trails with comparable use, type, and experience.

High Use Trails:

- Boulder Creek
- Boulder Creek Falls
- Brandy Creek Falls
- Brandy Creek
- Crystal Creek Falls
- Davis Gulch
- James K. Carr (Whiskeytown Falls)
- James K. Carr Trail Extension
- Oak Bottom Water Ditch
- Whiskeytown Lake Trail

Moderate Use Trails:

- Camden Water Ditch
- Clear Creek Canal Trail
- Clear Creek Picnic Trail
- Crystal Creek Water Ditch
- East Boundary Vista Trail
- Guardian Rock
- Guardian Rock Equestrian Trail
- Horse Camp
- Horsetail Canyon
- Kanaka Peak
- Knobcone
- Logging Camp
- Martha's Ditch
- Mount Shasta Mine Loop
- Mill Creek
- Orofino Trail
- Papoose
- Ridge Trail
- Shasta Divide Nature
- Tower Grave

Low Use Trails:

- Buck Hollow
- Clear Creek Vista
- Hydraulic Mine
- Monarch Mountain
- Mule Mountain Pass
- Peltier
- Princess Ditch
- Prospect
- Rich Gulch
- Salt Gulch
- Shasta Bally
- Shasta Divide

As of May 2021, approximately 55% of the trails at Whiskeytown remain closed because of the Carr Fire (NPS 2021). This equates to 15 of 27 total trails being closed. Post-fire reopenings will continue to phase in If there are no safety or resource issues associated with post-fire use.

Diversity of Visitor Opportunities. Whiskeytown National Recreation Area offers a variety of day and overnight use areas via easy, moderate and strenuous trails that provide visitors with views of the lake, through historic landscapes, up peaks, or to the park's numerous waterfalls. The overall trail network includes 66 miles of trails. Trails at Whiskeytown NRA range from .25 miles to 7.25 miles in length, with elevation changes ranging from 50 feet to 4,356 feet. This diversity of trail difficulties accommodates a wide variety of recreational experiences. Most of these trails are formal and maintained by park staff, while other trails are user-created trails. Recreational opportunities include boating, swimming, camping, hiking, biking, fishing, hunting, horseback riding, and gold panning.

Most trails at Whiskeytown National Recreation Area are multiuse, providing a large network of trail opportunities to a wide variety of users. The following activities take place on these trails: hiking, mountain biking, trail running, horseback riding, dog walking, and scenic viewing. Hiking is the primary activity within the park trail network (making up 85% of use), followed by mountain biking (8% of use), trail running (4% of use), and horseback riding (1% of use). Bicycle use, including the use of Class 1 e-bikes, occurs on all multiuse trails at Whiskeytown, totaling 46.2 miles of trails. During public scoping, many commenters expressed support for improving and increasing horseback riding trails and facilities throughout the park, particularly along the perimeter of the lake. While dogs must be kept on a 6-foot leash and owners must clean up after their dogs, the park has observed that more than 50% of dogs at the park are off-leash and an increase in dog waste, digging, and small mammal predation. In addition to restrictions near water resources at the park, dog walking is not allowed at viewing areas or picnic areas adjacent to the park's designated swim beaches. The Trail Use Survey recommends installing dog waste bags at the most heavily used trailheads to reduce fecal loading of nearby waterways and improve the visitor experience. In the winter, skiing, and snowshoeing use are allowed on trails. Trails also provide access to enjoy cultural resources including Kennedy Memorial, Whiskeytown Cemetery, Judge Francis Carr Powerhouse, and the Tower House Historic District.

The following trails are foot-traffic only:

- Brandy Creek Falls (First mile is multiuse to the intersection of Rich Gulch Trail)
- Boulder Creek Falls
- Davis Gulch
- James K. Carr (First 0.4 miles is multiuse to the intersection of the Mill Creek Trail)
- Crystal Creek Water Ditch
- Shasta Divide Nature

There are three private WES trails that are not accessible to the public. The WES-only trails include Horsetail Canyon, Martha's Ditch, Salt Creek Mine.

The biggest visitor use management challenges experienced on Whiskeytown trails include user conflicts on shared trails (i.e., hikers and bicyclists) and seasonal trail degradation due to winter recreation activities. Additional visitor related issues include litter on the trails, wayfinding confusion, and visitor safety (i.e., trails that are not safe for downhill biking are not properly noted via trail signs). Approximately half of the existing trails have safety concerns, and approximately a quarter of existing trails have potential user group conflicts according to the 2020 Bike Matrix (see appendix E). In a visitor survey report from 2013, visitors rated recreational opportunities as highly satisfactory. Recreational opportunities included learning about nature, history or culture and

outdoor recreation. The report included an average overall satisfaction rating for outdoor recreation of 98% (Visitor Survey Report 2013).

Options for longer backcountry hikes and bicycling on asphalt trails are currently lacking, and these lack of options generally limits visitors' experiences and contributes to crowding. Impacts to visitor use and experience, such as limited trail opportunities and crowding, would be noticeable to some trail users in the short-term, and would increase as this region's population increases and the popularity of WHIS increases in the long-term.

In the short-term, the existing trail system would continue to be accessible to the public and visitors' use and enjoyment of the trails would not change. Park visitation and trail use are expected to rise, matching the increase of density in the surrounding metropolitan areas. As park visitation and trail use rises, increased crowding and congestion on the trails as well as associated infrastructure like trailheads, parking lots, and access roads are experienced. This crowding and congestion is typically confined to a few select locations such as Brandy Creek Falls and Whiskeytown Falls at first, and could grow to include other locations over time. Crowding and congestion take away from visitors' experience of the trail system and opportunities for connection with nature and solitude. Crowding and congestion sometimes impacts visitor access, as trailhead parking lots fill more quickly and result in visitors facing uncertainty of finding parking. When visitors have difficulty finding parking, cars sometimes park in areas undesignated for parking which results in erosion and impacts to resources along roads.

Impacts on Visitor Use and Experience

No-Action Alternative. Under the no-action alternative, the effects of visitor use and experience would remain the same as described in the affected environment. The current resource threats and impacts to visitor use and experience would continue to occur, including potential user conflicts on shared trails (i.e., hikers and bicyclists) and safety concerns such as poor signage notifying visitors entering difficult trails.

Action Alternative – NPS Proposed Action and Preferred Alternative. The additional trail mileage and rerouted existing trails proposed in the action alternative would result in long-term beneficial impacts to visitor use and experience. The new trails would vary in length and would offer access to important features and key experiences that are not currently available in the park, as well as increased interconnectivity between park sites and with external trail networks. The additional trail miles would also improve the visitor experience by helping to disperse use, decreasing crowding and congestion on more popular trails near various waterfalls and historic ditches. The additional trail miles would be particularly beneficial for visitors seeking solitude, as some of the new trails away from the crowding along the most used trails would provide more opportunity to have the trail to oneself. Rerouted trails would improve visitor safety and experience because all of the trails that have safety concerns and/or potential user group conflicts are proposed for reroute, according to the 2020 Bike Matrix (see appendix E). Though some trails or portions of trails may be closed while improvements are being made, these closures would only result in short-term adverse impacts lasting a few weeks to a few months. These impacts would be mitigated by timely and accurate communication regarding closures, timing to minimize impact, as well as noise abatement and visual screening. Overall, the action alternative would result in long-term, beneficial impacts to visitor use and experience, as recreational opportunities within the park are added to, improved, and diversified. Mitigation measures relevant to visitor use and experience are identified in chapter 2.

Accessibility — The use of ABA Accessibility Standards (ABAAS) to improve accessibility of trails as practicable would benefit visitors of differing abilities. Improved information about the condition and difficulty of trails would allow visitors of all abilities to make informed decisions about which trail to use, thereby improving the overall quality of their experience as their experiences align with expectations.

Management Strategies Associated with Indicators and Thresholds — The Indicators and Thresholds (See appendix B) contain a number of management strategies which would impact visitor use and experience.

Improved trail identification and signage would mean visitors could more easily find their way and reconcile on-the-ground trails with mapped trails. Likewise, the evaluation and potential rehabilitation or designation of visitor created trails would prevent confusion and disorientation for visitors, who often mistake them for official trails.

Management strategies designed to educate visitors about a diversity of trails will positively impact visitors through educating them about lesser known trails with less crowding and congestion. These strategies will help disperse visitors on different trails and enhance visitor experiences on the trails. Relatedly, encouraging visitors to start their hikes earlier or later in the day will help reduce visitors' experience of crowding on the trails. Educational signs and programs will also inform visitors about appropriate ways to engage with cultural and historic sites.

Management strategies related to resource preservation may result in short-term impacts to visitor experience. For example, limiting parking along roadsides near trailheads would reduce soil compaction, and preserve natural vegetation, but may also result in visitor challenges finding parking. Through encouraging visitation of diverse trails and at off-peak times, parking challenges should be reduced. Similarly, temporary closures of trails post precipitation events, construction, or improvements may have short-term impacts to visitor experiences. These short-term closures would result in more sustainable trails, resulting in longer-term positive impacts to visitor experience.

Management Strategies Associated with Visitor Capacity — The Visitor Capacity analysis includes management strategies designed to implement the visitor capacity. These management strategies would generally have a beneficial impact to visitor experience, though in some cases they may adversely affect visitor use.

The continued management of roadside parking would adversely impact visitor access as trailhead parking lots frequently fill in the Tower House Historic District. As visitors face the uncertainty or inability to find parking, they may have to adjust their plans to arrive at a different time, or they may not be able to visit highly desirable destinations.

Increased education and expectation setting encouraging visitors to visit popular trails early or late in the day would beneficially impact visitor experience. As visitors are made more aware of the crowded conditions they are likely to find in the middle of the day and the possibility they may not be able to find parking, more visitors would choose to arrive early or late in the day. This would decrease crowding and congestion during the middle of the day and improve the quality of the experience for all visitors. Even if visitors do not alter their plans based on this information, they would know in advance to expect crowded conditions. As expectations more closely match the actual experience, the perceived quality of the experience would improve.

The implementation of scenic rest points and destination points along the trails, especially at Brandy Creek Falls Trail and Boulder Creek Falls Trail would increase the interpretive value of the area and help spread out visitors along these popular trails. Repairs and restoration to trails through vegetation plantings would improve visitor experiences on trails. Repairs and restoration to historic features on or nearby trails would improve the interpretive integrity of these resources.

Educating visitors about multiuse standards would enhance visitors experience on trails. This would be especially important on the new multiuse paved Whiskeytown Lake Trail where road bicyclists would be riding up to 15 miles per hour on the same trail as pedestrians (hikers, runners, and anglers). Education on how to safely pass others on this trail would be essential to ensure a low frequency of visitor conflicts. Designating points of interest and pull out points along the Whiskeytown Lake Trail would help reduce likelihood of user conflicts.

Adaptive Management Strategies Associated with Visitor Capacity — The Visitor Capacity analysis also includes adaptive management strategies that would be implemented if and when they are necessary. These actions would be taken when visitor capacities are being approached or exceeded. These adaptive management strategies would generally have a beneficial impact to visitor experience, and they may adversely affect visitor access and use.

The strategy of requiring reservations for larger groups (more than ten visitors at once) on trails may adversely impact visitors. The beneficial effect would be a reduction of multiple large groups on trails at the same time, spreading out the use of large groups on the trail. Requiring reservations for larger groups would allow visitors to experience conditions that are consistent with the desired conditions for the area, thus benefitting the visitor experience. Visitors would no longer be subjected to the crowding and congestion that is inconsistent with desired conditions, and at times unsafe, during peak visitation times.

Temporarily closing trails for trail restoration would have a short-term adverse impact to visitors who intended on using the trail that day. Temporary trail closures would have long-term benefits to visitors through improving the safety and condition of the trails, thus allowing visitors to experience conditions that are consistent with the desired conditions.

The addition of an access point to the Paige Boulder Trail Complex would both benefit and adversely impact visitor experience. The additional access point would increase ease of accessing this trail network, allowing more visitors to safely recreate in this trail complex. Adding a new access point may result in short-term adverse impacts to visitor experience related to temporary closures needed for construction of a new access point.

Trail by trail impacts to visitor use and experience for action alternative trails are listed below. For multi-use trails, bicycle use is evaluated.

Boulder Creek Trail – This reroute would enhance the visitors' experience through connecting this reroute of the existing Mill Creek Trail to connect with the existing Boulder Creek Trail.

James K. Carr Trail Extension – This new trail segment would provide a new trailhead for the James K. Carr Trail to Whiskeytown Falls. It would decrease the demand for parking at the current trailhead parking lot and would increase visitor opportunities for recreating on this popular trail to Whiskeytown Falls. At this new primary James K. Carr trailhead at Upper Crystal Creek there would be increased opportunities for parking and overnight camping. While there are erosive soils in this area, bicycle use on adjacent existing trails has not contributed to soil loss due to bicycles. In

addition, trail alignment will ensure minimal maintenance and avoid impacts to natural and cultural resources.

Camden Water Ditch Trail Extension – This connection trail would enhance visitors' experience in the Tower House Historic District by providing more diversity of trail length options available. This multiuse trail connects two existing multiuse trails, the Camden Water Ditch and Crystal Creek Water Ditch trails. The anticipated bicycle impact on this trail would therefore match that existing multi-use connecting trails, which are both not steep (slope of less than 20%), have stable soils, no signs of trail erosion due to bikes, no safety issues, and no significant natural resource or cultural resource issues.

Clear Creek Canal Trail – This reroute would enhance the visitors' experience through increased safety, bringing the trail closer to meeting the desired conditions in this area. Enhanced alignment and design on this multi-use trail would reduce the steep inclines on the current trail alignment, reducing user group conflicts and safety concerns for hikers and bicyclists on this trail.

Clear Creek Picnic Trail – This new, short trail would be a Class 5 multiuse trail and would provide an opportunity for visitors to enjoy this area as a day use picnic site. This new trail would enhance visitors' experience through the creation of an accessible route along the desirable Clear Creek. This multi-use trail follows closely with the topography of the area, ensuring minimal maintenance due to bicycle use.

Davis Gulch Trail –This reroute would enhance the visitors' experience through increased safety, bringing the trail closer to meeting the desired conditions in this area. This trail is for pedestrians only.

East Boundary Vista Trail – By providing this connection, this trail would increase diverse opportunities for visitors to experience longer trail connections and loops. This multi-use trail closely follows the topography of the area, ensuring minimal maintenance due to bicycle use. In addition, there are no known significant natural or cultural resources that would be impacted by bicycle use here.

Guardian Rock Equestrian Trail – The trail will enhance visitors' opportunities by providing an additional trail for a different user group. Separating user groups on these two trails will help minimize user conflicts between equestrian users on the Guardian Rock Equestrian Trail and other user groups on the class 5 Guardian Rock ABAAS accessible trail. Little to no bicycle use would occur on this trail, as bicyclists would be encouraged to utilize the existing multi-use Guardian Rock trail to reduce conflicts with equestrians.

Horse Camp Trail – This additional connection trail would enhance visitors' experience by providing more opportunity for both shorter and longer trail connections and loops. This multi-use trail closely follows the topography of the area, ensuring minimal maintenance due to bicycle use. In addition, there are no known significant natural or cultural resources that would be impacted by bicycle use here.

Mill Creek Trail – This reroute would enhance the visitors' experience through increased safety, bringing the trail closer to meeting the desired conditions in this area. Enhanced alignment and design on this multi-use trail would reduce the steep inclines on the current trail alignment, reducing user group conflicts and safety concerns for hikers and bicyclists on this trail.

Mount Shasta Mine Loop Trail – The reroutes for this trail would enhance the visitor experience and enjoyment of recreating on these trails through enhanced safety and aesthetics of the trail. Enhanced alignment and design on this multi-use trail would reduce the steep inclines on the current trail alignment, reducing user group conflicts and safety concerns for hikers and bicyclists on this trail.

Mule Mountain Pass Trail – This reroute would enhance the visitors' experience through increased safety, bringing the trail closer to meeting the desired conditions in this area. Enhanced alignment and design on this multi-use trail would reduce the steep inclines on the current trail alignment, reducing user group conflicts and safety concerns for hikers and bicyclists on this trail.

Orofino Trail – By formalizing the social trail, visitors' experience would be enhanced through maintenance of the trail. Visitors would be able to continue this trail by crossing Paige Bar Road. The new segment of the Orofino Trail connects the visitors to the Clear Creek Canal Trail. This new trail segment provides visitors with enhanced trail opportunities including more diverse trail connections. This multi-use trail closely follows the topography of the area, ensuring minimal maintenance due to bicycle use. In addition, there are no known significant natural or cultural resources that would be impacted by bicycle use here.

Papoose Pass Trail – This reroute would enhance the visitors' experience through increased safety, bringing the trail closer to meeting the desired conditions in this area. Enhanced alignment and design on this multi-use trail would reduce the steep inclines on the current trail alignment, reducing user group conflicts and safety concerns for hikers and bicyclists on this trail.

Peltier Bridge Trail – By formalizing the social trail, visitors' experience would be enhanced through maintenance of the trail. Visitors would be able to continue this trail east of its intersection with Clear Creek Canal trail onto a new segment of the Peltier Bridge trail, ending at Paige Bar Road. This new trail segment provides visitors with enhanced trail opportunities including more diverse trail connections. This multi-use trail would connect bicyclists from the road to a deeper network of trails with soils suitable for bicycle use.

Prospect Trail – This new trail segment provides visitors with enhanced trail opportunities including more diverse trail connections. This multi-use trail extends an existing trail with no signs of trail erosion due to bicycle use and no safety issues among different user groups.

Salt Gulch Trail – This reroute would enhance the visitors' experience through increased safety, bringing the trail closer to meeting the desired conditions in this area. Enhanced alignment and design on this multi-use trail would reduce the steep inclines on the current trail alignment, reducing user group conflicts and safety concerns for hikers and bicyclists on this trail.

Shasta Divide Trail – This additional trail would provide beneficial impacts to access and would diversify visitor opportunities through a longer trail with a solitude experience. This multi-use trail closely follows the topography of the area, ensuring minimal maintenance due to bicycle use. In addition, there are no known significant natural or cultural resources that would be impacted by bicycle use here.

Whiskeytown Lake Trail – The implementation of this lakeshore trail may introduce the new user group of road bicyclists at Whiskeytown NRA as it will be a new paved trail. This additional trail would provide beneficial impacts to visitor opportunities through this new paved multiuse trail experience and diverse use types. While this trail is multi-use, no equestrian use will be allowed to ensure safety of pedestrians and bicyclists. This trail closely follows the topography of the area,

ensuring minimal maintenance costs due to bicycle use, and this trail avoids significant natural and cultural resources.

Conclusion. The action alternative would provide beneficial impacts to visitor use and experience, providing more diverse visitor opportunities and experiences through an increase of trail mileage and the addition of a lakefront trail. The action alternative also provides comprehensive strategies for visitor use management including indicators and thresholds and visitor capacity analyses. These visitor use management strategies would help reduce crowding at popular areas and enhance visitors' overall experience. No trails and therefore no trail experiences would be lost through the implementation of the action alternative. Under the no-action alternative, the effects of visitor use and experience would remain the same and the current resource threats and impacts to visitor use and experience would continue to occur. In summary, the action alternative would be more beneficial than the no-action alternative.

CHAPTER 4: CONSULTATION AND COORDINATION

PUBLIC INVOLVEMENT

Civic engagement began in May 2017 to inform the trail management plan and environmental assessment. Public involvement occurred via public meetings and a 30-day comment period. One public meeting occurred on May 25, 2017 at Redding City Hall's Community Room, and two additional public scoping meetings occurred. In total, 125 people attended the three public scoping meetings or visited the project information booth inside the park's Visitor Center.

During the public scoping period, members of the public entered comments into the NPS Planning, Environment, and Public Comment (PEPC) website, provided comments directly at a public meeting, or mailed or emailed comments directly to the park. Overall, 43 total correspondence were received. The planning team also received comments via email, mailed letters, and PEPC.

To publicize the process, the planning team distributed a newsletter containing the purpose and need for the plan, key planning objectives, a proposed action, how to comment, where the public open house would be held, and a general project schedule.

To reach a broad audience, the newsletter and information about public scoping were shared with the public in a variety of ways. An interactive webmap was created to dynamically display information about the plan and the proposed action. Press releases, website posts, and social media notifications were also used to inform the public and stakeholders about the planning process and the opportunity to comment. The planning team collected public comments to understand the public's perspectives on potential trail management options for the park. In implementing the NEPA process, thoughts and ideas from individuals, organizations, and agencies were analyzed and considered equally. For this reason, the unique content of comments, rather than the number of times a comment was received, was used to guide the development of a range of reasonable management alternatives for the plan.

A summary of the comments received during the civic engagement period was compiled in the Public Scoping Comment Summary Report (July 7, 2017). Many supported expanded mountain biking opportunities with less steep trails (5% grade or less) and recommended building trails by hand and cooperating with local mountain biking groups to help build and maintain the trails. There was support for multiuse trails with increased signage to decrease the concern for conflicts between mountain bikers, horseback riders, and hikers. Others expressed a desire for expanded horseback riding opportunities and facilities for equestrian use such as trailhead parking with adequate space for trailers. There was also support for increased trail accessibility on hiking trails to accommodate wheelchairs and walkers, providing benches along trails, and allowing three-wheel bikes or e-bikes on trails. Other comments support expansion of trails and connections, especially along the South Shore portion of Whiskeytown Lake. Lastly, several commenters asked for kiosks at trailheads with maps that included elevations and lengths.

CONSULTATION WITH AGENCIES AND TRIBES

Whiskeytown National Recreation Area initiated tribal consultation for the trails management plan on November 6, 2017 by mailing letters to the Redding Rancheria and the Wintu Educational Council. No comments were received. More general consultation letters, that included information

on the trails management plan, were sent in 2019 and 2020 (The trails management plan process was paused in 2018 due to various circumstances including the Carr Fire). In February of 2021, the park requested a record search from the Native American Heritage Commission (NAHC) Sacred Lands File (SLF). The record search was returned in a letter dated March 18, 2021 with positive results. The final draft of the trail management plan EA will be mailed to the Tribal Partners identified by the NAHC for review and comment.

A meeting with Chairman Hayward of the Nor Rel Muk Wintu was held on November 12, 2020. Various park projects, including the trails management plan, were discussed and Chairman Hayward indicated interest in potential monitor for any projects within the Tower House Historic District and Tower House Archeological District, but otherwise supported the trails management plan with no immediate concerns expressed. A meeting with Redding Rancheria Chairman Potter followed on March 1, 2021. Topics of discussion included a brief review of the trails management plan. Chairman Potter indicated generally for all national recreation area projects that he would not likely comment where no new ground disturbance occurred, but would potentially comment, provide feedback, or request a Tribal Monitor on projects where new ground disturbance may occur or in specific areas subject to concern. Park staff informed Chairman Potter that the trails management plan required regular consultation for individual actions as proposed to ensure compliance with Section 106 as well as to fulfill the park's responsibilities to consult with the Tribal Community.

Whiskeytown continued consultation on the revised draft of the trails management plan in a letter sent May 25, 2021 to our tribal partners identified by the NAHC. The consultation included a copy of the draft trails management plan for review and comment.

