



Tenaya Lake Area Plan Environmental Assessment October 2010





IN REPLY REFER TO:
L7617 (YOSE)

United States Department of the Interior

NATIONAL PARK SERVICE

Yosemite National Park
P.O. Box 577
Yosemite, California 95389
September 22, 2010

Dear Yosemite Friends:

I am pleased to provide you with the *Tenaya Lake Area Plan Environmental Assessment* (EA) for your review and comment. The purpose of the plan is to develop management alternatives for the Tenaya Lake area, with specific planning at East Beach, Murphy Creek, and the Sunrise Trailhead and Old Campground areas. Development of this plan will allow the National Park Service (NPS) to manage and protect Yosemite's natural and cultural resources. Following public review of the EA, the NPS will refine the preferred alternative as necessary, prepare a Finding of No Significant Impact, and design development will begin.

This EA fulfills the requirements under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act. Public, tribal, and agency consultation has played an important role in developing this plan. Public scoping for the EA took place from September 4, 2008, through October 18, 2008, and several presentations were made at monthly Open House sessions held in Yosemite Valley to solicit comments, concerns, and ideas. Information has been available on the park's website and at Open Houses throughout public scoping and development of the EA. The park initiated consultation with American Indian Tribes which have cultural associations with Yosemite National Park on July 22, 2008, and conducted a site visit at Tenaya Lake on August 17, 2010. The planning team has integrated comments and ideas generated during the scoping period and consultation session into the range of alternatives for this plan.

A 30-day public review and comment period commences with release of this EA, and an announcement will be made in the local newspaper of record, via the Yosemite National Park e-newsletter, and on the park's website. Please refer to <http://www.nps.gov/yose/parkmgmt/tenaya.htm> for the comment period end date. Comments on the EA can be submitted electronically through the Planning, Environment and Public Comment (PEPC) website at www.parkplanning.nps.gov. You will find the EA listed under *Projects with Documents Open for Comment* on the PEPC homepage. Park staff will be available to answer questions and written comments will be accepted at the monthly Open House scheduled during the comment period. Hardcopies or CD's of the EA can be requested online at Yose_Planning@nps.gov. You may also mail or fax your comments to:

Superintendent, Yosemite National Park
Attention: Tenaya Lake Plan EA
P.O. Box 577, Yosemite, California 95389

FAX: (209) 379-1294

The park considers all public comments in making a decision, which will be documented in a Finding of No Significant Impact, if appropriate. If approved, implementation would begin in summer 2011.

We appreciate your interest and welcome your continued participation.

Sincerely,

Don L. Neubacher
Superintendent

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**Tenaya Lake Area Plan
Environmental Assessment**

Yosemite National Park

Lead Agency: National Park Service

ABSTRACT

Tenaya Lake is a magnificent High Sierra lake surrounded by granite domes, lodgepole forests, and Yosemite's vast wilderness. It is the largest natural lake in Yosemite. Because of its remarkable scenic qualities, its inviting blue water, and its proximity to Tioga Road, Tenaya Lake is one of the most popular destinations for summer visitors in Yosemite. Problems associated with visitor use, visitor safety, and resource impacts have been occurring for decades. The purpose of the Tenaya Lake Area Plan is to guide management actions by the National Park Service (NPS) in order to restore and protect resources while providing opportunities for appropriate high-country visitor experiences at Tenaya Lake.

This document presents environmental analysis of five alternatives that the agency is currently considering, for public input and review, in accordance with the National Environmental Policy Act of 1969 (NEPA). Alternative 1 is the No Action Alternative. Alternative 2 (Tenaya Confluence) (Preferred) would restore 9.7 acres to natural conditions, reduce roadside parking to five spaces on the southern side of Tioga Road, include a continuous trail along the western side of the lake, provide an accessible trail between Murphy Creek and East Beach, and replace existing culverts with a box culvert and provide a pedestrian sidewalk at the Tioga Road/Murphy Creek crossing. Alternative 3 (Tenaya Ecotones) would restore 9.8 acres to natural conditions, reduce Tioga Road southern roadside parking to 15 spaces, include an accessible trail between Murphy Creek and East Beach, relocate the Murphy Creek trail and construct a bridge over Murphy Creek north of Tioga Road, and remove culverts and construct a combined vehicular/pedestrian bridge at the Tioga Road/Murphy Creek crossing. Alternative 4 (Lake Loop) would restore 6.0 acres to natural conditions; eliminate roadside parking on the southern side of Tioga Road; include an accessible trail from the Sunrise Trailhead, along the western side of the lake, to the northern extent of the South Trail; and include a bridge crossing over the Tenaya Lake outlet. Alternative 5 (Immersive Nodes) would restore 9.6 acres to natural conditions, retain 74 designated roadside parking spaces along Tioga Road, include the development of 10 primitive campsites on the northern side of Tioga Road, relocate the Murphy Creek trail and construct a bridge over Murphy Creek north of Tioga Road, and remove culverts and construct a 25-foot vehicular bridge at the Tioga Road/Murphy Creek Crossing. Under all alternatives, approximately 15 undesignated parking spaces along the northern side of Tioga Road would remain.