List of Agencies Consulted

Tribes

Shasta Nation

Nor-Rel-Muk Nation

Redding Rancheria

Winnemem Wintu Tribe

Wintu Tribe of Northern California and Toyon-Wintu Center

Wintu Educational and Cultural Council

Agency Consultation

U.S. Fish and Wildlife Service - Yreka Fish and Wildlife Office

National Marine Fisheries Service, West Coast Region - California Central Valley Area Office

National Oceanic and Atmospheric Administration

State Historic Preservation Office

In accordance with Section 106 of the National Historic Preservation Act, Whiskeytown National Recreation Area initiated consultation with the California State Historic Preservation Office (SHPO) of the proposed trails management plan in a letter dated May 15, 2017 (NPS_2017_1113_002).

In response to the park (letter dated May 15, 2017), SHPO concurred that the proposed project constitutes an undertaking with the potential to affect historic properties and agreed to further consult with the National Park Service as the undertaking became better defined and the effects on potential historic properties were identified. The SHPO was provided with a copy of the trails management plan / environmental assessment for their review. As presented in the plan, some proposed trails have the potential to affect the park's archeological resources and historic ditches. As a result, NPS staff propose to take appropriate measures to preserve and protect the resources from potential visitor use damage or other factors (e.g., weathering and erosion). The park completed Section 106 of the NHPA for this plan. Because all preservation measures and trail development would be carried out in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties and Section 106 of the NHPA, the National Park Service finds that the development of the trails management plan resulted in a section 106 determination of no adverse effect to historic properties.

In a letter dated May 24, 2021, Whiskeytown submitted additional consultation with the California State Historic Preservation Office (SHPO) that included a revised draft of the proposed trails management plan for SHPO review.

US Fish and Wildlife Service

Via the Information for Planning and Consultation (IPAC) website for the US Fish and Wildlife Service, the National Park Service requested a species list and any designated critical habitat protected under the federal Endangered Species Act (ESA) that may be impacted by projects in Whiskeytown National Recreation Area. This action served as a record that the National Park Service had initiated consultation with the US Fish and Wildlife Service pursuant to the requirements of Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544) and NPS management policies.

National Marine Fisheries Services

The National Park Service has initiated consultation with the National Marine Fisheries Service on the Central Valley spring run Chinook salmon (*Oncorhynchus tshawytscha*) and the California Central Valley (Evolutionary Significant Unit) steelhead trout (*Oncorhynchus mykiss*). Both species are protected under the ESA and are federally listed as "threatened." This Environmental Assessment was sent to NMFS for review and comment as part of Section 7 compliance for this plan.

List of Preparers

Whiskeytown National Recreation Area

Josh Hoines – Superintendent

Glendee Ane Osborne – Cultural Resource Program Manager

Brian Rasmussen – Geologist

Russell Weatherbee – Wildlife Biologist

Laura Shaskey – Chief of Resource Management and Interpretation (current)

Jennifer Gibson - Chief of Resource Management and Interpretation (prior)

Joseph Nicholas – Biological Technician (prior)

Stephen Femmel – Biologist (retired)

Jason Judd – Trails Program Lead

David Oechsli – Roads and Trails Supervisor

Dave Larabee – Chief of Facilities

Denver Service Center

Tessa Buono – Natural Resource Specialist

Mindy Burke – Contract Editor

Steve DeGrush – Natural Resource Specialist

Laurie Domler – Project Manager

Westby Mize – Cultural Resource Specialist

Andrew White – Visitor Use Management Specialist

CHAPTER 5: REFERENCES

Bureau of Land Management (BLM) US Department of the Interior

2011 "The Princess Ditch and Princess Hydrallic (sic) Mining Company: Historic Background Research, Evaluation of Significance, and Recommendations."

National Park Service (NPS) US Department of the Interior

2005 US Department of the Interior. National Park Service. "The Shasta-Trinity Trail Plan and Environmental Assessment." On file at park headquarters.

2015 US Department of the Interior. National Park Service. NEPA Handbook.

2018 "Whiskeytown Trail Use Survey Results" Whiskeytown National Recreation Area Division of Resource Management.

2019 US Department of the Interior. National Park Service. Whiskeytown National Recreation Area – Cultural Landscape Report for Tower House Historic District (Draft)

2020a Whiskeytown National Recreation Area - Oak Bottom Post-Fire Recovery Plan Preliminary Project Planning Completion Report.

2020b "NPS Stats: National Park Service Visitor Use Statistics." https://irma.nps.gov/Stats/Reports/National. Accessed March 12, 2020.

2020c nps.gov/whis/planyourvisit/hiking.htm 2020 NPS Website. Accessed March 12, 2020.

2020d Personal communication. Russell Weatherbee, Wildlife Biologist, Whiskeytown National Recreation Area. 9/21/20.

2020e Douglas Deur, Rochelle Bloom, Katie Wynia & Jamie Hebert.Wintu Homelands on Clear Creek: Ethnographic Accounts of Whiskeytown National Recreation Area (Draft).

Burge, Dylan O. and Dieter H. Wilken

2020 *Ceanothus pinetorum*, in Jepson Flora Project (eds.) *Jepson eFlora*, Revision 8, https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=18488, accessed on December 22, 2020.

California Native Plant Society. *Sedum obtusatum spp. paradism*, in Calscape.

2020 http://calscape.org/Sedum-obtusatum-ssp.-paradisum-(Canyon-Creek-Stonecrop)?srchcr=sc583788107b532), accessed on December 22, 2020.

US Census, Shasta County population

2017 https://www.shastaedc.org/regional-data/demographics/

This page intentionally left blank.

APPENDIX A – VISITOR USE MANAGEMENT FRAMEWORK

This plan incorporates the process described by the Visitor Use Management Framework to develop long-term strategies for managing and monitoring visitor use within the park (IVUMC, https://visitorusemanagement.nps.gov/). Key aspects of visitor use management incorporated into the action (NPS preferred) alternative include the identification of desired conditions, indicators and thresholds, and visitor capacity.

DESIRED CONDITIONS

Desired conditions are statements of aspiration that describe resource conditions, visitor experiences and opportunities, and facilities and services that an agency strives to achieve and maintain in a particular area. Within the VUM framework, desired conditions are a crucial step that help guide management decisions. Within this plan, desired conditions described in previous plans such as the General Management Plan have been considered and provide high level guidance. To provide guidance more specific to actions contained in this plan, desired conditions for visitor use and experience have been further articulated. Below are desired conditions for visitor experience by trail class.

Trail Class One: Not applicable as no class one trails are in the plan.

Trail Class Two: Opportunities for quiet and a sense of solitude will occur along these moderately developed trails. Signs of human development will be minimal to support a sense of discovery and immersion in a natural habitat. Visitor amenities and services will support basic visitor access and navigation of trails but will be minimal. Maintenance of trails will be done as needed, however, the natural setting along this trail class would be emphasized and visitors would likely encounter obstacles such as uneven surfaces, creek crossings, and thick vegetation in some areas or times.

Trail Class Three: Opportunities for quiet and contemplative experiences will occur along these developed trails. At certain areas or times, the sights and sounds of others may be present, however, the sights and sounds of nature should be predominant overall. A moderate level of visitor amenities and services support social opportunities for small groups (i.e., vaulted toilets, picnic tables, and primitive campgrounds).

Trail Class Four: Opportunities to recreate while also learning about the natural and human history will occur along these highly developed trails. Experiences along these trails will be highly social at times, however, visitors will be able to reach their intended destinations with minimal crowding or conflicts. Visitor amenities and services will provide a moderate to high degree of visitor comfort and will focus on providing interpretive content to visitors (i.e., waysides, restrooms, bridges).

Trail Class Five: Opportunities to engage with others while enjoying the outdoors will dominate along these fully developed trails. Experiences along these trails will be highly social, however, visitors will be able to reach their intended destinations with minimal crowding and conflicts. Visitor amenities and services will provide a high degree of visitor comfort and will focus on providing access to a diverse set of user groups (ABAAS trails, restrooms, developed areas, etc.).

Indicators and Thresholds

Monitoring in this plan is accomplished through establishment of "indicators" and "thresholds." "Indicators" are specific resource or experiential attributes that can be measured to track changes in conditions so that progress toward achieving and maintaining desired conditions can be assessed. "Thresholds" are the minimum acceptable conditions associated with each indicator. Indicators and thresholds provide park managers with monitoring protocols to ensure desired conditions for resources and visitor experiences are achieved and maintained over time.

The planning team considered many potential indicators related to conditions influenced by visitor use, but ultimately identified five that are the most important to monitor the effectiveness of the plan's management strategies. The five indicator topics include Visitor Proximity to Others, Social Trails, Soil Erosion, Damage to Cultural and Historic Resources, and Encounter Rates. These indicators and the associated thresholds are considered common to the action (NPS preferred) alternative.

Indicator: Visitor Proximity to Others at Key Locations and Destinations

Threshold: Visitors at key locations and destinations have at least 6 feet of personal space.

Indicator: Number of New Social Trails

Threshold:

- Front-country trails or those near popular destinations such as water features will have no more than 5 additional social trails per trail mile when compared to baseline conditions
- Backcountry trails or those near specific features of interest will have no more than 1 new social trail per mile when compared to baseline conditions

Indicator: Amount of Soil Erosion Features

Threshold: No more than 100 feet of rilling or rutting per 1 mile of trail or unless specified for specific trail. This threshold may be updated as more information is gathered on specific trails.

Indicator: Damage to Cultural Resources and Historic Sites (i.e., vandalism and/or graffiti)

Threshold: No more than two incidents of damage to cultural resources and historic sites per year unless specifically stated for individual sites or areas

Indicator: Number of groups encountered on trails per day

Threshold: No more than 35 groups encountered on high use trails; no more than 8 groups encountered on moderate use trails; and no more than 3 groups encountered on low use trails.

The planning team also identified management strategies associated with each indicator. The impacts of these management strategies are analyzed in chapter 4. See appendix B for detailed descriptions of the indicators and thresholds, associated rationales and monitoring protocols, and descriptions of the management strategies.

Visitor Capacity

Visitor capacity is a component of visitor use management defined as the maximum amount and types of visitor use that an area can accommodate while sustaining desired resource conditions and visitor experiences consistent with the purpose for which the area was established (IVUMC, 2019). Visitor capacity would be used to inform and implement the management strategies included as part of this trail management plan. By establishing and implementing visitor capacities, the National Park Service can help ensure that resources are protected and that visitors have the opportunity for a range of high-quality experiences. This plan contributes to meeting the legal requirements (1978 NPRA, 54 USC 100502) to identify and implement visitor capacities by including detailed direction and analysis for the park's trail system. The following section outlines the considerations and process used to identify visitor capacity. See appendix C for visitor capacity and implementation strategies.

Visitor capacities are identified in appendix C for the currently existing and proposed trails included in the plan. The visitor capacities are identified based on the principles described in the Interagency Visitor Use Management Council's (IVUMC's) "Visitor Use Management Framework" and "Visitor Capacity Guidebook." These documents and associated background material are available on the IVUMC's website at: http://visitorusemanagement.nps.gov/.

Through this planning effort, Whiskeytown has an important opportunity to proactively safeguard the highly valued experiences and resources throughout the park unit. At some sites, current use levels are resulting in adverse impacts to resources and experiences while other sites have opportunity to accommodate additional visitor use. The Visitor Capacity analysis in appendix C outlines the considerations and process used to identify visitor capacity for key areas. The visitor capacities identified as part of this plan are below.

The following table compares the Current Use Level and the identified visitor capacities for each trail in each of the six analysis areas within Whiskeytown NRA. Current use level and visitor capacity is noted in People in One Day (PIOD). An allocation for bike use has been included in the visitor capacity for the Lower Clear Creek Trail Complex due to its increased level of bike use. All other analysis areas do not have visitor capacity for bicycle use, as noted by the "N/A."

Table A-1. Current Use Levels and Visitor Capacities by Analysis Area

Trail Name	Current Use Level (PIOD)	Visitor Capacity (PIOD)	Visitor Capacity (Bikers PIOD)
Brandy Creek Trail Complex			
Brandy Creek	40	80	N/A
Brandy Creek Falls	115	220	N/A
Davis Gulch	30	60	N/A
Rich Gulch	10	20	N/A
Brandy Creek Picnic	Unknown	80	N/A

Trail Name	Current Use Level (PIOD)	Visitor Capacity (PIOD)	Visitor Capacity (Bikers PIOD)
Brandy Creek RV	Unknown	80	N/A
Boulder Creek Trail Complex			
Boulder Creek	30	60	N/A
Boulder Creek Falls	30	60	N/A
Papoose Pass	10	20	N/A
Mill Creek	5	10	N/A
James K Carr	130	260	N/A
Crystal Creek Camp	N/A	260	N/A
Crystal Creek Falls	N/A	60	N/A
Lower Clear Creek Trail Complex			
Shasta Divide	5	10	2
Shasta Divide Nature	20	40	0
Mount Shasta Mine Loop	30	60	10
Clear Creek Canal	20	40	10
Buck Hollow	5	10	10
Princess Ditch	5	10	10
Mule Mountain Pass	10	20	10
Guardian Rock Trail	10	20	2
Prospect Trail	35	70	60
WES Emergency Access Road	Unknown	Private	Private
Knobcone	Unknown	40	10
Horsecamp	N/A	20	2
Peltier Bridge	N/A	40	10
Orofino Trail	N/A	20	2
East Boundary Vista Trail	N/A	60	10
Guardian Rock Equestrian Trail	N/A	20	2
Paige Boulder Trail Complex			
Kanaka Peak	20	35	N/A
Salt Gulch	5	15	N/A

Trail Name	Current Use Level (PIOD)	Visitor Capacity (PIOD)	Visitor Capacity (Bikers PIOD)
Peltier	10	30	N/A
Ridge	5	15	N/A
Hydraulic Mine	10	15	N/A
Horsetail Canyon	Unknown	10	N/A
Logging Camp	Unknown	10	N/A
Martha's Ditch	Unknown	10	N/A
Tower House Historic District			
Camden Water Ditch	15	30	N/A
Tower Grave	15	30	N/A
Clear Creek Vista (Upper Mill Creek)	10	20	N/A
Mill Creek	25	40	N/A
Oak Bottom Water Ditch	25	50	N/A
Crystal Creek Water Ditch	30	60	N/A
Clear Creek Picnic	N/A	60	N/A
Whiskeytown Lake Trail			
Whiskeytown Lake Trail	N/A	240	N/A

This page intentionally left blank.

APPENDIX B – INDICATORS AND THRESHOLDS

Indicators translate goals and objectives of the Whiskeytown Trail Management Plan into measurable attributes (i.e., number of social trails) that can be tracked over time to evaluate change in resource or experiential conditions. These are a critical component of the Visitor Use Management (VUM) framework and are considered common to the action alternative. The interdisciplinary planning team considered potential issues and developed related indicators that would help identify when a level of impact becomes cause for concern and when management action may be needed. The indicators described below were considered the most critical, given the importance and vulnerability of the resource or visitor experience affected by types of visitor use.

Thresholds represent the minimum acceptable condition for each indicator and were established by considering qualitative descriptions of the goals and objectives, data on existing conditions, relevant research studies, staff management experience, and scoping on public preferences. Although defined as "minimally acceptable," thresholds still represent acceptable conditions. In addition, establishing thresholds does not imply that no action would be taken prior to reaching the threshold. Thresholds identify when conditions approach unacceptable levels and accordingly serve as a "line in the sand," letting managers and the public know that corrective action must be taken to keep conditions acceptable, ultimately allowing goals and objectives to be met and tracked over time.

Indicators, thresholds, associated management strategies, and mitigation measures would be implemented as a result of this planning effort. The planning team arrived at the following four indicator topics that would translate the goals and objectives into measurable attributes that could be tracked over time (tables B-1 through B-5):

- Visitor Proximity to Others
- Social Trails
- Soil Erosion
- Damage to Cultural and Historic Resources
- Encounter Rates

Visitor use management is an iterative process in which management decisions are continuously informed and improved. Indicators are monitored, and adjustments are made as appropriate. As monitoring of conditions continues, managers may decide to modify or add indicators if better ways are found to measure important changes in resource and experiential conditions. Monitoring indicators helps NPS staff determine the most effective way to manage visitor use to attain desired visitor experiences and resource conditions. Information on the NPS monitoring efforts, related visitor use management actions, and any changes to the indicators and thresholds would be available to the public.

Table B-1. Indicator Topic: Visitor Proximity to Others

Indicator Topic: Visitor Proximity to Others
Indicator: Visitor Proximity to others at Key Locations and Destinations
Threshold: Visitors at key locations and destinations have at least 6 feet of personal space.
Rationale for Indicator and Threshold: This indicator monitors the density of use at key destinations to determine impacts to resources and experiences at key locations such as waterfalls, overlooks, and popular rest areas on the trail. This indicator will inform park managers on whether the trail network adequately meets the visitors' needs for diverse opportunities and helps reduce user conflicts on the trail. Measuring this indicator informs park managers' awareness of visitor opportunities for a relaxed and uncongested experience as well as resource degradation caused by trampling of soils and vegetation. Preferences for personal space can be influenced by a number of factors including where someone is from, age, pandemics or illness seasons, and physical temperature of a location. Research has broadly shown that people have different preferences for personal space depending on context of interactions as well, whether in a social, personal, or intimate situation. The current threshold derives from research showing that in the Unites States, people prefer 3 feet of personal space when in social situations (Sorokoska et al., 2007). Given recent national health and safety standards due to the COVID-19 pandemic, this distance has been increased to 6 feet of personal space. Six feet of personal space has become a new norm in a variety of social situations, including on trails outdoors. This threshold will be implemented until further data collection and monitoring can be used to establish refined thresholds for different park areas.
Management Strategies and Mitigation Measures: • Develop education materials on the desired visitor experiences and resource conditions associated with Whiskeytown NRA, focusing on potential impacts from visitor use in sensitive areas such as waterfalls and how visitors can avoid causing impacts. Educational materials could include information on what actions the National Park Service is taking to address resource and visitor experience concerns and provide suggestions such as visiting during less busy times of year. • Develop park information and messaging so that a variety of destinations are recommended or highlighted to help spread visitors out on park trails. • Modify how specific destinations are presented in public information and education when thresholds are being approached. • Maintain facilities such as parking area commensurate with identified visitor capacities • Alter logistics and management of current educational programming to disperse visitor use away from locations where impacts are occurring. Could include adding more events that are smaller in nature, changing the destinations associated with them, or conducting them less frequently.

- Discontinue special events (such as mountain bike races) that focus visitor use on key destinations.
- Limit parking along roadsides near trailheads
- Add physical barriers (e.g., logs and fences) at destinations to discourage visitor use on sensitive resources.
- Increase law enforcement presence along trails and at key locations.
- Continue to require groups of 25 or more to obtain a special use permit to inform visitor use.

Monitoring: Photo point locations will be identified for key areas so that information is collected consistently from year to year using the same viewscape to monitor. The number of people visible in a viewscape (people per viewscape) will be captured and recorded. This may be done using installed cameras, by park staff or volunteers, or by other means as technology changes. Monitoring will be performed annually during busy seasons at areas of concern (i.e., highest-use trails and destinations). Monitoring will be rotated among other areas every two to three years. As data sets are developed from the data collected, levels of use will be adjusted every five years based on review and monitoring, to determine the optimum number of visitors at any given site.

Table B-2. Indicator Topic: Social Trails

Indicator Topic: Social Trails
Indicator: Number of New Social Trails
Threshold: • Frontcountry trails or those near popular destinations such as water features will have no more than 5 additional social trails per trail mile when compared to baseline conditions. • Backcountry trails or those near specific features of interest will have no more than 1 new social trail per mile when compared to baseline conditions.
Rationale for Indicator and Threshold: Social trails (also referred to as informal trails, or visitor-created trails) trails degrade resources and should be kept to a minimum. Visitor-created trails can indicate ineffective trail design, inadequate wayfinding, and visitor interest in accessing new areas. This indicator was selected based on the ease of measurement, ability to provide useful data, and cost-effectiveness. It helps managers protect sensitive habitat, reduce invasive species introduced by visitors, address wayfinding problems, and identify potential future sites or routes of interest. It also provides a range of management actions depending on resource sensitivity and level of use.

Management Strategies and Mitigation Measures:

- Develop trail watch volunteers, including trail stewardship programs.
- Place informational signs instructing visitors to not use informal trails. As possible, also provide information on the impacts that using informal trails can have on resources.
- Improve maintenance and trail markings to discourage the creation of or use of informal trails.
- As new informal trails are identified, examine the trail for possible reasons why it was created and determine appropriate actions accordingly.
- Add physical barriers and other site management strategies (e.g., rocks, logs, ropes, fences or other barriers) along trails in key areas to discourage the use or formation of informal trails.
- Additional monitoring may be conducted along trails with high numbers of informal trails to further document the extent of informal trails in an area or along a trail. NPS staff would then identify any additional management actions needed to improve conditions.
- As additional monitoring or data collection demonstrates is necessary, refine thresholds in order to protect resources and human safety.
- Formalize informal trails as appropriate.
- Restore social trails to natural conditions if earlier management strategies have been implemented and determined ineffective.

Monitoring:

Monitoring will occur annually for trails where known issue with resource damage is occurring and will occur on a rotational basis every 2-3 years on other trails. A standard monitoring protocol will be developed that will count the number of informal trails originating from a formal trail. Priorities for trail monitoring will be determined by NPS staff.

Table B-3. Indicator Topic: Soil Erosion

Indicator Topic: Soil Erosion
Indicator: Amount of Soil Erosion Features
Threshold: No more than 100 feet of rilling or rutting per 1 mile of trail or unless specified for specific trail. This threshold may be updated as more information is gathered on specific trails.
Rationale for Indicator and Threshold: This indicator measures soil erosion by looking for specific trail features that show soil loss or impacts. The indicator could be applied to any of the trails, however, it is specifically intended for new or rerouted trails as part of the trail management plan. Rilling or rutting along trails may indicate that trail construction and design improvements are needed (i.e., steep trail grades,

building materials, construction techniques) or that other management actions are needed (i.e., the timing or level of visitor use, types of visitor use that occurs). By monitoring the amount of soil erosion features on trails, the NPS is able to track the effectiveness of sustainability goals for trails that are an important part of this plan and take management actions to address sustainability concerns.

Management Strategies and Mitigation Measures:

- Develop trail watch volunteers, including trail stewardship programs.
- Educate visitors regarding sensitive resources and staying on trails and not widening trails and improve communication with visitors about trail stewardship.
- As trails are surveyed for soil erosion features, individual thresholds for trails or trail sections may be developed considering the specific features of that trail (i.e., soil type, grade, visitation levels).
- Using best practices and current methods, make trail improvements in areas where the number of soil erosion features is near or over threshold.
- Reroute trails if necessary.
- Reduce access for 24 hours post precipitation events, construction, or improvements.

Monitoring: Monitoring protocols will be developed to outline how soil erosion features are measured and recorded. New or rerouted trails, or trail sections, will be surveyed for soil erosion features annually for the first 2 years after trail construction is completed. Trails that do not show signs of soil erosion features will then be monitored less frequently, up to 5 years after construction. As NPS staff deem necessary and within staffing capabilities, existing trails will be surveyed for soil erosion features. Existing trails that have soil erosion amounts above thresholds will be considered for trail maintenance or improvements as part of the Whiskeytown's trail management program.

Table B-4. Indicator Topic: Damage to Cultural and Historic Resources

Indicator Topic: Damage to Cultural and Historic Resources
Indicator: Damage to Cultural Resources and Historic Sites (i.e., vandalism and/or graffiti)
Threshold: No more than two incidents of damage to cultural resources and historic sites per year unless specifically stated for individual sites or areas.
Rationale for Indicator and Threshold: This indicator measures the amount of damage to historic and cultural resources that are accessible from trails. This indicator is related to amount of use on trails, and easy access to historic and cultural resources. This would allow NPS staff to monitor the number of incidents at historic and cultural resources. This indicator would be applied to all cultural sites along trails, however, priority cultural or historic areas for the park, as determined by NPS staff and other management directives, would be prioritized for monitoring and management actions. Damage to historic sites and cultural resources can occur through both intentional and unintentional means. Both can cause impacts that influence the integrity of these resources. Cultural sites and historic properties are nonrenewable. This means they cannot recover from natural and human-caused disturbance, and as a result, thresholds are set low. Management efforts would be focused on maintaining the integrity and condition of sites.
Management Strategies and Mitigation Measures: • Continued enforcement of park regulations. • Educational signage and programs related to appropriate activities surrounding cultural and historic sites. • Provide deterrents to inappropriate visitor use near cultural sites (e.g., logs, rocks, etc.). • Increase law enforcement presence at impacted sites. • Implement security measures, such as alarm systems and cameras, at sites along trails. • Remove artifacts from field as ultimate preservation/protection measures. • Implement temporary, seasonal, or permanent reduction of access around cultural resources or historic sites. • Reroute trails away from cultural or historic sites.
Monitoring: The park will continue to record incidences of disturbance or vandalism/graffiti. A recent baseline study in 2016 provided current conditions on 200 archaeological sites. To monitor this indicator, the park will evaluate IMARs reports annually to track incidents at sites, and the Cultural Program will track incidents and inform Park Administration in real time. Conditions will also be monitored against the 2016 baseline data. Specific thresholds may be identified for sites, areas, or types of sites (i.e., mines) as deemed necessary in order to protect cultural resources.

Table B-5. Indicator Topic: Encounter Rates

Indicator Topic: Encounter Rates
Indicator: Number of groups encountered on trails per day
Threshold: No more than 35 groups encountered on high use trails; no more than 8 groups encountered on moderate use trails; and no more than 3 groups encountered on low use trails.
Rationale for Indicator and Threshold: WHIS provides opportunities for hiking on both lake-adjacent trails and within the backcountry, where opportunities for solitude are highly valued. This indicator measures the number of groups that visitors encounter as they travel on trails throughout Whiskeytown NRA. Encounter rates are a primary means by which opportunities for solitude would be measured on trails in WHIS. The use categories or high, moderate, and low derive from the 2018 Whiskeytown Trail Use Survey. Thresholds for each use category were determined based on the estimated daily use for trails in the high use, moderate use, and low use categories.
Management Strategies and Mitigation Measures: • Develop and implement a public information effort about the desired conditions for the park and actions the National Park Service is taking to achieve those conditions and how visitors can best experience the park. This information could be distributed through direct visitor contact, park publications, wayside exhibits, social media, websites, and through park partners. • Ensure that informational materials that cover a wide variety of topics such as park rules and regulations, Leave No Trace practices, and backcountry stewardship are available to visitors in a variety of ways. • Encourage visitors to start their hikes earlier or later in the day, or during off-peak times of the year to avoid periods of peak use on high-use trail sections. • Encourage visitors to explore a diversity of trails.
Monitoring: Random trail sections will be monitored during the high-use season. Monitoring will be done on a reoccurring basis as needed, utilizing automated trail counters. NPS staff will periodically conduct direct observation counts of encounters in monitored trail sections to ensure that the equation representing the relationship between automated count totals and encounter rates remains the same.

This page intentionally left blank.

APPENDIX C – VISITOR CAPACITY

INTRODUCTION

Among the goals of the trail management plan are ensuring that the trail system offers high-quality visitor experiences while protecting park resources from impacts associated with trail use (see chapter 1). By identifying capacities and managing the amounts and types of use within those capacities, the National Park Service can ensure that resources are protected and that visitors have opportunities for high-quality experiences. In addition to being an effective management tool, identifying visitor capacities is also directed by legal mandate. The National Parks and Recreation Act of 1978 requires the National Park Service to identify and implement commitments for visitor capacities for all areas of a park unit.

Visitor capacities are management decisions based on the best available data and other factors, including professional judgment, staff experience and expertise, lessons learned, and public input. Visitor capacity identifications, like other management decisions, provide management direction.

Visitor capacities were identified using the four guidelines described in the "Visitor Capacity Guidebook:"

1. determine the analysis area,
2. review existing direction and knowledge,
3. identify the limiting attribute, and
4. identify visitor capacity.

Determine the Analysis Area

To determine the analysis areas, the WHIS staff and planning team considered the most meaningful geographic areas to understand the relationship between existing and potential visitor use patterns as well as goals and objectives for the TMP. The analysis areas include trails that are both existing and proposed under the action alternative. Visitor capacities for other areas outside of the trail system are outside the scope of this project and would have either already been identified or would be identified in future planning. Analysis areas are shown in the following map and the six analysis areas include:

1. Brandy Creek Trail Complex
    a. This analysis area includes Brandy Creek Trail, Brandy Creek Falls Trails, Davis Gulch Trail, Rich Gulch Trail, Brandy Creek Picnic Trail, and Brandy Creek RV Trail
2. Boulder Creek Trail Complex
    a. Boulder Creek, Boulder Creek Falls, Papoose Pass, Mill Creek, James K. Carr Trail Extension, James Carr Trail, Crystal Creek Falls Trail
3. Lower Clear Creek Trail Complex
    a. Shasta Divide Trail, Shasta Divide Natural Trail, Mount Shasta Mine Loop, Clear Creek Canal Trail, WES trails, Buck Hollow, Princess Ditch Trail, Mule Mountain Pass Trail, Mule Mountain Loop Trail, Hydraulic Mine Trail, Horse Camp Trail, Peltier Bridge Trail, Orofino Trail, East Boundary Vista Trail, Knobcone, Guardian Rock Trail, Guardian Rock Equestrian Trail, Prospect Trail, WES Emergency Access Road

4. Paige Boulder Trail Complex
    a. Kanaka Peak Trail, Salt Gulch Trail, Peltier Trail, Ridge Trail, Horsetail Canyon Trail, Logging Camp Trail, Martha's Ditch, Hydraulic Mine Trail
5. Tower House Historic District
    a. Clear Creek Falls, Camden Water Ditch, Tower Grave, Clear Creek Picnic Trail, Clear Creek Vista, Mill Creek Trail, Oak Bottom Water Ditch, Crystal Creek Water Ditch Trail, Clear Creek Canal Trail
6. Whiskeytown Lake Trail

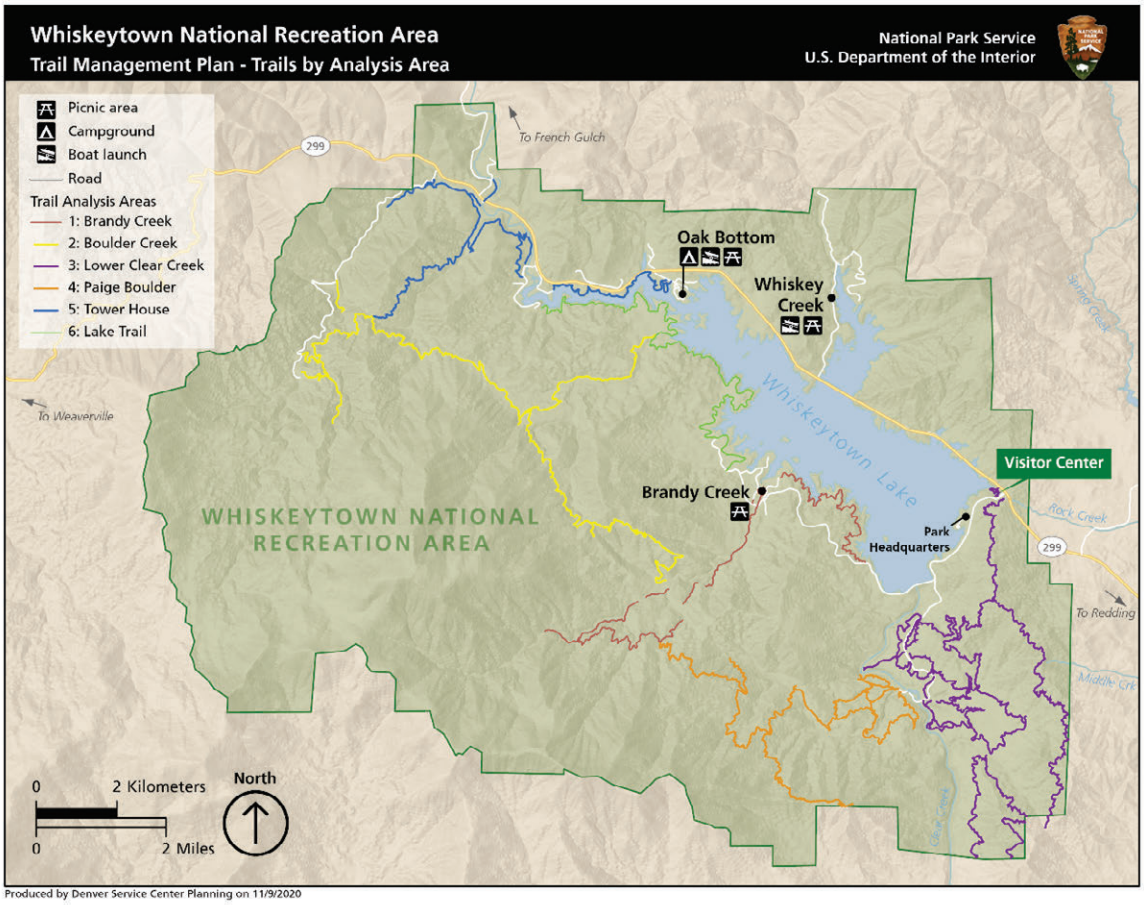


Figure C-1. Map of Trails by Analysis Area

Together, the above six analysis areas comprise all of the existing and proposed trails within the park. Below, each analysis area is discussed, including a review of existing direction and knowledge, the limiting attribute and relevant indicators, and visitor capacity identifications and associated rationale.

Existing Direction and Knowledge

From April 2017 to April 2018, the park implemented a trail monitoring program using three methods: trail monitoring by NPS employees; trail cameras on earthen trails; and special use permits. This trail monitoring program included 65 miles of trail in the park. The park excluded Horsetail Canyon, Kanaka Cutoff, Knobcone, Martha's Ditch, Orofino, and Salt Creek Loop trails because they are either WES trails or the park intends to remove the trails from the system. The park also excluded Mule Mountain Loop Trail and all paved trails from this monitoring program. The locations, date, and time of trail observations were picked randomly from each category giving highest priority (most visits) to trails that were predicted to have High Use and lower priority to the trails that were predicted to have the lowest use. Monitoring points were fixed locations including trail heads, roads, and parking lots throughout the park. This program resulted in a total of 2923 observations, and observations occurred between the hours of 8 am and 8 pm. The results from this monitoring program are documented in the 2018 Whiskeytown Trail Use Survey.

The Trail Use Survey provides estimated visitors per year for each trail surveyed, for all user groups. According to this survey, Whiskeytown Falls (James Carr) Trail shows the highest-use, Shasta Bally Trail shows the lowest use, and Clear Creek Canal is an example of a moderate-use trail. Trail-by-trail visitor observations may be viewed in the following graph.

The results of the monitoring estimate that the Park receives approximately 93,000 trail visits per year and two popular trails account for 36% of all trail usage—James Carr (Whiskeytown Falls) and Brandy Creek Falls trails. The results also show that hiking is the most popular activity with 85% of all trail users hiking, followed by biking with 8% of trail use, running with 4% of trail use, equestrian use with 1% of trail use, and hunting, fishing, and other uses each accounting for with about 1%visitation. The "Other" user group was dominated by swimmers, but included small populations of gold panners and kayakers. More than 12% of visitors had dogs recorded and 56% of the dogs were off leash. In one year, it is estimated that over 13,000 dogs visit the trail system with the heaviest use on James Carr (Whiskeytown Falls) and Brandy Creek Falls trails.

During monitoring from 2017 to 2018, peak visitation occurred in May and June when cooler, dryer weather prevailed, with minimum visitation in August when the area experienced extreme heat. Other peak months were January and February when Whiskeytown experienced unusually warm and dry weather for the winter. Trail use is closely tied to weather conditions.

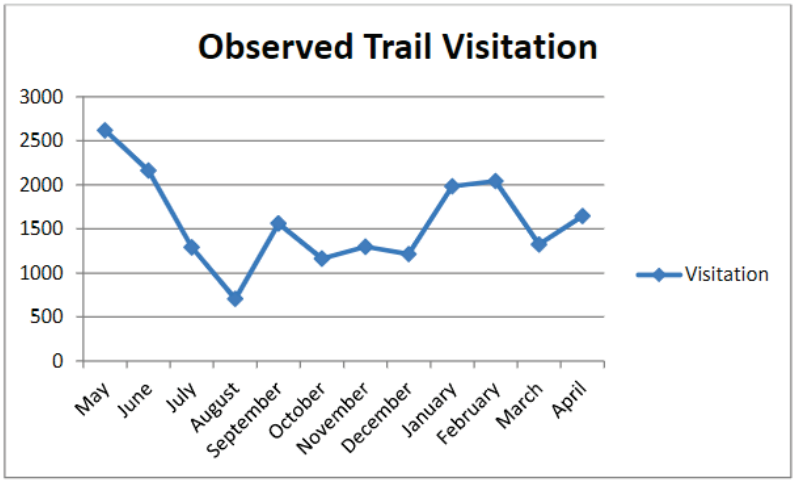


Figure C-2. Observed Trail Visitation by Month, 2017–2018

It should be noted that the seasonal pattern of use on Whiskeytown's trails differs somewhat from the overall pattern of visitation to the park. Overall visitation tends to follow a more standard bell curve peaking during the summer months, with much lower visitation during the winter (see Chapter 3, Visitor Use and Experience). This is indicative of the fact that trail use tends to be a secondary visitor activity to water-based recreation on Whiskeytown Lake. While visitors flock to the lake during the hot summer months, they tend to stay off the trails during this same period due to the heat. Instead, trail use tends to be greatest in the winter and spring when cooler temperatures and dryer weather are more conducive to trail-based recreation.

In most cases, Whiskeytown receives much more trail use on weekends than on weekdays. One exception seems to be the biking community, which saw almost even distribution of trail use on weekends and weekdays. Trail monitoring suggests that bike use is greatest on the Oak Bottom Water Ditch trail in the northwest portion of the park and on the Brandy Creek Falls and Clear Creek Canal trails in the central south to southwest portion of the park. Visitation spikes are seen on certain holidays and the days that surround them, including Martin Luther King Day, Memorial Day, Christmas, New Year's Day, Independence Day, and Thanksgiving.

The Trail Use Survey provides estimated visitors per year for each trail surveyed, for all user groups. These estimates were developed by comparing data from the three data collection methods used, 1) physical trail monitoring by volunteers and employees; 2) trail cameras; and 3) special use permits issued for trail use events. A linear regression was then used to estimate the total use on a per trail basis based upon a 12-hour day from 8 a.m. to 8 p.m.

This linear regression yielded trail by trail use estimates on a visits/year, visits/day, weekend visits/hour, weekday, visits per hour and other metrics. The data also provided an estimate of the average length of stay for different user groups.

For the purposes of this visitor capacity analysis, "current use level" is understood to be the typical weekend day during the four busiest months of May, June, January, and February. To attain this number, the use levels per hour by user type in the Trail Use Survey are summed together and multiplied by 12 to yield a total number of users per weekend day. Since these four months are roughly 40% busier than the average for the year, this number is then multiplied by 1.4 to yield a number of users per busy weekend day. This number is then rounded up (in increments of 5) to provide a "current use level" which represents a realistic perspective of visitation.

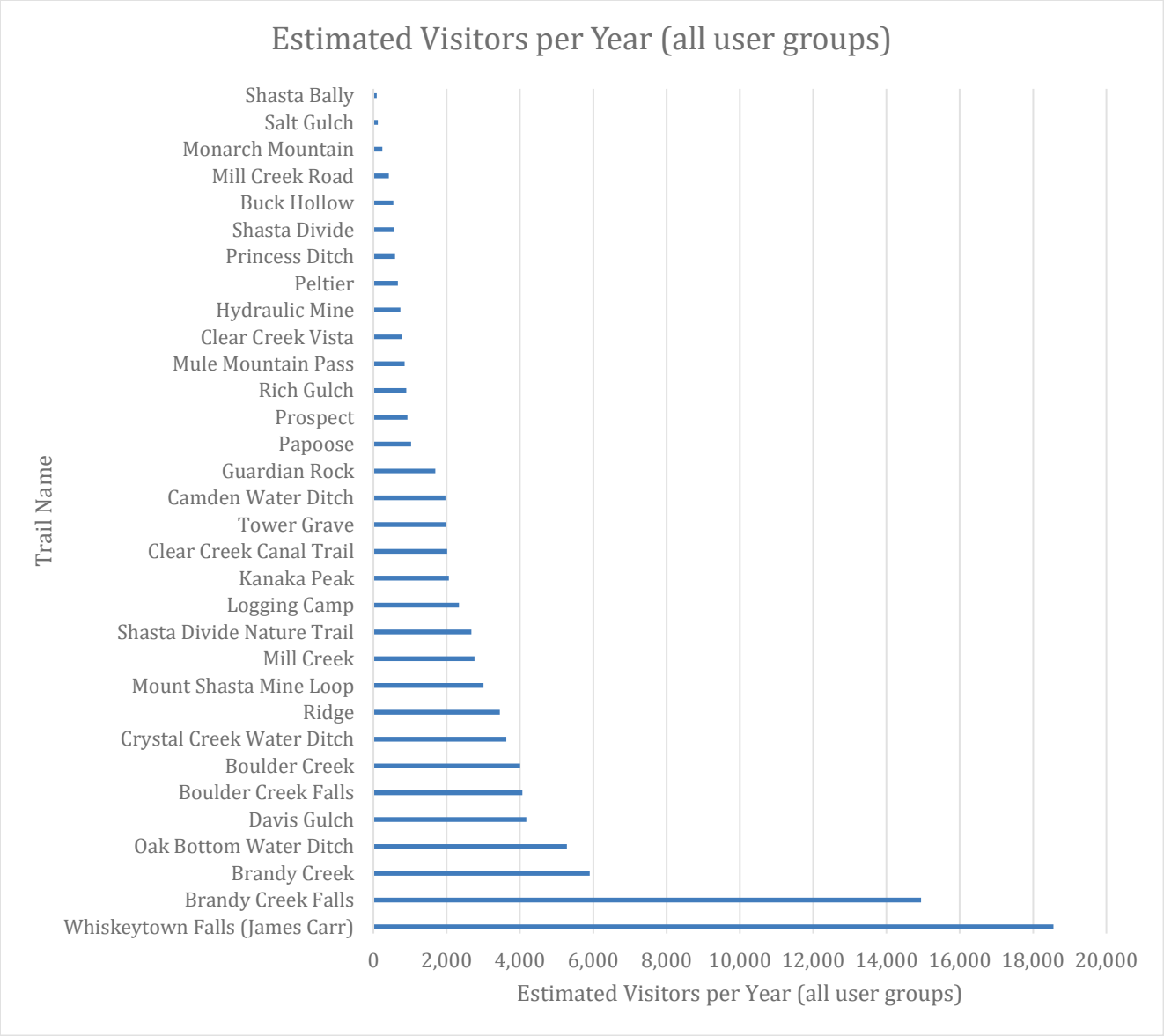


Figure C-3. Estimated Visitors Per Year, All User Groups, 2017–2018

Appendix I of the Whiskeytown Trail Use Survey provides predicted trail use categories. Within these categories, approximately 20% of the trails fall within the high-use category, 60% of the trails in the moderate-use category, and 20% in the low-use category. These predicted trail use categories were updated based on the 2018 survey results of observed visitation trends. The following trail use categories are based on observed trail use. Trails which were not included in the 2018 Trail Use Survey and proposed trails in the action alternative were categorized into trail use categories based on trails with comparable use, type, and experience.

As of May 2021, approximately 55% of the trails at Whiskeytown remain closed due to the Carr Fire (NPS 2021). This equates to 15 of 27 total trails being closed. Post-fire reopenings will continue to phase in after the park reopens from COVID-19 closures.

High Use Trails:

- Boulder Creek
- Boulder Creek Falls
- Brandy Creek Falls
- Brandy Creek
- Crystal Creek Falls
- Davis Gulch
- James K. Carr (Whiskeytown Falls)
- James K. Carr Trail Extension
- Oak Bottom Water Ditch
- Whiskeytown Lake Trail

Moderate Use Trails:

- Camden Water Ditch
- Clear Creek Canal Trail
- Clear Creek Picnic Trail
- Crystal Creek Water Ditch
- East Boundary Vista Trail
- Guardian Rock
- Guardian Rock Equestrian Trail
- Horse Camp
- Horsetail Canyon
- Kanaka Peak
- Knobcone
- Logging Camp
- Martha's Ditch
- Mount Shasta Mine Loop
- Mill Creek
- Orofino Trail
- Papoose
- Ridge Trail
- Shasta Divide Nature
- Tower Grave

Low Use Trails:

- Buck Hollow
- Clear Creek Vista
- Hydraulic Mine
- Monarch Mountain
- Mule Mountain Pass
- Peltier
- Princess Ditch
- Prospect
- Rich Gulch
- Salt Gulch
- Shasta Bally
- Shasta Divid

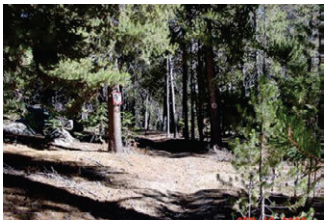
During the first step of the visitor capacity identification process, the planning team reviewed desired conditions for the analysis area, existing conditions in each analysis area, any major concerns related to visitor use, as well as particularly relevant indicators and thresholds. The following tables summarize the desired conditions outlined in the WHIS GMP (1999), Foundation Document (2014), and as outlined in chapter 2 of this trails management plan / environmental assessment.

Table C-1. Desired Conditions from 1999 GMP

Area	Desired Condition
Frontcountry Zone	Developed Sub-Zone - These are the areas where public use, concession, special use, or administrative facilities are developed. Included are major developed areas at Brandy Creek, Whiskey Creek, Carr Powerhouse, and the NEED camp. Landscaping, using native species, would be used to soften visual impacts and blend with adjacent zones. However, the visitor experience is that of a built environment.
Backcountry Zone	This zone would be managed so as to provide a largely natural experience with opportunities to escape from crowding and urban influences. Motorized vehicles and equipment would be allowed only on designated roads. Areas impacted by man's roads and mine sites would be restored to natural conditions except where historically or archaeologically [sic] significant. Maximum overnight use levels would be prescribed by sector and adjusted over time based on resource condition monitoring and visitor satisfaction surveys. Unpaved road corridors in the backcountry would be managed so as to retain primarily natural character and provide a largely natural experience. Small unpaved parking lots and rustic overnight facilities could be provided adjacent to existing roads.