Alternative 1 (No Action Alternative) describes existing conditions, operations, and maintenance associated with management of the Tenaya Lake area. Under this alternative, designated parking areas would remain the same, and undesignated roadside areas accommodating approximately 277 standard vehicles would remain on Tioga Road. This alternative provides a baseline to compare the effects of the Action Alternatives on natural, cultural, and social resources.

Alternatives 2, 3, 4, and 5 satisfy the purpose and need of the action and generally conform to existing agency and park planning documents. The 1980 Yosemite National Park General

Management Plan goals applicable to Tioga Road campgrounds and picnic areas (including the Tenaya Lake Area) include retaining 50 campsites at the lake and elimination of all roadside parking on Tioga Road. Based on comprehensive review of resource constraints, the Tenaya Lake Area Plan would not conform to these specific goals.

Alternative 2 (Tenaya Confluence), the preferred alternative, would provide a diverse range of visitor experiences within the Tenaya Lake area, including an accessible trail along the western edge of the lake between East Beach and Murphy Creek and within the East Beach and Sunrise Trailhead areas. Many existing trails located within ecologically and culturally sensitive areas would be removed and restored to natural conditions. This alternative includes 9.7 acres of ecological restoration within areas currently affected by visitor use, creation of volunteer trails, and stormwater erosion. The trail systems around the lake and north of Tioga Road would be realigned to avoid sensitive natural and cultural resources and support protection and restoration, and use of pedestrian bridges and boardwalks over waterways and wetland habitat would restore hydrological function of major waterways. Removal of the culverts and construction of a box culvert at the Tioga Road/Murphy Creek crossing would allow Murphy Creek to flow unimpeded under the roadway and into the lake. Interpretive materials and improved connections to the trail along the southern edge of the lake and Sunrise and Murphy Creek trailheads would facilitate wayfinding, minimize visitor confusion, and reduce the potential for volunteer trails and subsequent adverse effects to natural and cultural resources. Visitor parking capacity would total 215 spaces, including 195 spaces within designated lots south of Tioga Road, five designated roadside spaces south of Tioga Road between Sunrise Trailhead and Murphy Creek, and 15 undesignated spaces on the northern side of Tioga Road near East Beach.

Similar to Alternative 2, Alternatives 3, 4, and 5 also include realigned trail systems, ecological restoration, and use of boardwalks and pedestrian bridges to protect wetland habitat and facilitate hydrological functions. Alternative 3 (Tenaya Ecotones) would include similar features as Alternative 2; however, 15 designated parking spaces would be provided on the southern side of Tioga Road, and the Murphy Creek trailhead north of Tioga Road would be relocated, the trail would be reconstructed and would include a new pedestrian bridge in wilderness. Visitor parking capacity would total 208, including 193 designated visitor parking spaces. Alternative 4 (Lake Loop) would not include realignment of the Murphy Creek Trail north of Tioga Road. Three pedestrian bridges would be constructed within the Murphy Creek area. All undesignated parking on the southern side of Tioga Road would be removed, and all visitor parking (199 spaces) would be located within designated parking areas. Alternative 5 (Immersive Nodes) is somewhat distinct from the other action alternatives; this alternative includes 10 campsites on the northern side of Tioga Road, and would provide the highest amount of parking (251 spaces), including roadside parking totaling 89 spaces.

There will be an official 30- day public comment period following the release of this document. Exact dates will be announced. Park staff will be available to answer questions and written comments will be accepted at the monthly Yosemite National Park Open House scheduled during the comment period. Please refer to the project website for the comment review period and Open House dates: <http://www.nps.gov/yose/parkmgmt/tenaya.htm>. To submit comments electronically access the Planning, Environment, and Public Comments (PEPC) website: <http://www.parkplanning.gov/yose> (click on the 'Open for Comment' link and select Tenaya Lake Are Plan Environmental Assessment.

Comments postmarked within the 30- day comment period can also be submitted to:

Mail: Superintendent, Yosemite National Park
Attn: Tenaya Lake Area Plan EA
P.O. Box 577
Yosemite, California 95389

Fax: (209) 379-1294

To request a printed copy or CD of this environmental assessment (available in limited number),
please email: Yose_Planning@nps.gov.

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EXECUTIVE SUMMARY

INTRODUCTION

Pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA) (Public Law [PL] 91- 190, as amended), and the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] Part 1500- 1508), the Department of the Interior, National Park Service (NPS), has prepared an environmental assessment (EA) identifying and evaluating five alternatives for the Tenaya Lake Area Plan in Yosemite National Park. This document is intended also to meet the requirements of Section 106 of the National Historic Preservation Act (NHPA), and fulfills public review requirements under the California Environmental Quality Act (CEQA).