Table C-2. Desired Conditions from Chapter 2 of the TMP

Trail Class	Desired Condition
Trail Class 1: Minimally Developed 	Not applicable as no class one trails are in the plan.
Trail Class 2: Moderately Developed 	Opportunities for quiet and a sense of solitude will occur along these moderately developed trails. Signs of human development will be minimal to support a sense of discovery and immersion in a natural habitat. Visitor amenities and services will support basic visitor access and navigation of trails but will be minimal. Maintenance of trails will be done as needed, however, the natural setting along this trail class would be emphasized and visitors would likely encounter obstacles such as uneven surfaces, creek crossings, and thick vegetation in some areas or times.

Trail Class	Desired Condition
Trail Class 3: Developed 	Opportunities for quiet and contemplative experiences will occur along these developed trails. At certain areas or times, the sights and sounds of others may be present, however, the sights and sounds of nature should be predominant overall. A moderate level of visitor amenities and services support social opportunities for small groups (i.e., vaulted toilets, picnic tables, and primitive campgrounds).
Trail Class 4: Highly Developed 	Opportunities to recreate while also learning about the natural and human history will occur along these highly developed trails. Experiences along these trails will be highly social at times, however, visitors will be able to reach their intended destinations with minimal crowding or conflicts. Visitor amenities and services will provide a moderate to high degree of visitor comfort and will focus on providing interpretive content to visitors (i.e., waysides, restrooms, bridges).
Trail Class 5: Fully Developed 	Opportunities to engage with others while enjoying the outdoors will dominate along these fully developed trails. Experiences along these trails will be highly social, however, visitors will be able to reach their intended destinations with minimal crowding and conflicts. Visitor amenities and services will provide a high degree of visitor comfort and will focus on providing access to a diverse set of user groups (ABAAS trails, restrooms, developed areas, etc.).

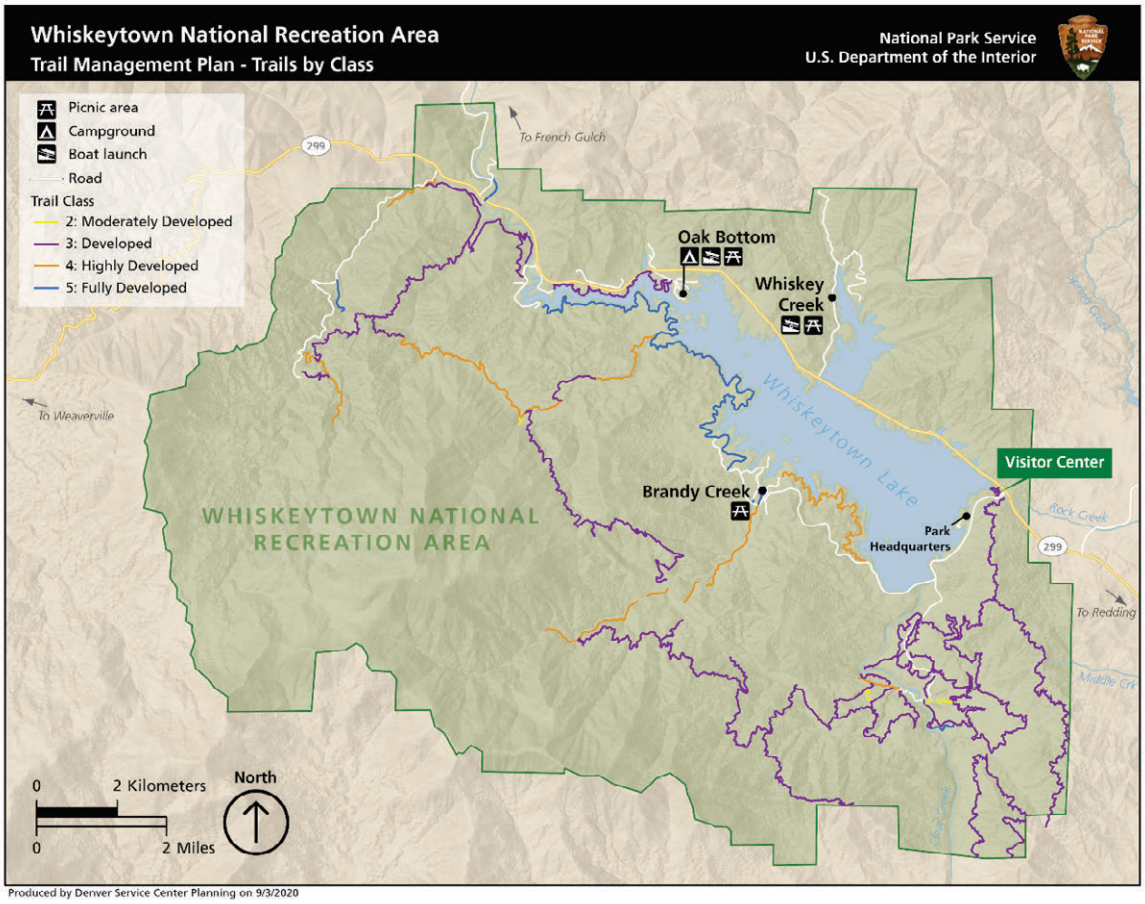


Figure C-4. Map of Existing and Proposed Trails in Action Alternative by Class.

The Limiting Attribute

This guideline involves the identification of the limiting attribute(s) that most constrains the analysis area's ability to accommodate visitor use while achieving and/or maintaining desired conditions. The limiting or constraining attribute can vary from analysis area to analysis area and is described under each analysis area. For example, a limiting attribute might be encounters with other groups traveling along a trail, a historic bridge's structural integrity and ability to accommodate a volume of trail uses, or trampled vegetation. Identification of the limiting attribute is an important step as it connects the most important resources and visitor experiences to on-the-ground conditions with the identified visitor capacity number.

Identify Visitor Capacity and Implementation Strategies

Visitor capacity contains two parts. First is the identification of the visitor capacity (maximum amounts and types of use), and second is the identification of management strategies and/or actions that could be taken to implement visitor capacity to ensure the amount of visitor use is managed to achieve and maintain desired conditions.

Identify Visitor Capacity. To identify the appropriate amounts and types of use for each of the analysis areas, the previous steps were reviewed to understand current conditions and how they compare to desired conditions for the area. Based on this understanding, the planning team determined whether visitation levels should be allowed to increase, maintained at the current level, or decreased to achieve desired conditions. If current conditions are in keeping with desired conditions, the visitor capacity allows for an increase in visitation from current levels. However, if current conditions are not consistent with desired conditions, the visitor capacity is identified below the current use level. When current conditions align with desired conditions, but are close to violating them, the visitor capacity is identified at or about the current use level.

While the trails within a given analysis area do share general visitation dynamics, visitor experiences, and resources, the overall use level can vary significantly from trail to trail. With this in mind, a broad determination to generally increase, maintain, or decrease the visitation level was made at the analysis area level. Within the analysis area, visitor capacities for individual trails vary somewhat in the degree to which levels are increased or decreased compared to current use levels. This variability was based on unique circumstances of each trail. In some cases, the variability allows for redistribution of use from high-use trails to similar trails that don't receive as much use within the same analysis area.

Visitor capacities were identified not only for existing trails that have ample trail counter data from previous years, but also for trails which have little or no counter data and trails which are proposed under the alternatives and therefore do not have previous data. For trails that do not have data on which to rely, the capacities were set by identifying a similar trail with comparable use patterns based on staff knowledge.

Because of the varying complexity of managing visitor use on the different trails in the trails system, current trail use levels and visitor capacities are expressed in terms of the number of people per day for most trails. This visitor capacity will allow for simple implementation and monitoring, as park staff can review trail counter data on a daily use level and quickly assess if the trail is at or over capacity.

Implementation Strategies. Management strategies to ensure use levels stay within identified visitor capacities were adapted from best practices in visitor use management and examples from other plans and projects across the National Park Service. Implementation strategies include actions that would be taken immediately as well as adaptive management strategies. The adaptive management strategies would only be implemented if and when conditions dictate they are necessary and after a variety of management strategies have been implemented. These conditions would be evaluated through routine monitoring.

VISITOR CAPACITY IDENTIFICATION AND ASSOCIATED IMPLEMENTATION STRATEGIES

Brandy Creek Trail Complex

Analysis Area. This analysis area includes Brandy Creek Trail, Brandy Creek Falls Trails, Davis Gulch Trail, Rich Gulch Trail, Brandy Creek Picnic Trail, and Brandy Creek RV Trail

Existing Direction and Knowledge. The trails within the Brandy Creek Trail Complex are classes 3, 4, and 5. Most of the trails in this complex are within the Backcountry, with the exception of one trail – Brandy Creek Picnic Trail, which is in the Frontcountry. This trail complex has the highest overall use of all of the trail complexes analyzed. See the following table for trail mileage, use level category, and trail class.

Table C-3. Brandy Creek Trail Complex Trail Details

Trail Name	Mileage	Use Level Category	Trail Class
Brandy Creek	2.5	High	4
Brandy Creek Falls	1.5	High	4
Davis Gulch	3.2	Moderate	4
Rich Gulch	2.4	Moderate	3
Brandy Creek Picnic	0.3	High	5
Brandy Creek RV	0.17	Moderate	3

Trails in the Brandy Creek Trail Complex generally see the highest levels of use on weekends from May through November. Visitation on the weekends is just shy of doubling that of the visitation on the weekdays in this analysis area (table C-4). According to the 2018 Trail Use Survey, the Brandy Creek Falls Trail is the second most used trail in the park, and most used by pedestrians in this trail complex, at an average of 40 per day (2018). The Brandy Creek Falls Trail is currently closed and needs to be reconstructed to be safely enjoyed by visitors. Both Brandy Creek Trail and Brandy Creek Falls Trail see moderate mountain bike use throughout the week. The following table describes the trails visitation data in more detail, by user group from the 2018 Whiskeytown Trail Use Survey. No visitation data exists for Brandy Creek Picnic Trail nor the Brandy Creek RV Trail, as they were not included in the 2018 trail use study.

Table C-4 Brandy Creek Trail Complex Visitation (2018 Survey)

Trail Name	Total Weekend Visits/Day (Busy Months)	Weekend Pedestrians/Day (Busy Months)	Weekend Bikes/Day (Busy Months)	Weekend Equestrians/Day (Busy Months)	Average Length of Stay
Brandy Creek	40	40	5	0	1:15
Brandy Creek Falls	115	110	5	1	1:55
Davis Gulch	30	25	0	0	1:25
Rich Gulch	10	10	5	0	0:40

***Figures have been rounded to the nearest 5, or if less than 1, they have been rounded to 1. Totals may not equal the sum of different uses. Some "other uses" are not shown but do contribute to total use levels. See 2018 Whiskeytown Trail Use Survey for complete results.**

The biggest concerns within this trail complex include major closures due to erosion, conflicts between user groups, social trailing, and safety issues. Major reroutes are needed on Davis Gulch, Rich Gulch, and Brandy Creek due to erosive decomposed granite. A few trails within this complex have been closed for one to two years due to damage from post-fire watershed conditions. Rerouting trails away from the creek is important here to reduce erosion and flooding. Reroutes anticipated here intend to create less steep grade to reduce erosion, in addition to reestablishing tread and widening the trails. Conflicts between user groups occur between bicyclists and hikers, and hikers sometimes need to dodge off the trail suddenly when bicyclists gain speed traveling downhill steep trails. Several mountain bike trails built by visitors add speed to this user conflict. Unauthorized bike jumps built on the Brandy Creek Trail and Rich Gulch Trail also increase potential for user conflicts and create safety concerns. Social trails are an issue on Davis Gulch bringing visitors access to the lake. Lastly, parts of Brandy Creek Trail are on the road, posing a safety issue to visitors. Safety concerns arise here due to pedestrians traveling on the road with vehicular traffic on windy roads with limited visibility.

The most relevant indicators in the Brandy Creek Trail Complex include the following: Visitor Proximity to Others at Key Locations and Destinations, Number of New Social Trails, Amount of Soil Erosion Features, Number of people encountered on trails per day.

Limiting Attribute. The limiting attributes for this analysis area are soil erosion and the encounter rate threshold. Soil is most limiting attribute on all of the trails in this analysis area except for the Brandy Creek Falls Trail, where the encounter rate is more limiting.

Among the objectives of this plan is to restore unsustainable trails and establish sustainable design standards for trails. In addition, the indicator for amount of soil erosion features further reinforces that a trail system which minimizes soil erosion is one of the primary desired conditions of the plan. The rationale for this indicator includes the impact that the timing, level, and types of visitor use that occurs on the trails has on soil erosion. High precipitation increases erosion of the trails. Different user groups (i.e., pedestrians, bicyclists, and equestrian users) impact the wet soil in different ways and to different degrees of severity. The variety of impacts to trails during wet times, coupled with the degrees of severity can contribute to increased erosion which affects the ability of the analysis area to accommodate visitor use.

The encounter rate indicator identifies thresholds for the maximum number of groups that would be encountered during a trip on the trail. Thresholds are no more than 35 groups encountered on high use trails; no more than 8 groups encountered on moderate use trails; and no more than 3 groups encountered on low use trails.

Visitor Capacity. While soil erosion is currently occurring on the trails in the Brandy Creek Trail Complex, the reroutes and reconstruction of these trails that is included in this plan is expected to largely address these erosion issues. Once these trail improvements are made, park staff estimate that trail use by all user types could roughly double from current use levels before the additional soil erosion caused by users would become unacceptable. In other words, trail use could double before conditions reach the identified threshold of no more than 100 feet of rilling or rutting per 1 mile of trail.

The one exception to this is the Brandy Creek Falls trail. If use levels were permitted to double from the current level of 115 People In One Day to a 230 People In One Day (PIOD), the number of groups encountered on the trail would slightly exceed the threshold for a high use trail—35 groups encountered per day. This would lead to perceptions of crowding that are inconsistent with the desired conditions for this class 4 trail, which state that "Experiences along (this trail) will be highly social at times, however, visitors will be able to reach their intended destinations with minimal crowding or conflicts." Therefore, the visitor capacity for the Brandy Creek Falls Trail is identified at the level that would accommodate encounters of no more than 35 groups in one day using the following formula.

$$Visitor\ Capacity\ = \frac{(Turnover\ Rate\ [6.3]\ x\ Encounter\ Rate\ Threshold\ [35]\ x\ Average\ Group\ Size\ [2]}{Adjustment\ for\ groups\ present\ at\ one\ time\ encountered\ during\ visit\ [2]}$$

The following table compares the Current Use Level and the identified visitor capacities for each trail in this analysis area. The visitor capacity for Brandy Creek Picnic Trail is identified at the same level as the Brandy Creek Trail.

Table C-5. Brandy Creek Trail Complex Current Use Levels and Visitor Capacities

Trail Name	Current Use Level (PIOD)	Visitor Capacity (PIOD)
Brandy Creek	40	80
Brandy Creek Falls	115	220
Davis Gulch	30	60
Rich Gulch	10	20
Brandy Creek Picnic	Unknown	80
Brandy Creek RV	Unknown	80

Management Strategies to Implement Visitor Capacity. The following management strategies would be utilized as needed to ensure use remains within the visitor capacities identified above.

- Increase amenities and signs along trails. Install dog waste bag stations at trailheads with high levels of dog use.
- Implement scenic rest points and destination points along the trails, especially on Brandy Creek Falls Trail to increase the interpretive value of the area and help spread out visitors.
- Plant native vegetation to deter trail widening and reduce trail damage from overuse.
- Increase interpretation through education. Opportunities include waysides, information sharing, volunteer programs for trash cleanup, and ranger programs.
- Repair and restore damaged areas of existing trails.
- Educate visitors about the opportunities to recreate on lesser-used trails
- Encourage visitors to visit early in the morning or later in the afternoon. This would spread out use from the peak times of noon to 4 p.m. when use reaches visitor capacities to times when there is available capacity.
- Set appropriate expectations for visitors to high use trails. Inform them that they will encounter many other visitors, and those seeking a quieter experience can choose other locations.
- Increase Leave No Trace education and practice through increased presence of backcountry rangers

Adaptive Management Strategies

- Consider user group restriction for visitors if needed. (Require Special Use Permits for groups larger than 10)

Boulder Creek Trail Complex

Analysis Area. This analysis area includes Boulder Creek, Boulder Creek Falls, Papoose Pass, Mill Creek, Crystal CreekCamp Trail, James K Carr Trail, Crystal Creek Falls Trail

Existing Direction and Knowledge. The trails within the Boulder Creek Trail Complex are classes 2, 3, and 4. All the trails in this complex are within the Backcountry Zone. See the following table for trail mileage, use level category, and trail class.

Table C-6. Boulder Creek Trail Complex Trail Details

Trail Name	Mileage	Use Level Category	Trail Class
Boulder Creek	4.3	High	3, 4
Boulder Creek Falls	.1	High	4
Papoose Pass	0.5	Moderate	3
Mill Creek	2.0	Low	3, 4
James K Carr	1.7	High	4
James K. Carr Trail Extension	0.5	High	3
Crystal Creek Falls	0.5	High	5

Overall, trails in the Boulder Creek Trail Complex see the heaviest use on weekends from May through June. Visitation on the weekends is double that of the visitation on the weekdays in this analysis area. Within the Boulder Creek Trail Complex, the James K. Carr Trail (also known as the Whiskeytown Falls Trail) is the most heavily trafficked trail in this analysis area. Boulder Creek Trail and Boulder Creek Falls Trail are the second most trafficked trails in this analysis area. Bicycle use is heaviest on the Papoose Pass Trail. The following table describes the trails visitation data in more detail, by user group from the 2018 Whiskeytown Trail Use Survey. No visitation data exists for Crystal Creek Falls Trail as it was not included in the 2018 trail use study. No visitation data exists for Crystal Creek Trail, as this is a new proposed trail.

Table C-7. Boulder Creek Trail Complex Visitation (2018 Survey)

Trail Name	Total Weekend Visits/Day (Busy Months)	Weekend Pedestrians/Day (Busy Months)	Weekend Bikes/Day (Busy Months)	Weekend Equestrians/Day (Busy Months)	Average Length of Stay
Boulder Creek	30	30	1	1	N/A
Boulder Creek Falls	30	30	0	1	N/A
Papoose Pass	10	10	5	1	1:45
Mill Creek	5	5	1	0	2:11
James K Carr	130	125	1	0	1:35

***Figures have been rounded to the nearest 5, or if less than 1, they have been rounded to 1. Totals may not equal the sum of different uses. Some "other uses" are not shown, but do contribute to total use levels. See 2018 Whiskeytown Trail Use Survey for complete results.**

Minor concerns within this trail complex include its high weekend use dependency and the anticipated visitor use increase with the James K. Carr Trail Extension. This area sees twice as high visitation over the weekends than on weekdays, concentrating visitor impacts to the trails. Once the James K. Carr Trail Extension to the James Carr Trail is established, visitor use may increase due to an increase of parking availability at the James K. Carr Trail Extension Trailhead.

The most relevant indicators in the Boulder Creek Trail Complex include the following: Visitor Proximity to Others at Key Locations and Destinations, and Number of people encountered on trails per day.

Limiting Attributes. The limiting attributes for this analysis area include crowding along the Whiskeytown Trail/James Carr and at the Whiskeytown Falls viewing area, and soil erosion. The James K Carr Trail is very popular. Many school groups visit this trail, specifically during the annual Waterfall Week programming. Soil erosion limits access in this analysis area. Erosion materials traveling down trails can make some trails impassible, leading to social trailing.

Among the objectives of this plan is to restore unsustainable trails and establish sustainable design standards for trails. In addition, the indicator for amount of soil erosion features further reinforces that a trail system which minimizes soil erosion is one of the primary desired conditions of the plan. The rationale for this indicator includes the impact that the timing, level, and types of visitor use that occurs on the trails has on soil erosion. Another objective of this plan is to disperse users and offer a diversity of visitor experiences. Relatedly, the indicator for visitor proximity to others at key locations and destinations further reinforces that a trail system which minimizes crowding on trails is one of the primary desired conditions of the plan. The rationale for this indicator includes visitor experiences at key locations including waterfalls, overlooks, and popular rest areas on the trail.

Relatedly, the James K Carr Trail parking lot only accommodates for eight parking spots and one ADA parking spot. As a result of the limited parking availability, visitors often park vehicles on the road leading to impacts along the road. Current limitations in parking availability at the James K Carr Trailhead would be addressed through the James K. Carr Trail Extension and the resulting addition of up to fifty cars, scheduled for implementation in 3-5 years.

The most relevant indicators in the Boulder Creek Trail Complex include the following: Visitor Proximity to Others at Key Locations and Destinations, and Number of people encountered on trails per day.

Visitor Capacity. While soil erosion is currently occurring on the trails in the Boulder Creek Trail Complex, the reroutes and reconstruction of these trails that is included in this plan is expected to largely address these erosion issues. Once these trail improvements are made, park staff estimate that trail use by all user types could roughly double from current use levels before the additional soil erosion caused by users would become unacceptable. In other words, trail use could double before conditions reach the identified threshold of no more than 100 feet of rilling or rutting per 1 mile of trail. Increased use is anticipated for this analysis area due to the James K. Carr Trail Extension. The trail complex could accommodate increases in all types of visitor use under the alternatives. Visitor capacities could double on these trails while maintaining and achieving the desired conditions for the analysis areas.

The following table compares the Current Use Level and the identified visitor capacities for each trail in this analysis area. The visitor capacity for Crystal Creek Camp Trail is identified at the same level as the James K Carr Trail; visitor capacity for the Crystal Creek Falls Trail are identified as the same level as the Boulder Creek Trail.

Table C-8. Boulder Creek Trail Complex Current Use Levels and Visitor Capacities

Trail Name	Current Use Level (PIOD)	Visitor Capacity (PIOD)
Boulder Creek	30	60
Boulder Creek Falls	30	60
Papoose Pass	10	20
Mill Creek	5	10
James K Carr	130	260
James K. Carr Trail Extension	N/A	260
Crystal Creek Falls	N/A	60

Management Strategies to Implement Visitor Capacity. The following management strategies would be utilized as needed to ensure use remains within the visitor capacities identified above.

- Increase amenities and signs along trails.
- Implement scenic rest points and destination points along the trails, especially on Boulder Creek Falls Trail to increase the interpretive value of the area and help spread out visitors.
- Plant native vegetation to deter trail widening and reduce trail damage from overuse.
- Increase interpretation through education. Opportunities include waysides, information sharing, volunteer programs for trash cleanup, and ranger programs.
- Repair and restore damaged areas of existing trails.
- Educate visitors about the opportunities to recreate on lesser-used trails
- Encourage visitors to visit early in the morning or later in the afternoon. This would spread out use from the peak times of noon to 4 p.m. when use reaches visitor capacities to times when there is available capacity.
- Set appropriate expectations for visitors to high use trails. Inform them that they will encounter many other visitors, and those seeking a quieter experience can choose other locations.
- Increase Leave No Trace education and practice through increased presence of backcountry rangers.

Adaptive Management Strategies

- Consider user group restriction for visitors if needed. (Require Special Use Permits for groups larger than 10)
- Consider installing dog waste bags at trailheads with heavy dog waste.

Lower Clear Creek Trail Complex

Analysis Area. This analysis area includes Shasta Divide Trail, Shasta Divide Natural Trail, Mount Shasta Mine Loop, Clear Creek Canal Trail, WES trails, Buck Hollow, Princess Ditch Trail, Mule Mountain Pass Trail, Mule Mountain Loop Trail, Horsecamp Trail, Peltier Bridge Trail, Orofino Trail, East Boundary Vista Trail, Knobcone, Guardian Rock Trail, Guardian Rock Equestrian Trail, Prospect Trail, WES Emergency Access Road.

Existing Direction and Knowledge. The trails within the Lower Clear Creek Trail Complex are classes 2 and 3. All the trails in this complex are within the Backcountry Zone. See the following table for trail mileage, use level category, and trail class.

Table C-9. Lower Clear Creek Trail Complex Trail Details

Trail Name	Mileage	Use Level Category	Trail Class
Shasta Divide	3.6	Low	3
Shasta Divide Nature	0.4	Moderate	3
Mount Shasta Mine Loop	3.1	Moderate	3
Clear Creek Canal	4.7	Moderate	3
Buck Hollow	1.0	Low	3
Princess Ditch	2.5	Low	3
Mule Mountain Pass	1.5	Low	3
Guardian Rock Trail	1.0	Moderate	3, 5
Prospect Trail	0.4	Low	3
WES Emergency Access Road	0.6	Unknown	4
Knobcone	0.3	Moderate	3
Horse Camp	0.4	Moderate	3
Peltier Bridge	1.1	Low	3
Orofino Trail	0.1	Moderate	2
East Boundary Vista Trail	1.4	Moderate	3
Guardian Rock Equestrian Trail	0.3	Moderate	3

Overall, trails in the Lower Clear Creek Trail Complex see higher use on the weekends than on the weekdays. Weekend use is as high as two and a third of the use on the weekdays. Destination sites within this analysis area include abandoned mines, including trails such as Mine Loop, Buck Hollow, and Princess Ditch. Ditch trails in this analysis area are destinations as well, since they are historic sites. This analysis area is popular for both equestrian use and bicyclists.

Within the Lower Clear Creek Trail Complex, the Shasta Divide Nature Trail and Mount Shasta Mine Loop see the highest use. Clear Creek Canal Trail and Guardian Rock Trail see the next heaviest use in this analysis area. Bicycle use is present in this analysis area and is generally low, however annual cycling events could bring hundreds of cyclists to this area one or two days each year. This area is adjacent to the Swasey Recreation Area managed by the Bureau of Land Management, a popular mountain bike park. Mule Mountain Pass Trail and Princess Ditch Trail in Whiskeytown NRA serve as connecting trails for those recreating at Swasey Recreation Area, and accordingly sees heavier bicycle use than other trails at Whiskeytown NRA. With trail improvements in this area, higher bicycle use is expected.

The following table describes the trails visitation data in more detail, by user group from the 2018 Whiskeytown Trail Use Survey. No visitation data exists for Horsecamp, Peltier Bridge, Orofino Trail, East Boundary Vista Trail, or Guardian Rock Equestrian Trail as these are new proposed trails. No visitation data exists for WES Trail, Mule Mountain Loop Trail, and Knobcone Trail, as they were not included in the 2018 trail use study.

Table C-10. Lower Clear Creek Trail Complex Visitation (2018 Survey)

Trail Name	Total Weekend Visits/Day (Busy Months)	Weekend Pedestrians/Day (Busy Months)	Weekend Bikes/Day (Busy Months)	Weekend Equestrians/Day (Busy Months)	Average Length of Stay
Shasta Divide	5	5	1	0	1:00
Shasta Divide Nature	20	20	0	0	1:35
Mount Shasta Mine Loop	30	25	5	5	1:30
Clear Creek Canal	20	15	5	5	1:05
Buck Hollow	5	1	5	1	1:20
Princess Ditch	5	1	5	1	N/A
Mule Mountain Pass	10	5	5	1	2:25
Guardian Rock Trail	10	10	1	0	N/A
Prospect Trail	10	5	5	1	0:15

***Figures have been rounded to the nearest 5, or if less than 1, they have been rounded to 1. Totals may not equal the sum of different uses. Some "other uses" are not shown but do contribute to total use levels. See 2018 Whiskeytown Trail Use Survey for complete results.**

Concerns within this trail complex include user conflicts, erosion, cultural resource damage, and visitor safety at cultural resource sites. Due to the popularity of equestrian use and bicycles in this analysis area, there is high potential for user conflicts between equestrian users, bicyclists and hikers. Numerous unauthorized bike jumps built on the trail increase potential for user conflicts. Bike jumps also increase the wear and tear of the trails, increasing soil erosion in this analysis area. Pitting is the unintentional or intentional creation of holes in the trail by various user groups, and results in ruts in the trail.

In terms of cultural resources, there is unauthorized collection, unauthorized excavation, hand piling of artifacts, attempted access to mine features, and minor graffiti within this area. Historic ditches are sometimes damaged through puncturing to drain the ditch by various user groups in the wet season. Some trails in this analysis area travel straight through historic sites and archeological sites, increasing chances of visitor-related damage to the cultural resources. Social trailing also compacts soils and negatively impacts undisturbed vegetation. Lastly, this area contains numerous mine features. As the mine features are slowly discovered, social trailing increases and visitors attempt to visit the dangerous mine features.

The most relevant indicators in the Lower Clear Creek Trail Complex include the following: Number of New Social Trails, Amount of Soil Erosion Features, Damage to Cultural Resources and Historic Sites (i.e., vandalism and/or graffiti).

Limiting Attributes. The limiting attributes for this analysis area include soil erosion, damage to vegetation via social trails, and damage to cultural resources. As soil erodes on trails, it may result in trails unsuitable for pedestrian travel. Unsuitable or undesirable trails may lead to social trailing and/or visitors venturing off to cultural resource sites. Among the objectives of this plan is to restore unsustainable trails and establish sustainable design standards for trails. In addition, the indicator for amount of soil erosion features further reinforces that a trail system which minimizes soil erosion is one of the primary desired conditions of the plan. The rationale for this indicator includes the impact that the timing, level, and types of visitor use that occurs on the trails has on soil erosion. The indicator for damage to cultural resources and historic sites reinforces the importance of maintaining integrity of the sites within the objectives of this plan.

A secondary limiting attribute in this area is the difficulty of terrain at Mule Mountain Pass Trail. The action alternative reroutes trails within this analysis area to avoid steep slopes on the current trail alignment. Steep slopes, in addition to rocky terrain, combined with limited signs communicating expectations to visitors, result in a limitation to visitation.

Visitor Capacity. While soil erosion and damage to cultural resources is currently occurring on the trails in the Lower Clear Creek Trail Complex, the reroutes and reconstruction of these trails that is included in this plan is expected to largely address these issues. Once these trail improvements are made, park staff estimate that trail use by all user types could roughly double from current use levels before the additional soil erosion and damage to cultural resources caused by users would become unacceptable. In other words, trail use could double before conditions reach the identified threshold of no more than 100 feet of rilling or rutting per 1 mile of trail, and no more than two incidents of damage to cultural resources and historic sites per year. Increased use is anticipated for this analysis area due to the Shasta Divide Trail connecting the Visitor Center and parking lot. The trail complex could accommodate increases in all types of visitor use under the alternatives. Visitor capacities could double on these trails while maintaining and achieving the desired conditions for the analysis areas. Visitor capacities could double on these trails while maintaining and achieving the desired conditions for the analysis areas.

Because of the increased levels of bike use in the Lower Clear Creek Area, an allocation for bike use has been included in the visitor capacity. This will address the expected increase in bike use in this area as well as concerns about conflicts between equestrian users, bicyclists and hikers. It will also address the concerns about unauthorized bike jumps and the wear and tear they have on trails and pitting and rutting. This allocation for bikes is included at Lower Clear Creek and not in the other analysis areas because bike use is a greater concern to park managers in this area than elsewhere.

The following table compares the Current Use Level and the identified visitor capacities for each trail in this analysis area. The visitor capacity for Knobcone Trail and Peltier Bridge are identified at the same level as Clear Creek Canal Trail; visitor capacity for Orofino Trail, Guardian Rock Equestrian Trail, and Horsecamp Trail are identified at the same level as Guardian Rock Trail; and the visitor capacity for East Boundary Vista Trail is identified at the same level as Mount Shasta Mine Loop Trail.

Table C-11. Lower Clear Creek Trail Complex Current Use Levels and Visitor Capacities

Trail Name	Current Use Level (PIOD)	Visitor Capacity (PIOD)	Visitor Capacity (Bikers PIOD)
Shasta Divide	5	10	2
Shasta Divide Nature	20	40	0
Mount Shasta Mine Loop	30	60	10
Clear Creek Canal	20	40	10
Buck Hollow	5	10	10
Princess Ditch	5	10	10
Mule Mountain Pass	10	20	10
Guardian Rock Trail	10	20	2
Prospect Trail	35	20	10
WES Emergency Access Road	Unknown	Private	Private
Knobcone	Unknown	40	10
Horse Camp	N/A	20	2
Peltier Bridge	N/A	40	10
Orofino Trail	N/A	20	2
East Boundary Vista Trail	N/A	60	10
Guardian Rock Equestrian Trail	N/A	20	2

Management Strategies to Implement Visitor Capacity. The following management strategies would be utilized as needed to ensure use remains within the visitor capacities identified above.

- Plant native vegetation to deter trail widening and reduce trail damage from overuse.
- Increase interpretation through education. Opportunities include waysides, information sharing, volunteer programs for trash cleanup, and ranger programs.
- Repair and restore damaged areas of existing trails.

- Repair or restore historic features on or nearby trails.
- Educate visitors about multiuse expectations in this area.
- Educate visitors about the opportunities to recreate on lesser-used trails
- Encourage visitors to visit early in the morning or later in the afternoon. This would spread out use from the peak times of noon to 4 p.m. when use reaches visitor capacities to times when there is available capacity.
- Manage overflow roadside parking through the placement of roadside barriers (i.e., large rocks) and increased NPS presence in the area.
- Set appropriate expectations for visitors to high use trails. Inform them that they will encounter many other visitors, and those seeking a quieter experience can choose other locations.
- Increase Leave No Trace education and practice through increased presence of backcountry rangers.

Adaptive Management Strategies

- Consider user group restriction for visitors if needed. (Require Special Use Permits for groups larger than 10)

Paige Boulder Trail Complex

Analysis Area. This analysis area includes Kanaka Peak Trail, Salt Gulch Trail, Peltier Trail, Ridge Trail, Horsetail Canyon Trail, Logging Camp Trail, Martha's Ditch, Hydraulic Mine Trail

Existing Direction and Knowledge. The trails within the Paige Boulder Trail Complex are classes 2 and 3. All the trails in this complex are within the Backcountry Zone. See the following table for trail mileage, use level category, and trail class.

Table C-12. Paige Boulder Trail Complex Trail Details

Trail Name	Mileage	Use Level Category	Trail Class
Kanaka Peak	4.1	Moderate	3
Salt Gulch	1.6	Low	3
Peltier	1.8	Low	3
Ridge	1.1	Moderate	3
Hydraulic Mine	0.5	Low	3
Horsetail Canyon	0.6	Moderate	2
Logging Camp	1.25	Moderate	3
Martha's Ditch	2.5	Moderate	3

Overall, use appears to be fairly well distributed across the seasons on trails in the Paige Boulder Trail Complex, with only slightly higher usage on the weekends. The Kanaka Peak Trail is the most heavily trafficked by hikers, cyclists and equestrians, however, all trails in this area see light visitor use overall, as compared to the other analysis areas.

Within the Paige Boulder Trail Complex, the top of Kanaka Peak is a key destination. Throughout this analysis area, there are numerous opportunities for scenic overviews. Mount Shasta Mine Loop Parking lot is one of the main parking areas for trails in this analysis area. The Ridge Trail and Logging Trail are both heavily used by WES, so the use on this trail is higher than other NPS-owned trails, especially in the Spring between January and June when educational programming occurs.

The following table describes the trails visitation data in more detail, by user group from the 2018 Whiskeytown Trail Use Survey. No visitation data exists for Horsetail Canyon, Logging Camp, and Martha's Ditch, as they were not included in the 2018 trail use study.

Table C-13. Paige Boulder Trail Complex Visitation (2018 Survey)

Trail Name	Total Weekend Visits/Day (Busy Months)	Weekend Pedestrians/Day (Busy Months)	Weekend Bikes/Day (Busy Months)	Weekend Equestrians/Day (Busy Months)	Average Length of Stay
Kanaka Peak	20	15	5	1	2:50
Salt Gulch	5	5	1	0	N/A
Peltier	10	5	5	0	0:30
Ridge	5	5	5	1	0:20
Hydraulic Mine	10	5	5	1	2:45

***Figures have been rounded to the nearest 5, or if less than 1, they have been rounded to 1. Totals may not equal the sum of different uses. Some "other uses" are not shown but do contribute to total use levels. See 2018 Whiskeytown Trail Use Survey for complete results.**

Concerns within this analysis area include cultural resource impacts and occasional visitor conflicts among different user groups. Cultural resource impacts in this area include graffiti and vandalism to cultural resource sites. Visitor conflicts among user groups in this area occur when pedestrians occasionally hear gun shots from hunters, which can alarm visitors. Hunting is not a major concern in terms of visitor conflicts in this area.

The most relevant indicators in the Lower Clear Creek Trail Complex include the following: Amount of Soil Erosion Features, Damage to Cultural Resources and Historic Sites (i.e., vandalism and/or graffiti), and Number of people encountered on trails per day.

Limiting Attributes. The limiting attribute for this analysis area is the protection of opportunities for solitude and the encounter rate threshold.

The desired conditions for this analysis area derive from the class 2 and class 3 descriptions. Opportunities for quiet, a sense of solitude, and contemplative experiences are desired conditions within this analysis area. In addition, this analysis area lies within the Backcountry Zone alone, which involves largely natural experience with opportunities to escape from crowding and urban influences. Most trails in this area are accessed via Peltier Valley Road, which is currently closed due to a washed out culvert and road damage predating the Carr Fire. Another access route to trails requires hiking on an administrative access road for a duration of the trail. Due to the relative

difficulty of accessing this area, opportunities for solitude are protected, which is in line with the desired conditions in this area.

The encounter rate is a limiting attribute for Kanaka Peak trail and Hydraulic Mine trail. The encounter rate indicator identifies thresholds for the maximum number of groups that would be encountered during a trip on the trail. Thresholds are no more than 35 groups encountered on high use trails; no more than 8 groups encountered on moderate use trails; and no more than 3 groups encountered on low use trails.

Visitor Capacity. Park staff identified that the visitor capacity for the Paige Boulder Trail Complex could increase two to three-fold from current use levels based on existing direction and knowledge as well as the limiting attributes. The trail complex could accommodate increases in all types of visitor use under the alternatives. Visitor capacities could triple on these trails while maintaining and achieving the desired conditions for the analysis areas.

Opportunities for solitude and primitive experiences would remain protected in this analysis area with the current management strategies and guidelines outlined in the action alternative of this plan. Once trail improvements are made in the Paige Boulder Trail Complex, park staff estimate that trail use by all user types could roughly triple from current use levels before the experience would become unacceptable because opportunities for solitude were no longer present. In other words, trail use could triple before conditions reach the point where desired conditions of this area are not met.

The two exceptions to this are the Kanaka Peak and Hydraulic Mine trails. If use levels were permitted to triple from the current level of 20 People In One Day to a 60 People In One Day (PIOD), the number of groups encountered on the trail would greatly exceed the threshold for a moderate use trail— 8 groups encountered per day. This would lead to perceptions of more social experiences on the trail than the solitude experiences described in the desired conditions for a Class 3 trail. Therefore, the visitor capacity for the Kanaka Peak Trail is identified at the level that would accommodate encounters of no more than 8 groups in one day using the following formula.

$$Visitor\ Capacity\ = \frac{(Turnover\ Rate\ [4.27]\ x\ Encounter\ Rate\ Threshold\ [8]\ x\ Average\ Group\ Size\ [2]}{Adjustment\ for\ groups\ present\ at\ one\ time\ encountered\ during\ visit\ [2]}$$

For the Hydraulic Mine trail, if use levels were permitted to triple from the current level of 10 People In One Day to a 30 People In One Day (PIOD), the number of groups encountered on the trail would greatly exceed the threshold for a low use trail— 3 groups encountered per day. This would lead to perceptions of more social experiences on the trail than the solitude experiences described in the desired conditions for a Class 2 trail. Therefore, the visitor capacity for the Kanaka Peak Trail is identified at the level that would accommodate encounters of no more than 3 groups in one day using the following formula.

$$Visitor\ Capacity\ = \frac{(Turnover\ Rate\ [4.42]\ x\ Encounter\ Rate\ Threshold\ [3]\ x\ Average\ Group\ Size\ [2]}{Adjustment\ for\ groups\ present\ at\ one\ time\ encountered\ during\ visit\ [2]}$$

The following table compares the Current Use Level and the identified visitor capacities for each trail in this analysis area. The visitor capacity for Horsetail Canyon, Martha's Ditch and Logging Camp trails is identified at the same level as the Ridge Trail because park staff believe these proposed trails are expected to have similar desired conditions and use profiles as the Ridge Trail.

Table C-14. Paige Boulder Trail Complex Current Use Levels and Visitor Capacities

Trail Name	Current Use Level (PIOD)	Visitor Capacity (PIOD)
Kanaka Peak	20	35
Salt Gulch	5	15
Peltier	10	30
Ridge	5	15
Hydraulic Mine	10	15
Horsetail Canyon	Unknown	10
Logging Camp	Unknown	10
Martha's Ditch	Unknown	10

Management Strategies to Implement Visitor Capacity. The following management strategies would be utilized as needed to ensure use remains within the visitor capacities identified above.

- Increase interpretation through education. Opportunities include waysides, information sharing, volunteer programs for trash cleanup, and ranger programs.
- Educate visitors about WES trails to ensure boundaries are understood by visitors.
- Educate visitors about the opportunities to recreate on lesser-used trails.
- Reduce erosion through taking grade out and outsloping to preserve the threatened and endangered species in this watershed.
- Educate visitors about threatened and endangered species in this area to promote their protection.

Adaptive Management Strategies

- Consider increasing access through a new road or trail if accessing this trail complex continues to be challenging for visitors.

Tower House Historic District

Analysis Area. This area includes Camden Water Ditch, Tower Grave, Clear Creek Picnic Trail, Clear Creek Vista Trail, Mill Creek Trail, and Crystal Creek Water Ditch Trail.

Existing Direction and Knowledge. The trails within the Tower House Historic District are classes 3, 4, and 5. Most trails in this complex are within the Backcountry Zone, with the exception of the Clear Creek Picnic Trail, and Tower Grave Trail, which lie within the Frontcountry Zone. See the following table for trail mileage, use level category, and trail class.

Table C-15. Tower House Historic District Trail Details

Trail Name	Mileage	Use Level Category	Trail Class
Camden Water Ditch	0.8	Moderate	3
Tower Grave	0.2	Moderate	3
Clear Creek Vista trail	2.7	Low	3
Mill Creek Trail	2.0	Low	2, 3
Crystal Creek Water Ditch	0.8	Moderate	4
Clear Creek Picnic Trail	0.3	Moderate	5

Overall, the trails in the Tower House Historic District see higher use on the weekends than on the weekdays. Tower House Historic District is a destination due to its historic structures and very large parking lot providing access to many key sites. All trails in this analysis area center around the Tower House Historic District. This analysis area sees a high amount of use by family groups, for mostly hikers and trail runners.

Within the Tower House Historic District, Crystal Creek Water Ditch, and Camden Water Ditch are the most used trails. Equestrian use can be seen on the Mill Creek Trail within this analysis area. Destinations in this area include the Crystal Creek Water Ditch (including a coffer dam at the end of the trail), Eldorado Mine Historic District, and Levi Tower Gravesite.

The following table describes the trails visitation data in more detail, by user group from the 2018 Whiskeytown Trail Use Survey. No visitation data exists for Clear Creek Picnic Trail as this is a new proposed trail.

Table C-16. Tower House Historic District Visitation (2018 Survey)

Trail Name	Total Weekend Visits/Day (Busy Months)	Weekend Pedestrians/Day (Busy Months)	Weekend Bikes/Day (Busy Months)	Weekend Equestrians/Day (Busy Months)	Average Length of Stay
Camden Water Ditch	15	15	1	0	0:55
Tower Grave	15	15	1	0	0:30
Clear Creek Vista	10	5	5	1	0:50
Mill Creek	25	25	5	0	1:00
Crystal Creek Water Ditch	30	30	0	0	1:10

***Figures have been rounded to the nearest 5, or if less than 1, they have been rounded to 1. Totals may not equal the sum of different uses. Some "other uses" are not shown but do contribute to total use levels. See 2018 Whiskeytown Trail Use Survey for complete results.**

Concerns within this area include impacts to historic and archeological resources. Within this area, there are ten to twelve historic structures, including the ditch trails, most of which are older than 100 years. The historic orchard in this area is sometimes climbed or limbs are broken, impacting the historic trees. This Historic District overlaps with an important Archeological District. A few different archeological sites are associated with this Historic District. Archeological sites are generally impacted through digging, which is most often related to gold mining at the confluence of multiple creeks. Graffiti, looting, vandalism, and ground disturbance impact the historic and archeological resources in this area. Lastly, this analysis area is currently limited in its ability to serve the public with restrooms and potable water and the park is in the process of addressing this through improved infrastructure to better serve more visitors.

The most relevant indicator in the Tower House Historic District is Damage to Cultural Resources and Historic Sites (i.e., vandalism and/or graffiti), and number of people encountered on trails per day.

Limiting Attributes. The limiting attribute for this analysis area is the cultural resources, especially during and after large events bringing crowds of visitors to the area.

The desired conditions for this analysis area derive from the class 3, 4, and 5 descriptions. Opportunities for contemplation, engaging with others, and highly social experiences are desired conditions within this analysis area. Another desired condition for this analysis area is learning about the natural and human history, including cultural resources. In addition, this analysis area lies within the Backcountry Zone and Frontcountry Zone. While the backcountry zone allows for engagement in a natural area with little development, the frontcountry zone allows for engagement in a developed built environment. This built environment includes public use, concession, special use, and administrative facilities. Due to this zoning, large events are within the desired conditions in this analysis area.

Biannual events typically bring between 600 and 2,000 visitors. During these large events, parking is a limitation. Minor impacts from these large events including soil compaction, erosion, and high trail use are typically quickly recovered. This area also does not have potable water nor fire hydrants, which limits the ability to meet visitors' basic needs. Lastly, soil erosion on Camden Water Ditch, Mill Creek Ditch, Crystal Creek Water Ditch, and Clear Creek Vista Trail (Upper Mill Creek Ditch) is a limiting factor due to the topography of these areas.

Among the objectives of this plan is to restore unsustainable trails and establish sustainable design standards for trails. One of the metrics of sustainable trails for this plan is the preservation of cultural resources along and near trails. In addition, the indicator for damage to cultural resources and historic sites reinforces the importance of maintaining integrity of the sites within the objectives of this plan. The rationale for this indicator includes the amount of use on trails, and easy access to historic and cultural resources.

A secondary limiting attribute in this analysis area is the visitor experience, specifically encounters with other visitors on the Mill Creek Trail. The encounter rate indicator identifies thresholds for the maximum number of groups that would be encountered during a trip on the trail. Thresholds are no more than 35 groups encountered on high use trails; no more than 8 groups encountered on moderate use trails; and no more than 3 groups encountered on low use trails.

Visitor Capacity. While damage to cultural resources is currently occurring on the trails in the Tower House Historic District, the reroutes and restoration of these trails that is included in this

plan is expected to largely address this issue. Once these trail improvements are made, park staff estimate that trail use by all user types could roughly double from current use levels before the additional cultural resource damage caused by users would become unacceptable. In other words, trail use could double before conditions reach the identified threshold of no more than two incidents of damage to cultural resources and historic sites per year.

Park staff identified that the visitor capacity for the Tower House Historic District could double from current use levels based on existing direction and knowledge as well as the limiting attributes. The trail complex could accommodate increases in all types of visitor use under the alternatives. Visitor capacities could double on these trails while maintaining and achieving the desired conditions for the analysis areas.

The one exception to this is the Mill Creek trail. If use levels were permitted to double from the current level of 25 People In One Day to a 50 People In One Day (PIOD), the number of groups encountered on the trail would slightly exceed the threshold for a low use trail—3 groups encountered per day. This would lead to perceptions of a social trail experience that are inconsistent with the desired conditions for this class 2 trail, which state an experience of "quiet and a sense of solitude." Therefore, the visitor capacity for the Mill Creek Trail is identified at the level that would accommodate encounters of no more than 3 groups in one day using the following formula.

$$Visitor\ Capacity\ = \frac{(Turnover\ Rate\ [12.69]\ x\ Encounter\ Rate\ Threshold\ [2]\ x\ Average\ Group\ Size\ [2]}{Adjustment\ for\ groups\ present\ at\ one\ time\ encountered\ during\ visit\ [2]}$$

The following table compares the Current Use Level and the identified visitor capacities for each trail in this analysis area. The visitor capacity for Clear Creek Picnic trail is identified at the same level as the Crystal Creek Water Ditch.

Table C-17. Tower House Historic District Current Use Levels and Visitor Capacities

Trail Name	Current Use Level (PIOD)	Visitor Capacity (PIOD)
Camden Water Ditch	15	30
Tower Grave	15	30
Clear Creek Vista	10	20
Mill Creek	25	40
Crystal Creek Water Ditch	30	60
Clear Creek Picnic	N/A	60

Management Strategies to Implement Visitor Capacity. The following management strategies would be utilized as needed to ensure use remains within the visitor capacities identified above.

- Increase interpretation through education. Opportunities include waysides, information sharing, volunteer programs for trash cleanup, and ranger programs.
- Educate visitors about the opportunities to recreate on lesser-used trails.

- Repair and restore damaged areas of existing trails.
- Construct new proposed trails as identified in the plan.
- Encourage responsible use of trails and educate visitors to stay on trail as off-trail travel can damage fragile vegetation and soils
- Repair or restore historic features on or nearby trails.
- Educate visitors about the opportunities to recreate on lesser-used trails.
- Manage overflow roadside parking through the placement of roadside barriers (i.e., large rocks) and increased NPS presence in the area.
- Set appropriate expectations for visitors to high use trails. Inform them that they will encounter many other visitors, and those seeking a quieter experience can choose other locations.

Whiskeytown Lake Trail

Analysis Area. This area includes the Whiskeytown Lake Trail.

Existing Direction and Knowledge. The proposed Whiskeytown Lake Trail would be Class 5. This new trail falls mostly within the Backcountry Zone. This trail crosses Frontcountry Zones in two different areas – at the Brandy Creek Marina and Judge Francis Carr Powerhouse. See the following table for trail mileage, use level category, and trail class.

Table C-18. Lake Trail Details

Trail Name	Mileage	Use Level Category	Trail Class
Whiskeytown Lake Trail	8.3	High	5

The Whiskeytown Lake Trail under the action alternative, would be a multiuse asphalt trail intended for bicycle and pedestrian use. The Lake Trail would connect to existing trail networks on land managed outside of the NPS boundary, including the multiuse paved Sacramento River Trail via paved roads connecting the two areas. The speed limit on this trail would be 15 miles per hour. Because of the increased access to the water, it is expected that anglers will use this trail as well. Equestrian use will not be permitted on this trail due to the asphalt paving. Higher use is expected on weekends in this analysis area.

No visitation data exists for Whiskeytown Lake Trail as it is a new proposed trail. It is expected that visitation will be similar to that of the Sacramento River Trail because of the similarity in trail intention, use, and design. The Sacramento River Trail is heavily trafficked and is appropriate for a wide variety of users including pedestrians, hikers, runners, and road bicyclists of all skill levels, according to AllTrails. The Whiskeytown Lake Trail will connect to parking at both Brandy Creek and at Carr Power House. The Brandy Creek parking area is large with heavy use, so it is expected that most visitors will start at the Brandy Creek parking lot and travel west along the Whiskeytown Lake Trail as an out-and-back trail.

If parking opportunities at Brandy Creek parking lot and Carr Power House parking lot do not meet the needs of increased visitor use, then there is potential to increase the lot at Carr Power House by approximately 10 parking spaces. In addition, Bureau of Reclamation currently manages the Carr Power House area and Homeland Security may require additional sensing here. As a result, potential changes to security requirements at this location may be a limitation to trail and parking access as boundaries are redrawn.

Concerns within this area include impacts to cultural resources, social trailing, litter, and the presence of bald eagle nests. Ground disturbance will occur with new construction causing potential short-term impacts to cultural resources. This area has not yet been surveyed and has the potential to contain historic mines, ditch lines, and other cultural resources. If cultural sites are identified during pre-construction, opportunities for interpretation and education can formalize visitor engagement of these resources.

There will likely be numerous key locations along the trail that draw visitors including viewpoints, peninsulas, and streams entering the lake. It is possible that the destination points may result in an increase of social trails in this area, as visitors seek out more secluded areas for sunbathing, swimming, and fishing. Increased access and visitation to this part of the park will likely result in an increase of litter and demand on pit toilets. Lastly, nesting bald eagles may potentially reside in this area. If during pre-construction evidence of nesting is found, then affected areas would have reduced access during critical nesting period within a half mile of the nest.

The most relevant indicator for the Whiskeytown Lake Trail include the Number of New Social Trails, Damage to Cultural Resources and Historic Sites (i.e., vandalism and/or graffiti), and Number of people encountered on trails per day. Since this trail complex lies within both the Frontcountry and Backcountry Zones, the threshold for the number of new social trails would be no more than 5 additional social trails per mile.

Limiting Attribute. The limiting attribute for this analysis area is visitor experience and potential for multiuser group conflicts which would constrain the ability of the analysis area to accommodate additional users.

The desired conditions for this new trail is based on the Class 5 trail description, including "opportunities to engage with others while enjoying the outdoors will dominate along these fully developed trails." In addition, this analysis area lies within the Backcountry Zone and Frontcountry Zone. While the backcountry zone allows for engagement in a natural area with little development, the frontcountry zone allows for engagement in a developed built environment. This built environment includes public use, concession, special use, and administrative facilities.

As the first paved multiuse trail in the park, the Whiskeytown Lake Trail would likely draw a new user group of road bicyclists. There are currently no other areas within the park where road bicyclist use overlaps with pedestrian use. These two user groups may come into conflict as cyclists attempt to pass pedestrians at a comparatively much greater speed. If too many cyclists and pedestrians share the pathway, it would create a safety issue as space to safely pass would become more scarce. Another potential limiting attribute would be the natural resources which constrain the ability to expand parking. Expanding parking in this area would involve a number of constraints including but not limited to land ownership, resource conditions, and physical limitations of space. This trail may be accessed by visitors via bicycle, however, use on the Whiskeytown Lake Trail would not necessarily be constrained by an inability to expand the parking lot. Without the limitation of

parking for some users, bicyclists may still experience an additional limiting attribute of crowding on the trail, which could contribute to multiuser conflicts.

Visitor Capacity. The desired conditions for this new trail is based on the Class 5 trail description, including "opportunities to engage with others while enjoying the outdoors would dominate along these fully developed trails." Class 5 trails are also designed to "provide a high degree of visitor comfort and would focus on providing access to a diverse set of user groups (ABAAS trails, restrooms, developed areas, etc.)" Based on this desired condition information, park staff identified that the visitor capacity for the Whiskeytown Lake Trail could reach 240 people in one day based on existing direction and knowledge as well as the limiting attributes. The PIOD metric for the Whiskeytown Lake Trail includes the anticipated mixed use of pedestrians (hikers, runners, dog walkers) and bicyclists (road bicyclists, mountain bicyclists, etc.). These uses are not separated out for the visitor capacity because the overall visitor capacity measurement in this area would provide the necessary information to inform management strategies around crowding and congestion on the trail. This number derives from an expectation that the visitation could be double that of the most popular trail at the park, the Whiskeytown James Carr Waterfall Trail, which has an annual visitation of 20,000. This would mean that annual visitation to the Whiskeytown Lake Trail would be about 40,000. To calculate the typical weekend day during the four busiest months of May, June, January, and February, the expected annual visitation of 40,000 was used, in combination with an assumption that weekends are twice as busy. Given that there are 104 weekend days in a year, the projected weekend use (170) was multiplied by 1.4 and then rounded up to the nearest 5 to obtain 240. The multiplier of 1.4 was used in this analysis area to match that of the other areas, where 1.4 is used because the four busiest months are roughly 40% busier than the average for the year.

The daily visitor capacity of 240 PIOD is consistent with use levels seen at other national park units with developed pathways, including at Grand Teton National Park, where a moderately well-used paved multiuse pathway received around 215 people in one day on the busiest day of 2018. More typical busy days (95th percentile) saw around 150 people in one day that year. At these levels, cyclists and pedestrians are typically able to safely share the pathway. It is expected that above 240 PIOD is about the level where pathway users on Whiskeytown Lake Trail would start to experience safety issues with biker/pedestrian conflicts.

The trail complex could accommodate increases in all types of visitor use under the alternatives, except for equestrian use. Increasing the use on these trails while maintaining and achieving the desired conditions for the analysis areas would result in the following capacities by trail in the table below. The following table compares the Current Use Level and the identified visitor capacities for each trail in this analysis area.

Table C-19. Whiskeytown Lake Trail Current Use Levels and Visitor Capacities

Trail Name	Current Use Level (PIOD)	Visitor Capacity (PIOD)
Whiskeytown Lake Trail	N/A	240

Management Strategies to Implement Visitor Capacity. The following management strategies would be utilized as needed to ensure use remains within the visitor capacities identified above.

- Encourage responsible use of trails and educate visitors to stay on trail as off-trail travel can damage fragile vegetation and soils
- Educate visitors about multiuse protocols on paved roads shared between pedestrians and bicyclists (i.e., when and how to pass others safely).
- Enforce speed limits of bicyclists through the presence of Law Enforcement staff.
- Designate points of interest, pull outs for picnicking/view sites, and rest points to increase opportunity of separating user groups and to reduce likelihood of user conflicts.
- Educate visitors of Special Use Permit requirement for large groups.
- Educate visitors on bear safety regarding litter and food since this area doesn't currently have visitors.

Adaptive Management Strategies

- Consider user group restriction for cyclists if needed. (Require Special Use Permits for groups larger than 10)

APPENDIX D – TRAIL MAINTENANCE HANDBOOK

SECTION 1. INTRODUCTION AND PURPOSE

Trail standards are the criteria for the minimum quality set for trails[1] in various use classes. The primary standard used for trails at Whiskeytown National Recreation Area (Whiskeytown) is one of environmental integrity. Problems and projects should be approached from an environmental perspective that allows natural processes to prevail. No work is undertaken that unacceptably impacts the resources. All trail work must be approached with aesthetics in mind so that the finished product would be pleasing to the eye and, above all, unobtrusive to the natural setting. Keeping existing trails well maintained enhances the visitor's experience, protects park resources, and reinforces the values of the National Park Service (NPS) at Whiskeytown.

Work described in this document adds to the scope of work for compliance with the National Environmental Protection Act (NEPA) in the trail management plan / environmental assessment (plan). *Any work specified in this handbook that is not integrated into the plan would require separate NEPA compliance.*

This handbook defines the standards and methods for the maintenance of standard terra[2] trails in Whiskeytown. These standards outline the types of cyclic upkeep necessary to maintain the function and safety of recreation area trails in accordance with their defined classification ranking, as outlined in the National Quality Standards for Trails (see plan alternatives – first reference to trail class – team needs to add reference there - National Quality Standards for Trails?) Whiskeytown trails are classified according to their user groups, accessibility, terrain, and general character. These classifications permit quantification of trail features and associated actions necessary to maintain trails.

This document of general trails maintenance guidelines is intended to have a five-year life span, at the end of which a new document should be drafted.

The purpose of this document is to identify which maintenance activities and procedures are considered part of normal maintenance for existing trails. Trail maintenance activities outside the scope of this document should be submitted in the park PEPC program. These routine activities would take place on existing trails and would not alter the character of the recreation area or its trail system. Normal cyclic maintenance permits annual upkeep, stabilization, and spot-improvements to trails. These maintenance activities are completed such that the trail class remains unchanged. Normal maintenance also includes minor repairs and rehabilitation activities performed in response to acute deterioration of trails resulting from weather or geophysical events. Activities that extend beyond routine maintenance require subsequent management approval and NEPA compliance.

The following mitigation measures are in place is the responsibility of the project leader. The project leader would be defined in PEPC when the list of project areas is entered:

---

[2] For the purpose of this document, a "trail" is defined as: "A cleared travel corridor leading from one point to another." (*Lightly on the Land,* The Student Conservation Association, Second Edition, Pg. 18)

Cultural Resources

- Known archeological resources would be avoided during project implementation. Archeological monitoring is required when working near sensitive archeological resources. Provision for inadvertent discovery applies. If concealed archeological resources are encountered during project activities, work would stop and all necessary steps would be taken to protect them. The park cultural resource management staff would be notified immediately. Archeological surveys would be completed before projects are permitted to begin.
- All workers would be informed of the criminal penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers also would be informed of the correct procedures should previously unknown resources be uncovered during construction activities. Data recovery excavations would be carried out under NPS guidance to mitigate adverse effects as outlined in the trail management plan / environmental assessment section on environmental consequences.

Visitor Experience/Viewshed

- The project leader would work to minimize cut edges from downed trees and branches visible from trails (e.g., flush cutting stumps; flush cutting branches against main stem).
- Special consideration would be given to visitor viewshed and aesthetics; tree and brush removal would be done selectively to maintain a naturalistic character such as preventing the creation of a linear trail edge.
- Projects with larger visitor impacts would be done outside of peak visitation season.

Natural Resources

- The project leader would prepare an annual work plan and present it to the Whiskeytown Management Team to identify any impacts outside of the scope of this plan.
- Ground disturbance would be contained to the trail prism area as defined in the Trail Management Objectives (TMO's) a buffer of two feet on either side of the trail tread where crews stand to work on the trail, place tools, or pile debris during construction.
- Gravel and soil sources would come from inside the park if possible. The project leader should give ample lead time to resource management staff to facilitate inspections of change in where materials are sourced. Inspections should occur once in March when weeds are in bloom and once more in June.
- All projects should be reviewed by resource management staff to determine potential impacts to wildlife. Any project occurring within ½ mile of an active bald eagle nest may need to be delayed until after the nest is inactive for the season (the nesting effort fails or the chicks have fledged).
- All operations would cease if wildlife are observed to be disturbed or displaced by trail work after the initial assessments have been conducted, and the wildlife biologist should be notified immediately.

- All US Fish and Wildlife Service (USFWS) and NOAA Fisheries (NMFS) recovery plans and surveying protocols for wildlife species listed as threatened or endangered should be followed prior to implementing project work.
- Areas planned for reroutes longer than 660 linear feet and/or vegetation destruction need to be surveyed by resource management staff for rare species. The project leader would coordinate with resource management staff to ensure surveys have been conducted, results communicated, mitigations are in place, and any appropriate plant salvage and/or collection has occurred.
- Cutting and removal of hardwoods or conifers, with the exception of knobcone pine and grey pine, would be avoided whenever possible.

Legal Requirements

Trail construction and maintenance in national parks are subject to a variety of federal laws and regulations.

- **National Environmental Policy Act**
  The National Environmental Policy Act (1969) requires that federal agencies consider environmental impacts resulting from any major federal action including the construction of infrastructure such as roads, trails, and buildings through the environmental assessment and the environmental impact statement processes. Trail projects in Whiskeytown National Recreation Area are subject to NEPA review. The National Environmental Policy Act also permits "categorical exclusion," of actions that do not have an individual or cumulative significant impact on the environment and thus are not subject to further environmental review (42 U.S.C. §4321 et seq. [1969]).

- **National Historic Preservation Act (NHPA)**
  Section 106 of the National Historic Preservation Act (1966) requires that federal agencies consider effects to historic properties listed on or eligible for the National Register of Historic Places. Whiskeytown trail projects are subject to Section 106, and special attention must be paid when excavation takes place as part of trail construction and maintenance. Whiskeytown trails employees work with park staff to ensure adherence to Section 106 regulations.

- **Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) (1968)**
  The Americans with Disabilities Act and the Architectural Barriers Act guide construction and alterations of public facilities. Specifically, the Architectural Barriers Act provides regulations for federally financed facilities, including trails. The Access Board requires that federal facilities are accessible where reasonable and practicable. In trail construction, managers are to maximize all opportunities to construct new trails or make upgrades to trails compliant with accessible guidelines. The Access Board also recognizes situations where landscape, environment, or cultural resources limit the feasibility of constructing and accessible trail.

Routine maintenance of trails is also exempt from the ABA's technical provisions such that tasks such as brushing and erosion control can be undertaken without scoping so long as no significant alterations to the trail are undertaken. The Whiskeytown program adheres to ABA requirements to the extent possible as permitted by the rugged and remote terrain of the recreation area.

- **Other Legal Considerations**
  Other federal and state laws impact Whiskeytown trail logistics, placement, and access. NPS *Management Policies 2006*, The Organic Act, and Whiskeytown-specific policies impact the recreation area's program. Particularly when considering any trail activity in parts of the park adjacent to lands managed by other entities, consideration must be given to rights-of-way, easements, private property, wetlands impact, etc. The Whiskeytown program considers these implications and coordinates with other park work groups, agencies, and governing bodies to ensure compliance.

SECTION 2. TRAIL CLASSIFICATION SYSTEM

The Whiskeytown National Recreation Area hiking trail system can be divided into five distinct classes based on user type, need for access, and terrain; this system is based on the 2011 Federal Trail Data Standards, National Trail Management Classes (USDA/DOI 2011). Class 5 trails are the most developed and provide access to the most important visitor facilities. Class 1 trails are trails/roads that have been abandoned by the park but are still used on a limited basis (i.e., by fire crews or natural resource staff for ease of travel in the backcountry). Table D-1 highlights the differences between the constructed features of the given trail classes.

For the purposes of this document, the designed construction standards and/or condition descriptions of the distinct trail classes would determine the extent to which improvements would be made during routine maintenance and repair.

"Trail Classes are general categories reflecting trail development scale, arranged along a continuum. The Trail Class identified for a trail prescribes its development scale, representing its intended design and management standards. Local deviations from any Trail Class descriptor may be established based on trail-specific conditions, topography, or other factors, provided that the deviations do not undermine the general intent of the applicable Trail Class" (USDA/DOI 2011).

Table D-1. National Trail Management Classes

Trail Attributes	Trail Class 1 Primitive / Undeveloped	Trail Class 2 Simple/Minor Development	Trail Class 3 Developed / Improved	Trail Class 4 Highly Developed	Trail Class 5 Fully Developed
Tread and Traffic Flow	Tread intermittent and indistinct. May require route finding. Native materials only. (User-created trail or social trails)	Tread discernible and continuous, but narrow and rough. Constructed tread 18"-36" of native materials. (Maintained trails utilizing abandoned fire roads)	Tread obvious and continuous. Constructed tread 24"-48" of native materials. Width accommodatesunhindered, one-lane travel.	Tread wide and relatively smooth with few irragularities. Constructed tread 36"-72" of native and/or imported materials. ADA guidelines where applicable.	Constructed tread at least 60" wide of a hardened surface such as asphalt. Designed to meet ADA guidelines.
Obstacles	Obstacles common. Downed trees and vegetation NOT cleared from trail corridor.	Obstacles occasionally present. Downed trees and vegetation cleared from trail corridor infrequently.	Obstacles infrequent. Vegetation cleared from trail corridor.	No protrusions higher than 2" and no gaps wider than 1/2". Grades typically <10%. Vegetation cleared from trail corridor.	No protrusions higher than 2" and no gaps wider than 1/2". Grades typically <5%. Vegetation cleared from trail corridor.
Constructed Features	No constructed features.	Structures protect trail infrastructure and resources. Drainage is functional. Primitive foot crossings or fords.	Trail structures may be common and substantial. Trail bridges as needed for resource protection and appropriate access. Generally native materials in Wilderness.	Structures frequent and substantial. Substantial bridges are appropriate at water crossings. Trailside amenities may be present.	Structures frequent and substantial. Substantial bridges are appropriate at water crossings. Trailside amenities may be present.
Signs	None.	Signs for basic direction.	Regulations, resource protection, and user reassurance. Directional signs at junctions. Mileages listed at trailheads for frontcountry trails only.	Wide variety of directional, regulatory, and interpretive signs. Mileages listed at trailheads.	Wide variety of directional, regulatory, and interpretive signs. Mileages listed at trailheads.

Whiskeytown National Recreation Area Design Standards

The following are design standards and condition descriptions for the five distinct trail classes.

Class 5 Trails. Fully developed, frontcountry and backcountry trails: Whiskeytown Lake Trail, Clear Creek Picnic Trail, and Guardian Rock Trail.

Class 5 Standards. Class 5 trails are designed to provide universal access between the Parks most highly used visitor facilities. Trails and trail features are designed to comply with the *Architectural Barriers Act Accessibility Standards* published by the United States Access Board.

Tread is paved asphalt or other hardened surface, at least 60" wide with gravel shoulders. Trail is built using turnpike or bench cut construction, and grades are 5% or less. Outslope on the trail is 2% or less. Trail tread is elevated through wet areas; ditches and culverts are used to provide the necessary trail drainage. Fabric underlayment and well-drained, sub-grade materials are used to mitigate poor soil types.

Whiskeytown bridges are constructed to the same standard for all trail classes. Bridges are pressure treated glue-laminated stringers with redwood 4" x 12" decking, and redwood 4" x 6" handrails that are draw knifed, sanded and stained. All hardware is 18-8 stainless steel and bridges are re-sanded and stained annually.

Retaining walls and other constructed features are built to match the historic architecture of the park. All stone and mortar work is to fallow guidelines laid out in the *Preservation Guide For Stone Masonry and Dry-Laid Resources* manual. Fill slopes and retainers are revegetated using appropriate site-specific, native genotypes and evidence of constructed and imported features is hidden.

The trail corridor is cleared of all vegetation 8' high, as well as 2' beyond the width of the trail tread. Trees more than 6 inches in diameter located on the edge of the trail are limbed, not removed, to provide clearance, so long as no more than half the total height of the tree is cleared of limbs. The park botanist would be consulted prior to any action being taken when any sensitive or nonnative plants are present in the trail corridor.

Trail maps and information, as well as regulatory information, are posted at all trail heads. Trailheads are signed in both directions on the road 500 feet before the parking area. Trail junctions have signs indicating directions to other trails and facilities and include mileages.

Class 4 Trails. These highly developed trails provide opportunities to recreate and support the discovery of natural and human history. Experiences along these trails will be highly social at times. Visitor amenities and services will provide a moderate to high degree of visitor comfort highlighted by interpretive content (i.e., waysides, restrooms, bridges).

Class 4 Standards. Class 4 trails enable visitors universal access to recreational hiking in the natural environment, and connect important visitor facilities in the park's frontcountry. Trails are designed to comply with the *Architectural Barriers Act Accessibility Standards*.

Tread is 36"—72" wide, built using full bench cut construction. Where the tread width is less than 60" for long sections, passing spaces (minimum 60"x 60") are provided at a minimum of every 200'. Running slope on Class 4 trails is 5% or less, although steeper sections exist over shorter runs: 8% for up to 200', 10% for 30', and 12.5% for 10'. Crowned or outsloped tread surface is maintained up to 2%; 15% grade and 5% cross slope are allowed for runs up to 5' to allow for proper

drainage. Trail tread is elevated through wet areas, and ditches and culverts are used to provide the necessary trail drainage and mitigate dewatering the native vegetation. Retaining walls and crib walls are used to stabilize tread.

No checks or steps are present that create barriers in the hiking surface. Retaining structures—rock, log, gabion or other design—may be used to reduce the trail running grade, support the edge of the trail, and to support switchbacks. Bridge structures are constructed of engineered steel or fiberglass materials for stingers and milled cedar planks for the decking and railings. Handrails are made using stone and mortar bases with rot-resistant rails. Benches for all trail classes are constructed of redwood 6" x 6" posts with redwood 4" x 6" seating and backrests. Retaining walls and other constructed features are built to match the historic architecture of the park. All stone and mortar work is to follow guidelines laid out in the *Preservation Guide For Stone Masonry and Dry-Laid Resources* manual. Fill slopes and retainers are revegetated using appropriate site-specific, native genotypes and evidence of constructed and imported features is hidden. Social trails causing resource damage are covered with loose forest litter such as branches, rocks, and needles.

The trail corridor is cleared of all vegetation 8' high, as well as 2' beyond the width of the trail tread. Trees more than 6 inches in diameter located on the edge of the trail are limbed, not removed, to provide clearance, so long as no more than half the total height of the tree is cleared of limbs. The park botanist would be consulted prior to any action being taken when any sensitive or nonnative plants are present in the trail corridor.

Trail maps and information, as well as regulatory information, are posted at all trail heads. Trailheads are signed in both directions on the road 500 feet before the parking area. Trail junctions have signs indicating directions to other trails and facilities and include mileages.

Class 3 Trails. This developed trail class provides opportunities for quiet and contemplative experiences with a moderate level of visitor amenities and services to support social opportunities for small groups (i.e., vaulted toilets, picnic tables, and primitive campgrounds). Sights and sounds of others may be present on these trails, however, natural sights and sounds would predominate.

Class 3 Standards. Class 3 trails provide recreational hiking opportunities in the frontcountry, accessing scenic views and destinations. Class 3 trails also provide for backcountry recreational hiking and stock use.

These trails are generally built with native tread 24"—48" wide, and roots are removed from tread surface. Running slope on class 3 trails is 12% or less when possible to maximize the accessibility of the trail and provide the most sustainable hiking surface. Steeper sections of trail exist when the natural environment or destination requires it.

Trail construction is full bench construction along curvilinear alignment, with grade reversals and out-sloping tread providing cross-slope drainage. Across flat, wet ground and poor soils, turnpike construction is underlain with engineering fabric and filled with native crush and gravel (fabric is not used in the park's proposed wilderness areas). Turnpike may be unbound, rock, gabion, or log bound. Ditching, culverts, and open rock culverts are installed as needed to provide drainage and mitigate dewatering the native vegetation.

Backcountry water crossings will comply with WHIS bridges standards or modified to suitable low water crossings that do not interfere with stream flow.

Frontcountry (no stock) trail corridors are cleared of all vegetation 8' high, as well as 1' beyond the width of the trail tread. Trees more than 6 inches in diameter located on the edge of the trail are limbed, not removed, to provide clearance, so long as no more than half the total height of the tree is cleared of limbs. The park botanist would be consulted prior to any action being taken when any sensitive or nonnative plants are present in the trail corridor. Fill slopes and retaining structures are covered with vegetation and evidence of constructed and imported features is hidden when possible. Social trails causing resource damage are covered with loose forest litter such as branches, rocks, and needles.

Backcountry (no stock) trail corridors are cleared of all vegetation 8' high, as well as 1' beyond the width of the trail tread. Trees more than 6 inches in diameter located on the edge of the trail are limbed, not removed, to provide clearance, so long as no more than half the total height of the tree is cleared of limbs. The park botanist would be consulted prior to any action being taken when any sensitive or nonnative plants are present in the trail corridor. Backcountry (stock) trail corridors are cleared of all vegetation 10' high, as well as 2' beyond the width of the trail tread. Large-diameter trees located on the edge of the trail are limbed, not removed, to provide clearance, so long as no more than half the total height of the tree is cleared of limbs.

Trail maps and information, as well as regulatory information, are posted at all trailheads. Trailheads are signed in both directions on the road 500 feet before the parking area. Trail junctions have signs indicating directions to other trails and facilities but may not include mileages.

Class 2 Trails. Opportunities for quiet and a sense of solitude will occur along these moderately developed trails. Signs of human development will be minimal to support discovery and immersion within natural habitat. Visitor amenities and services support basic visitor access and navigation.

Class 2 Standards. Class 2 trails utilize abandoned fire roads as a trail tread. These trails are connector trails to access the Pacific Crest Trail and other backcountry destinations. Tread is usually wider than trail standards and in-sloped, creating an unsustainable surface. Road structures such as culverts may be present along the routes and are maintained only to protect the trail tread. Vegetation and trees are not cleared to normal standards to allow the corridor to shrink to normal trail standards. Where possible, trail tread would be reduced by removing excess tread surface area. Drainage structures such as water bars and check bars are abundant to attempt to control water erosion and for resource protection.

Trail maps and information, as well as regulatory information, are posted at all trail heads, but directional signage along the trails is minimized.

Class 1 Trails. These trails include abandoned trails or roads used only to access backcountry areas with ease. Trails and roads in this trail class have not been rehabilitated to a natural state. Rather, managers have allowed these trails to regrow naturally. Fire crews and Resource staff use these trails/roads for ease of access.

Class 1 Standards. Class 1 trails are abandoned trails or roads that provide visitors/staff access to backcountry areas or features in the park that are not publicized. These trails may require route finding. No formal construction or maintenance occurs on Class 1 trails. Constructed features are not maintained but may be removed if necessary and signage removed if present.

SECTION 3. MAINTENANCE PROCEDURES

Whiskeytown National Recreation Area Maintenance Procedures

Section 3.1 BRUSHING

All brushing activities would comply with the NPS *Guide to Sustainable Mountain Trails* (2007) and the USFS *Trail Construction and Maintenance Notebook* (2007).

3.1.1 Corridor Clearing

Brush, branches, and downed trees may interfere with pedestrian traffic and limit hikers' visibility of one another and wildlife. All trees and brush more the 12" above ground would be cut to a 2- to 4-inch stump from within 4' of the centerline of the trail tread. All brush greater than 6 inches tall would be cut to a 2- to 4-inch stump within 1' of the trail tread. Trees would be cut low to the ground with hand saws and chainsaws. Brush would be removed with loppers or handsaws. Special consideration would be given to visitor viewshed and aesthetic; tree and brush removal would be done selectively to maintain a natural characteristic and prevent the creation of a linear brush line. No ground soil is disturbed in this process.

Limbs that must be removed from trees would be cut flush with the trunk, leaving no stubs, and shall be undercut to prevent tearing of the bark. Trees that are limbed over 50% of their height should be removed completely. Trees with a diameter of 6 inches or less would be removed from the trail corridor (4 feet from centerline of the trail tread).

The park botanist would be consulted prior to any action being taken on sensitive species or in areas of invasive plants.

3.1.2 Backslope Clearing

The backslope of a bench cut trail will be cleared of all brush that interferes with the flow of traffic. In areas where the surface vegetation is creeping down the backslope or into the tread, the vegetation will be trimmed off the backslope and dispersed or used for covering social trails. Vegetation growth is encouraged on backslopes when feasible to stabilize soil and bedrock and deter use by bikes.

3.1.3 Tread Encroachment

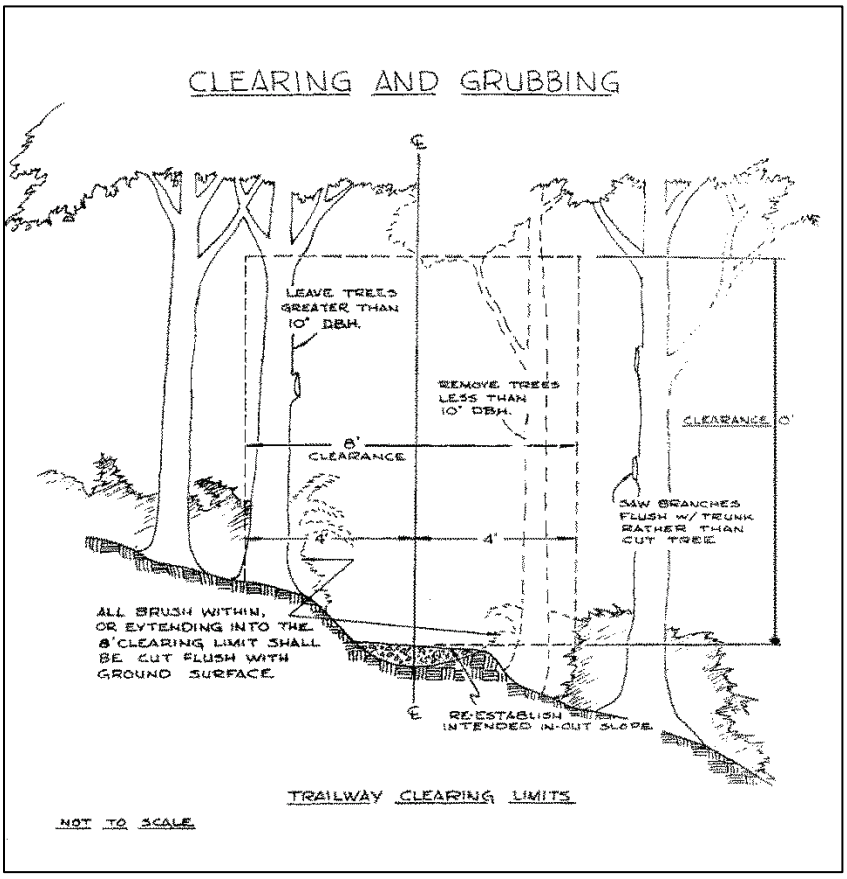
Vegetation and root matter that creeps into the trail tread would be removed. Vegetated berms on the downslope of the trail would be grubbed and removed with hand tools. Organic matter would be separated from the tread material and removed before the tread is reshaped and compacted.

3.1.4 Downed and Leaning Tree Removal

Trees that have fallen on backcountry trails and are blocking pedestrian traffic shall be removed once per season. Trees are bucked out of the trail corridor 4 feet from the centerline of the trail and 10 feet overhead. Backcountry trails can be cleared with chainsaws. Trees fallen on high use frontcountry trails would be removed immediately by the trail crew. Trees are bucked out of the trail corridor 3 feet from centerline of the trail or 1 ½ feet from the trail edge on wider trails and 8 feet above the trail. Leaning or fallen trees blocking an 8'-10' trail height corridor would be removed or trimmed to provide clearance.

3.1.5 Slash Dispersal

Cut vegetation (slash) would be dispersed out of sight of trail corridors. When the amount of cut vegetation exceeds a location's capacity to properly hide the brush, it would be piled (jackpotted) for burning, by a certified individual, at an appropriate time of year.



Section 3.2 TREAD MAINTENANCE

This section governs the methods of tread repair and maintenance; material grading and replacement, preparation of native soil and imported sub-grades, importation of aggregates, and compaction. All tread maintenance activities would comply with the NPS *Guide to Sustainable Mountain Trails* (2007) and the USFS *Trail Construction and Maintenance Notebook* (2007).

3.2.1 Tread Surface

The goal of surface maintenance, replenishment, and compaction is to provide the park's trails with a firm, tractionable, and maintainable surface free from washouts, puddling, loose gravel accumulation or any deviation in grade or outslope beyond the trail design standards.

Tread material in backcountry and frontcountry settings is primarily native soil. Concerning the existing tread surface to design standards for outslope and tread width would minimize the need to import new tread material. Durable tread material would be imported from maintenance pits located inside the park and approved be the park botanist prior to use.

Trailside barrow pits would not be used on frontcountry trails. For backcountry barrow pits, only uprooted large tree wells would be used.

Surface material used on Whiskeytown trails is typically either native material or Mule Mountain Stock acquired from Crystal Creek Quarry. Any material that is imported and used as tread material in the recreation area would be inspected by Whiskeytown cultural and natural resource managers. The application of surface materials provides the walking surface for the trail and is approximately 2" thick. Imported tread material is delivered using gravel bags, power or manual wheelbarrows, or some combination of these types.

Maintenance to tread materials involves the raking and reshaping of existing materials and/or the importation of new volumes. The combination of use, settling, and erosion requires improvements to tread periodically on most trails. Maintaining trail tread ensures longevity and safety of the trail. Trail tread is to be shaped for appropriate sheet flow and drainage, including outslope, in slope (into ditches), and crowning.

3.2.2 Base/Subgrade Materials

Whenever possible, native materials at the site of the trail construction or repair would be used as the trail's base. Ideally, these materials are free of clays, organic matter, excessive moisture, or other structurally unsound material. The depth of base materials would vary significantly by location but is ideally no less than 2" thick. Also, when needed, gravel (1" minus or similar) may be imported (using the same tools and techniques for import of tread material) to establish a sound base in areas with moist and unstable soils. Gravel acquisition sites and policies are addressed in Section 3.2.1.

Crushed aggregates, native rock, would be added to the subsurface layers of the trail to compensate for material lost because of erosion and subsidence.

3.2.3 Surface Preparation

Scarifying or rough grading to the lower depth of surface irregularities would be done across the entire travel surface width in the area to be worked. Excess subgrade material exposed in the rough grading process would be redistributed along the trail or transported and stockpiled for future trail projects.

In areas where removal and stockpiling of subsurface material is not feasible, the material would be sidecast or dispersed. All cast soil should be spread evenly with careful consideration given to its final location, so as not to bury and/or cover vegetation growing along the trail corridor. Proper disposal minimizes the visual impacts to visitors and disturbance to the natural environment. No materials would be cast or dispersed into riparian areas.

This work can be done with power wheelbarrow equipment on trails within each trail class outlined in the trail management plan that can withstand such traffic. Hand picks and grubbing tools would be used as needed on all other trails. Trail width shall conform to the trail design standard.

3.2.4 Compacting

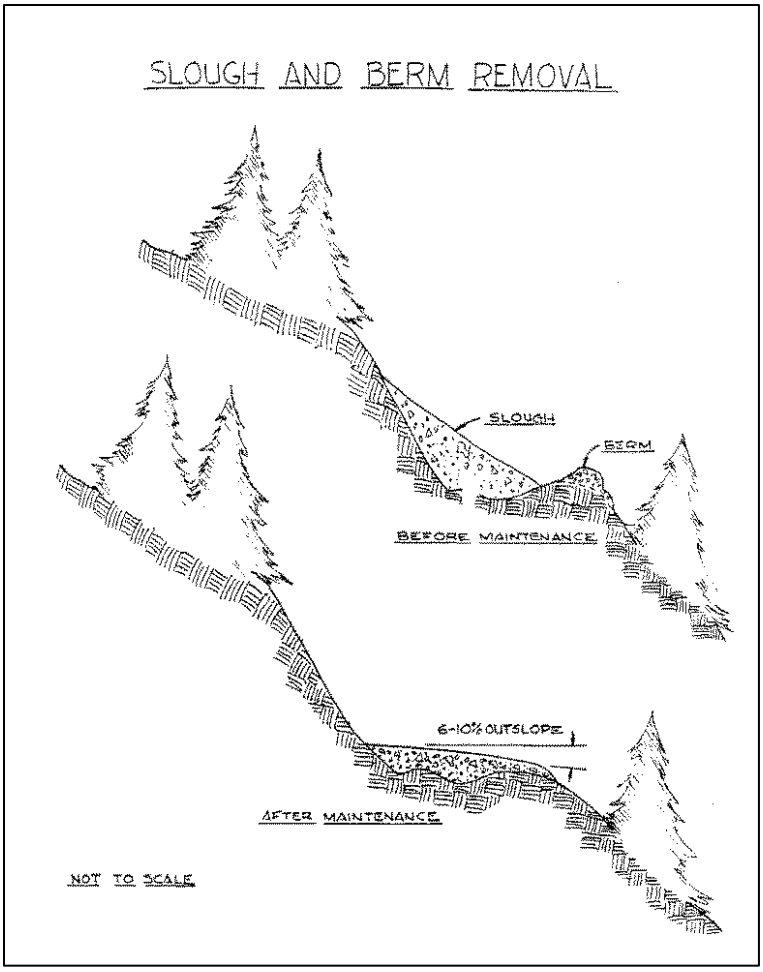
Mechanical compaction is acceptable for all trails and is encouraged when possible. Handheld plate compactors would be used when mechanical compaction is not possible. In all cases, compaction must occur. Whenever possible, the moisture content on trails would be brought to optimum levels by adding water or by drying existing material. Water may be added to stockpiles or directly to surface trail material when waiting for rain is not prudent or feasible. Water for compaction and revegetation can be obtained from recreation area spigots; ample, flowing streams, or Whiskeytown Lake.

3.2.5 Slope Maintenance

All slopes adjoining trails or on which trails sit collect and direct water flow. All slopes function best and avoid collapse if built to no more than a 45% slope. Backslopes and trail tread slope would be designed to adequately handle foreseeable water volumes within that specific area. Backslopes would

be maintained to allow for unrestricted drainage to an established drainage structure or by outsloping the trail tread to achieve sheet flow over the trail. This would include yearly periodic grading, shaping, and clearing to maintain a smoothly uniform drainage system that is free from obstruction, ponding, or areas of settlement. Backslopes and downslopes shall, with rare exception, be comprised of local, native material. Fill slopes may be native material or imported gravel based on trail class and location.

Additionally, effective delineation of the downslope is important to keep hikers on the actual trail and to prevent the perception that one is to walk where the downslope begins. Reshaping downslope sections and fill slopes may be periodically necessary to clarify the proper trail tread location.



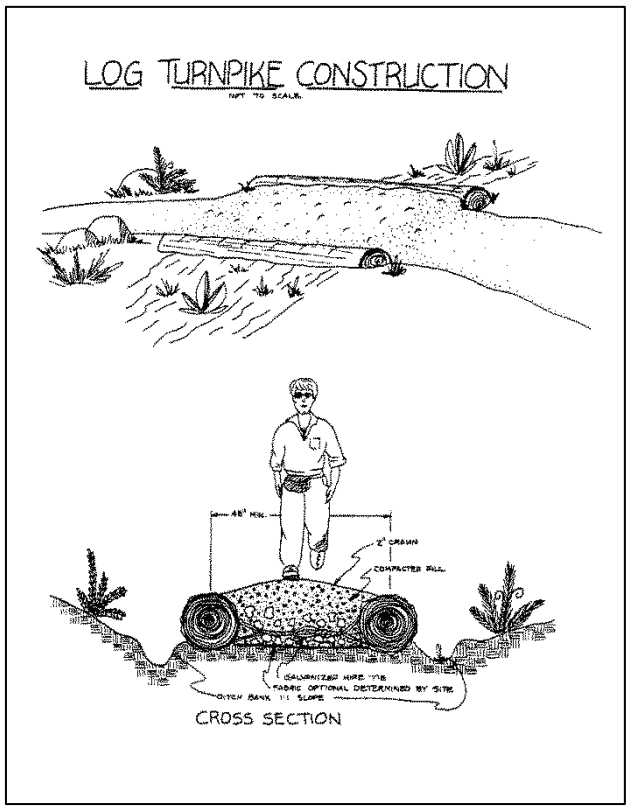
Section 3.3 TRAIL STRUCTURE MAINTENANCE

The goal of structural trail maintenance and repair is to provide the park's trails with safe and maintainable hiking surfaces, while at the same time protecting natural resource. Trail Design Standards and Trail Management Objectives determine the user type, use level, and construction techniques are needed to bear the intended use.

Maintenance or repair activities that address these elements are as follows: surface and base materials, engineered cloths and hardening structures; subsurface drainage (e.g., use of crush), downslopes and stabilization structures including crib walls, gabions, turnpikes, etc. Surface materials and maintenance are addressed in Section 3.2 of this document.

Drainage structures including drains, ditches, culverts, etc., are another integral part of trail structure. Common drainage structures found on Whiskeytown trails and maintenance of these structures is covered in Section 3.4 of this document.

All trail structure maintenance activities would comply with the NPS *Guide to Sustainable Mountain Trails* (2007); the USFS *Trail Construction and Maintenance Notebook* (2007); and the California State Parks *Resources Agency Department of Parks and Recreation Trail Handbook* (1991).



3.3.1 Turnpikes and Causeways

Turnpikes and causeways elevate the trail above the surrounding landscape, often serving to keep the tread drier than the surrounding terrain. Turnpikes are bound by logs or stones and may employ the use of lateral ditches and cross drains. Original construction of bound turnpikes may require transport of materials using either human-power or machinery depending on the trail class. Hardware such as rebar or spikes may also be used in the construction of these structures. Upkeep of turnpikes and causeways may occasionally require complete replacement as rocks and logs disconnect from the structure through either erosion or rotting. Basic maintenance includes removal of organic material and soil from wooden surfaces, replacing hardware protruding from the structure, and reshaping the tread surface and approaches. Work under this document only pertains to existing structures. Areas needing turnpikes or causeways would be a separate project with specific compliance.

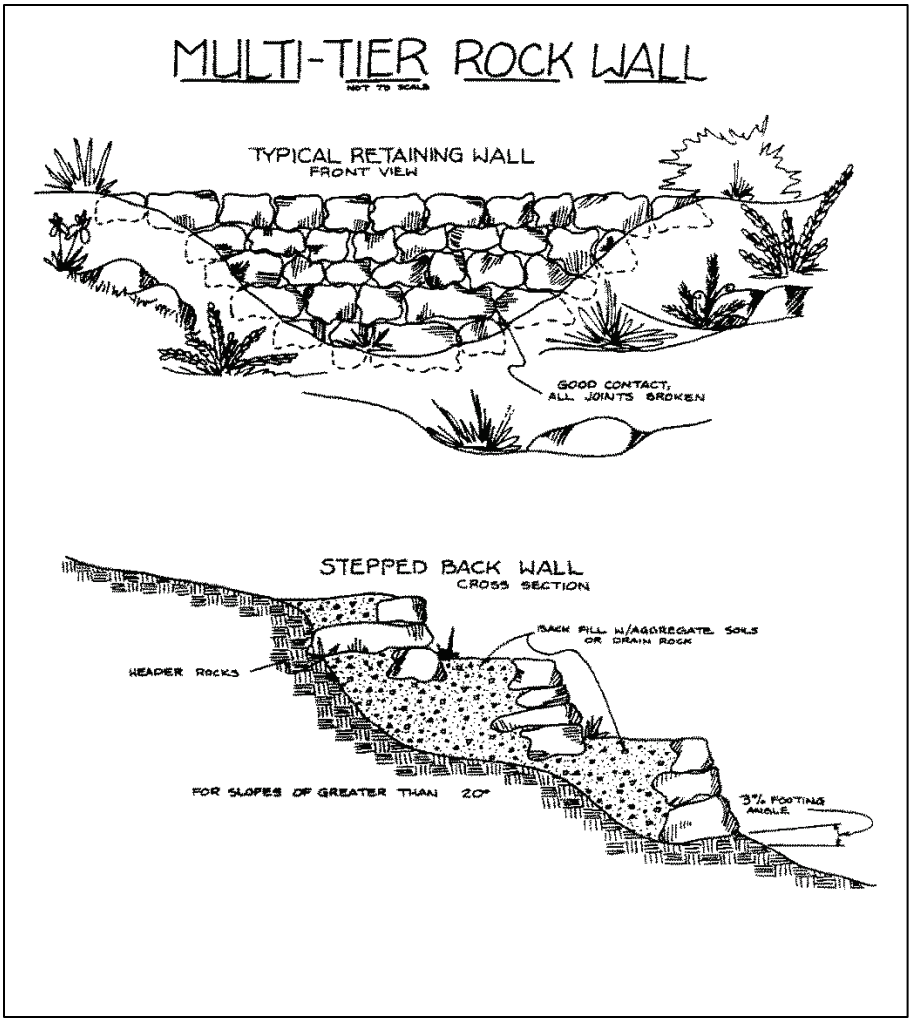
3.3.2 Retaining Walls

Retaining walls can be built using a variety of different techniques and materials and are used to keep materials in place that might otherwise quickly erode (e.g., downslope areas with sandy soils). Whenever possible, less obtuse solutions for effective trail construction should be employed and more significant construction of these types of structures should be used whenever conditions demand or Trail Class absolutely require such structures.

Whiskeytown uses log crib walls and rock retaining walls (mortared and dry masonry) in a variety of locations throughout the park. These structures are built in durable fashion using adequately sized materials (e.g., seasoned logs measuring greater than 8"). Retaining structures are constructed to blend into the landscape as much as possible. Local materials would be used whenever possible; however, no live trees would be harvested for construction purposes, with the exception of knobcone and gray pine.

The current treated wood cribbing would be replaced with rot-resistant wood cribbing on the downhill side of the trail and dry-stack stone retaining walls on the uphill side of the trail. The wood cribbing has proven to be a viable and long-term solution for erosion on steeper sections of this trail.

Maintenance of retaining wall structures includes replacing loose or rotten materials, restoring the fill material behind the wall, and checking for erosion under the wall. Rock structures that have become loose and wobbly should be dismantled and rebuilt using the same materials if possible.



3.3.3 Bridges

The goal of bridge maintenance and repair is to provide the traveling public with safe and adequately maintained bridges. This Trails SOP only applies to trail bridges currently being used by the park; any replacement of a bridge would require additional compliance.

Repair needs shall be identified during annual condition assessment inspections and repairs made on a scheduled or as-needed basis. All components of the bridge, including approaches, abutments, stringers, decking, hardware, towers, and railings would be inspected for functionality. Rotten materials would be noted, assessed, and replaced as needed.

The park's trail bridges are designed to bear the appropriate visitor traffic and snow load. Accordingly, any repair shall not reduce the bearing capacity of the structure. Park engineers would be consulted as needed to determine if changes may impact the load-bearing capacity of the structure.

Abutments and pilings may be protected as needed to prevent stream erosion occurring alongside the bridge structure. Rock would not be gathered from within the streams. Work would not change the stream flow or create new channels.

Wood components of the bridges would be treated with wood preservative (i.e., linseed oil). Sill logs would be replaced when rot has significantly reduced the structural integrity. Sills that have been eroded may be elevated or stabilized with rock, gravel, or replacement sills. Rotten decking would be replaced as needed, and hazards would be removed. Log handrails and bull rails would be reinforced or reattached with new hardware as needed, and they would be replaced when they are no longer functional.

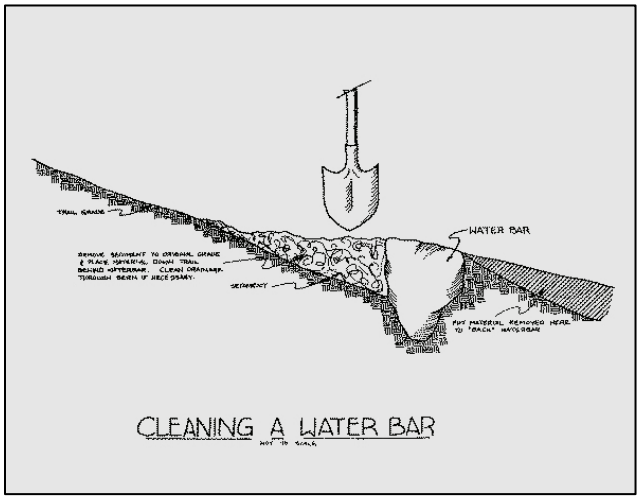
Section 3.4 TRAIL DRAINAGE MAINTENANCE

This section governs the methods of repair, installation and maintenance of drainage systems and their components. The goal of drainage system repair and maintenance, including installation of components such as water bars, is to provide trails with management of water flow type, volumes, and rates affecting Whiskeytown trails.

Routine maintenance would occur annually to prevent build-up of sediments, debris and encroaching vegetation. Site-specific structural inspections would also be conducted. Maintenance of any failing structures would be undertaken as needed. Native rock or wood would continue to be used for these structures and gathered locally, if possible. No live trees would be used for maintenance purposes, except for knobcone and gray pine. Native rock composed of Mule Mountain Stock can be obtained outside of the park from Crystal Creek Quarry and used when needed.

3.4.1 Open Drains, Grade Dips and Swales

Interruptions to the prevailing grade of the trail tread permits fall-line bound water to exit the trail surface. Simple open drains are shallow trenches, 6-12 inches deep, placed in the tread perpendicular to (or near perpendicular to) the tread, which permit the water to depart the trail. Grade dip structures "reverse" the prevailing grade of the trail, temporarily halting the flow of water and directing the water off the tread and should be a part of initial construction. At times, drains and dips may require hardening, including the installation of native material such as crush, rip rap, or large stones. Drains and grade dips may require periodic cleaning, tread work, and reshaping using hand tools.



3.4.2 Water Bars

Water bars use either rocks or wood to form an "apron" that catches water and directs it off the trail. Water bars tend to require maintenance as tread material erodes around either the wood or rocks out of which the "bar" is constructed. Installing additional material, maintaining the appropriate shape of the drain/apron, and clearing ditches associated with water bars are all parts of routine upkeep.

3.4.3 Ditches

Ditches located alongside trails are used to catch water traveling on either side of the trail in an effort to keep the water from pooling/running on the trail tread. Where a side slope is present, ditches are most often placed on the uphill side of the trail to catch water as it sheds downhill and direct water to established drains or culverts along the trail. Ditching may also be installed to catch water as it sheet flows off the side of a trail built with a 2% outslope or exits a drain. Ditches should be constructed such that they are ample in volume (up to 2' wide and 18" deep). As pertinent, ditches may be hardened with crush or other material and/or revegetated with plants to allow roots to add stability to the ditch's backslope. Ditches require routine maintenance to clear organic and soil debris that sloughs into the ditches periodically. Ditching is rarely used in sustainable trail construction.

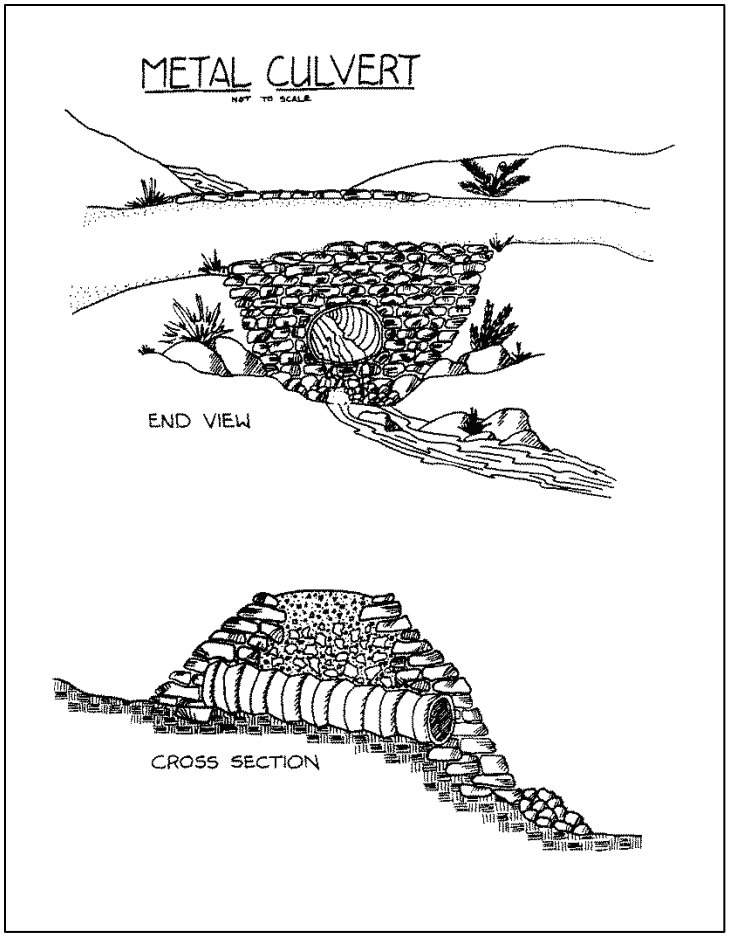
3.4.4 Culverts

Culverts can be open (trail tread would be interrupted) or closed (trail would travel over culvert relatively uninterrupted) and can be made of metal culvert material, rocks, or wood. All culverts would require seasonal cleaning both in and around culvert entrances and exits. Closed culverts at Whiskeytown occur primarily on trails that utilize abandoned fire roads. Where possible, these culverts would be removed and replaced with a bridge or other more suitable structure such as a low water crossing that does not interfere with stream flow. This action is outside of the scope of the compliance of the trail management plan and is only mentioned here for clarification.

Section 3.5 TRAIL SIGNAGE MAINTENANCE

This section governs the maintenance and repair of signs and markers at trailheads and along the park's trails. The goal of sign and marker maintenance and repair is to provide the park's visitors with appropriate directional information, maps, as well as safety and regulatory information.

Repair and maintenance to these elements shall be done on a periodic basis to stay accurate and accessible. As the trail system changes, accurate signs would replace outdated ones.



3.5.1 Signs and Markers

Construction, appearance and location of all Whiskeytown trail signs would follow guidance and approval of the Whiskeytown Sign Committee.

SECTION 4. REFERENCES

Birkby, Robert C.
2005 Lightly on the Land. The SCA Trail Building and Maintenance Manual, Second Edition. Published by the Mountaineers Books, Seattle, WA.

California Department of Parks and Recreation
1991 Trails Handbook. The Resources Agency Department of Parks and Recreation.

US Department of Agriculture
2007 USFS Trail Construction and Maintenance Notebook.

US Department of the Interior
2007 NPS Guide to Sustainable Mountain Trails.

US Department of Agriculture and US Department of the Interior
2011 FGDC Federal Trail Data Standards. FGDC Document Number FGCD-STD-017-2011.

This page intentionally blank.

APPENDIX E – BIKE MATRIX

Trail Name	TRLCODE	Action	Steep (>20% Slope in Sections)	Highly Erosive Soils	History of Bike Use	Signs of Trail Erosion (Bikes)	Safety Issues (Bikes)	Potential User Group Conflicts (Bikes)	Significant Natural Resources Being Impacted	Significant Cultural Resources Being Impacted	Comments
Boulder Creek	BOCR	Reroute	Y	N	Y	N	N	N	Y	N	
Boulder Creek Falls	BOCF	Reroute	N	N	N	N	N	N	N	N	No Bikes Allowed
Brandy Creek	BRCR	Reroute	Y	N	Y	N	Y	Y	Y	N	
Brandy Creek Falls	BRCF	Reroute	N	Y	Y	N	Y	Y	N	N	No Bikes Allowed past intersection with Rich Gulch Trail
Brandy Creek Picnic	BRCP	No Action	N	N	Y	N	N	N	N	N	Paved
Brandy Creek RV	BRRV	No Action	Y	N	Y	N	N	N	N	N	
Buck Hollow	BUHO	No Action	N	N	Y	Y	N	Y	Y	N	
Camden Water Ditch	CAWD	No Action	N	N	Y	N	N	N	N	Y	
Clear Creek Canal	CLCC	Reroute	Y	Y	Y	Y	Y	Y	Y	Y	
Clear Creek Vista	CLCV	Reroute	Y	N	Y	N	Y	N	N	Y	
Crystal Creek Falls	CCFA	No Action	N	N	Y	N	N	N	N	N	Paved

Trail Name	TRLCODE	Action	Steep (>20% Slope in Sections)	Highly Erosive Soils	History of Bike Use	Signs of Trail Erosion (Bikes)	Safety Issues (Bikes)	Potential User Group Conflicts (Bikes)	Significant Natural Resources Being Impacted	Significant Cultural Resources Being Impacted	Comments
Crystal Creek Water Ditch	CCWD	No Action	N	N	N	N	N	N	N	N	
Davis Gulch	DAGU	Reroute	Y	N	N	N	N	N	N	N	No Bikes Allowed
Guardian Rock	GURO	No Action	N	N	Y	N	Y	N	N	Y	
Horsetail Canyon	HOCA	Remove	Y	N	N	N	Y	N	Y	N	WES Trail
Hydraulic Mine	HYMI	Reroute	Y	N	Y	Y	Y	y	Y	N	
James K. Carr	WHFA	Reroute	Y	Y	Y	N	N	N	N	N	No Bikes past intersection with Mill Creek Trail
Kanaka Cutoff	KACU	Remove	Y	Y	Y	Y	Y	N	Y	N	
Kanaka Peak	KAPE	No Action	Y	N	Y	N	N	N	N	N	
Knobcone	KNOB	No Action	N	N	Y	N	N	N	N	N	
Ladybug Lane	LADY	No Action	Y	N	N	N	N	N	N	N	WES Trail
Logging Camp	LOCA	No Action	N	N	Y	N	N	N	N	N	
Martha's Ditch	MADI	No Action	N	N	N	Y	N	N	N	N	WES Trail
Mill Creek	MICR	Reroute	Y	N	Y	N	Y	N	N	N	

Trail Name	TRLCODE	Action	Steep (>20% Slope in Sections)	Highly Erosive Soils	History of Bike Use	Signs of Trail Erosion (Bikes)	Safety Issues (Bikes)	Potential User Group Conflicts (Bikes)	Significant Natural Resources Being Impacted	Significant Cultural Resources Being Impacted	Comments
Mill Creek	MCRD	Reroute	Y	Y	Y	N	Y	N	N	N	
Mount Shasta Mine Loop	MSML	Reroute	Y	Y	Y	Y	Y	y	Y	Y	
Mule Mountain Loop	MUML	No Action	N	N	Y	N	N	N	N	N	
Mule Mountain Pass	MUMP	Reroute	Y	N	Y	Y	Y	y	Y	Unknown	
Oak Bottom Water Ditch	OBWD	Reroute	N	N	Y	N	N	Y	N	Y	
Papoose Connector	PACO	No Action	N	Y	Y	N	N	N	N	N	
Papoose Pass	PAPO	Reroute	Y	Y	Y	Y	Y	Y	Y	N	
Peltier	PELT	Reroute	Y	Y	Y	N	Y	N	N	N	
Princess Ditch	PRDI	No Action	N	N	Y	N	N	Y	N	Y	
Prospect	PROS	Reroute	Y	Y	Y	N	N	N	N	Y	
Rich Gulch	RIGU	Reroute	Y	Y	Y	Y	Y	Y	Y	N	
Ridge	RIDG	No Action	N	N	Y	N	N	N	N	N	
Salt Creek	SACR	Remove	Y	Y	Y	Y	Y	N	Y	N	

Trail Name	TRLCODE	Action	Steep (>20% Slope in Sections)	Highly Erosive Soils	History of Bike Use	Signs of Trail Erosion (Bikes)	Safety Issues (Bikes)	Potential User Group Conflicts (Bikes)	Significant Natural Resources Being Impacted	Significant Cultural Resources Being Impacted	Comments
Salt Creek Mine	SCMI	Remove	Y	N	Y	N	Y	N	N	N	WES Trail
Salt Gulch	SAGU	Reroute	Y	N	Y	Y	Y	Y	Y	N	
Shasta Divide Nature	SHDN	No Action	N	N	N	N	Y	N	N	N	
Tower Grave	TOGR	No Action	N	N	Y	N	N	N	N	N	
WES Emergency Access Road	WECA	No Action	Y	N	Y	N	N	N	N	N	

APPENDIX F – LIFECYCLE COSTS

Total Cost of Facility Ownership (TCFO) Calculations for Action Alternative: Summary of Facility Operations and Maintenance Costs and Labor Requirements

To estimate costs for new trails under the preferred alternative, costs were broken down into one-time construction costs and 25-year life cycle costs. The trails were divided into trail class then converted to linear feet for estimating life cycle costs under a Total Cost of Facility Ownership (TCFO) calculator. The sum of the construction costs and life cycle costs provide a cost estimate under the preferred alternative. Table E-1 provides a summary of the new trails and their mileage.

Table E-1: Trail Lengths By Class

Trail	Class II	Class III	Class IV	Class V
Crystal Creek Camp Trail		0.5		
Camden Water Ditch Trail		0.3		
Clear Creek Canal Trail		0.4		
Clear Creek Picnic Trail				0.3
Davis Gulch Trail			1.1	
East Boundary Vista Trail		1.4		
Guardian Rock Equestrian Trail		0.3		
Horsecamp Trail		0.4		
Mill Creek Trail		2.6		
Mount Shasta Mine Loop Trail		2.7		
Mule Mountain Pass Trail		0.8		
Orofino Trail	0.3			
Papoose Pass Trail		2.5		
Peltier Bridge Trail		0.6		
Prospect Trail		0.7		
Salt Gulch Trail		2		
Shasta Divide Trail		7		
Whiskeytown Lake Trail				8.3
Total Miles	**0.3**	**22.2**	**1.1**	**8.6**
Linear Feet	**1,584**	**117,216**	**5,808**	**45,408**

Class II, III, and IV will be non-paved trails constructed and maintained by park staff. One-time construction costs for Class II (.3 miles), III (22.2 miles), and Class IV (1.1 miles) dirt trails are estimated at $40,000 per mile. Tables 2-4 include the construction costs for each trail class. Class II trails are assumed to be 3 linear feet wide and utilize abandoned fire roads as a trail tread. These trails are connector trails to access the Pacific Crest Trail and other backcountry destinations. Tread is usually wider than trail standards and in-sloped, creating an unsustainable surface. Class III trails are assumed to be 4 linear feet wide and will generally be built with native tread 24"—48" wide, and roots are removed from tread surface. Running slope on class 3 trails is 12% or less when possible to maximize the accessibility of the trail and provide the most sustainable hiking surface. Steeper sections of trail exist when the natural environment or destination requires it. Class IV trails are assumed to be 5 linear feet wide. Tread is 36"—72" wide, built using full bench cut construction. Where the tread width is less than 60" for long sections, passing spaces (minimum 60"x 60") are provided at a minimum of every 200'. Running slope on Class 4 trails is 5% or less, although steeper sections exist over shorter runs: 8% for up to 200', 10% for 30', and 12.5% for 10'. Crowned or outsloped tread surface is maintained up to 2%; 15% grade and 5% cross slope are allowed for runs up to 5' to allow for proper drainage. Trail tread is elevated through wet areas, and ditches and culverts are used to provide the necessary trail drainage and mitigate dewatering the native vegetation. Retaining walls and crib walls are used to stabilize tread. All of the trails are assumed to have a 2-foot corridor on both sides with slight fluctuation in grade.

Trail life cycle costs are estimated over a 25-year period into the following categories: component renewal, recurring maintenance, preventative maintenance, unscheduled maintenance, and facility operations. Component renewal is work activities that occur to replace a component or system at the end of its useful life. Recurring maintenance are work activities that occur on a cycle based on expected wear patterns. Preventative maintenance are work activities that regularly occur to lessen the likelihood of failure. Unscheduled maintenance are work activities that occur after failure and restore a component to operational condition. Facility Operations are work activities that regularly occur and are required for normal performance. The sum of these categories provide an estimate for total life cycle operation and maintenance. Tables E-2 through E-4 summarize the labor hours and life cycle costs for Class II, III, and IV trails.

Table E-2. Class II 25-Year Life Cycle Costs

Class II 25-year Life Cycle Costs	Labor Hours	Life Cycle Costs
Component Renewal	306	$64,560
Recurring Maintenance	434	$28,355
Preventative Maintenance	101	$3,665
Unscheduled Maintenance	3	$380
Facility Operations	195	$7,053
Total Life Cycle O&M		**$104,013**
Construction		**$12,000**

Table E-3. Class III 25-Year Life Cycle Costs

Class III 25-year Life Cycle Costs	Labor Hours	Life Cycle Costs
Component Renewal	19	$4,168
Recurring Maintenance	3,492	$127,336
Preventative Maintenance	3,073	$111,400
Unscheduled Maintenance	2	$323
Facility Operations	5,150	186,475
Total Life Cycle O&M		**$429,702**
Construction		**$888,000**

Table E-4. Class IV 25-Year Life Cycle Costs

Class IV 25-year Life Cycle Costs	Labor Hours	Life Cycle Costs
Component Renewal	306	$61,669
Recurring Maintenance	1,048	$50,599
Preventative Maintenance	265	$9,602
Unscheduled Maintenance	3	$380
Facility Operations	4,489	$162,444
Total Life Cycle O&M		**$284,694**
Construction		**$44,000**

A section of the Clear Creek Picnic Trail and the Whiskeytown Lake Trail will be Class IV trails paved with asphalt. The estimate below assumes work will be performed by a contractor. One-time construction costs for an asphalt trail 5 linear feet wide, with a 2-foot corridor on both sides, and 3 inches thick with a relatively flat grade is estimated at $1,000,000 per mile. Under the preferred alternative, the park would add 8.6 miles of trail. Total construction costs for the Class V trails are $8,600,000. Using a total cost of facility ownership calculator, the 25-year life cycle costs for the Class V asphalt trails is $11,255,062. Tread is paved asphalt or other hardened surface, at least 60” wide with gravel shoulders. Trail is built using turnpike or bench cut construction, and grades are 5% or less. Outslope on the trail is 2% or less. Trail tread is elevated through wet areas; ditches and culverts are used to provide the necessary trail drainage. Fabric underlayment and well-drained, sub-grade materials are used to mitigate poor soil types.

Table E-5. Class V 25-Year Life Cycle Costs

Class V Asphalt 25-year Life Cycle Costs	Labor Hours	Life Cycle Costs
Component Renewal	15,049	3,075,405
Recurring Maintenance	1,230	$205,211
Preventative Maintenance	1,538	$55,871
Unscheduled Maintenance	457	$134,366
Facility Operations	144,470	$7,784,209
Total Life Cycle O&M		**$11,255,062**
Construction		**$8,600,000**

Table E-6 summarizes the 25-year life cycle costs and construction costs for all of the trail classes. Under the preferred alternative, total life cycle costs are $12,073,471 and construction costs are $9,544,000. The sum under the preferred alternative is $21,617,471.

Table E-6. Construction and 25-Year Life Cycle Costs

Trail Class	25-Year Life Cycle Costs	Construction Costs
Class II	$104,013	$12,000
Class III	$429,702	$888,000
Class IV	$284,694	$44,000
Class V	$11,255,062	$8,600,000
Total	**$12,073,471**	**$9,544,000**