PURPOSE AND NEED FOR THE ACTION

Tenaya Lake is a magnificent High Sierra lake surrounded by granite domes, lodgepole forests, and Yosemite's vast wilderness. It is the largest natural lake in Yosemite. Because of its remarkable scenic qualities, its inviting blue water, and its proximity to Tioga Road, Tenaya Lake is one of the most popular destinations for summer visitors in Yosemite. Problems associated with visitor use, visitor safety, and resource impacts have been occurring for decades, which demonstrate the need for the project.

Resource Impacts. Existing trails traverse sensitive archeological resources. The trail to the East Beach and paved section of the Sunrise Trailhead interrupt hydrological patterns, including wetland habitat. The lack of wayfinding and interpretive materials has led to the creation of spur trails within sensitive resource areas (i.e., special- status vegetation, wetland habitat, and archeological resource deposits) and missed visitor opportunities and experiences. The extensive roadside parking has led to the compaction and denuding of vegetation along large swaths of the northern lake bank. Evidence of visitor- adaptation to seasonal flooding includes spur trails and trail widening, which has resulted in vegetation and bank trampling, soil compaction, and erosion at East Beach and the Sunrise Trailhead.

Visitor Use. Current issues include roadside parking congestion; unclear signage regarding parking areas, trails, use of watercraft, and facilities; missing connections between facilities and use areas; and no clear sense of arrival. Parking areas are not adequately designed to effectively accommodate the range of vehicles (i.e., personal vehicles, recreational vehicles, trailers, shuttles, and tour buses). The Tenaya Lake Campground was closed circa 1980 due to poor site selection, seasonal flooding, and water quality and sewage problems associated with a high water table.

Visitor Safety. Key visitor safety issues include no crosswalks, lack of adequate paths between the Sunrise Trailhead and Murphy Creek areas, and close proximity of pedestrians to moving traffic on Tioga Road. The current design of parking areas creates potential safety hazards including ingress and egress on blind curves and undesignated shuttle/tour bus areas.

Yosemite National Park has developed the Tenaya Lake Area Plan to address the issues summarized above. The plan includes conceptual designs for ecological restoration areas, parking areas, trails, access improvements, visitor facilities, and shuttle stops. The purpose of the Tenaya Lake Area Plan is to guide management actions by the NPS in order to protect resources and provide opportunities for appropriate high- country visitor experiences at Tenaya Lake.

RELATIONSHIP TO OTHER PLANS

The 1980 NPS *General Management Plan* (GMP) identifies goals and actions pertaining to visitor use of the Tioga Road campgrounds and picnic areas (including the Tenaya Lake area), but few of these goals have been implemented. Affirmation or adjustment of these goals is needed to better meet visitor and resource needs. The GMP goals and actions relating to Tenaya Lake include the following:

- Retain 50 campsites (status quo at the time the GMP was adopted)
- Retain picnic areas at their present location and capacity
- Eliminate volunteer parking from Tioga Road
- Limit parking to established use levels at backcountry trailheads
- Pave and delineate parking
- Restore damaged areas at parking sites and roadsides

The 1980 GMP set forth direction for future management in this area, and these goals are considered in the EA. The No Action Alternative and the four "action" alternatives are evaluated for fulfilling the GMP visitor enhancement and resource protection strategies. The proposed actions amend the GMP goal to eliminate all parking along Tioga Road. In the alternatives analyzed, parking capacity along Tioga Road ranges from 15 to 89 vehicles. Currently peak parking is 251, and median parking is 200 vehicles. Mitigations for resource protection and visitor safety improvements are presented for each alternative.

Alternative 5 includes the development of 10 primitive, walk-in campsites on the north side of Tioga Road, which amends the GMP recommendation of retaining 50 campsites. Alternatives 2, 3, and 4 recommend not reintroducing camping into Tenaya Lake. An analysis of potential resource impacts related to campground development is included in this document.

OVERVIEW OF THE ALTERNATIVES

This EA presents and analyzes five alternatives. Alternative 1, the No Action Alternative, represents the continuation of existing conditions, operations and management practices within the Tenaya Lake area. The action alternatives (Alternatives 2, 3, 4, and 5) represent a reasonable range of options that satisfy the purpose and need for the project, meet relevant legal requirements, and satisfy park policies and guidelines. Each Action Alternative aims to achieve the objectives of this project, but varies in the design approach. As shown in Figure ES-1, the Tenaya Lake area is comprised of five distinct areas described below:

Tioga Road. This area consists of the roadway, roadside parking, shoulder, and pedestrian path between Sunrise Trailhead and Murphy Creek (Tioga Road West) and between Murphy Creek and East Beach (Tioga Road East).

Sunrise Trailhead and Old Campground. This area is located in the southwestern portion of the lake, and includes the Sunrise Trailhead parking area, an asphalt parking/horse trailer/stock loop, associated trails, and the Tenaya Creek lake outlet.

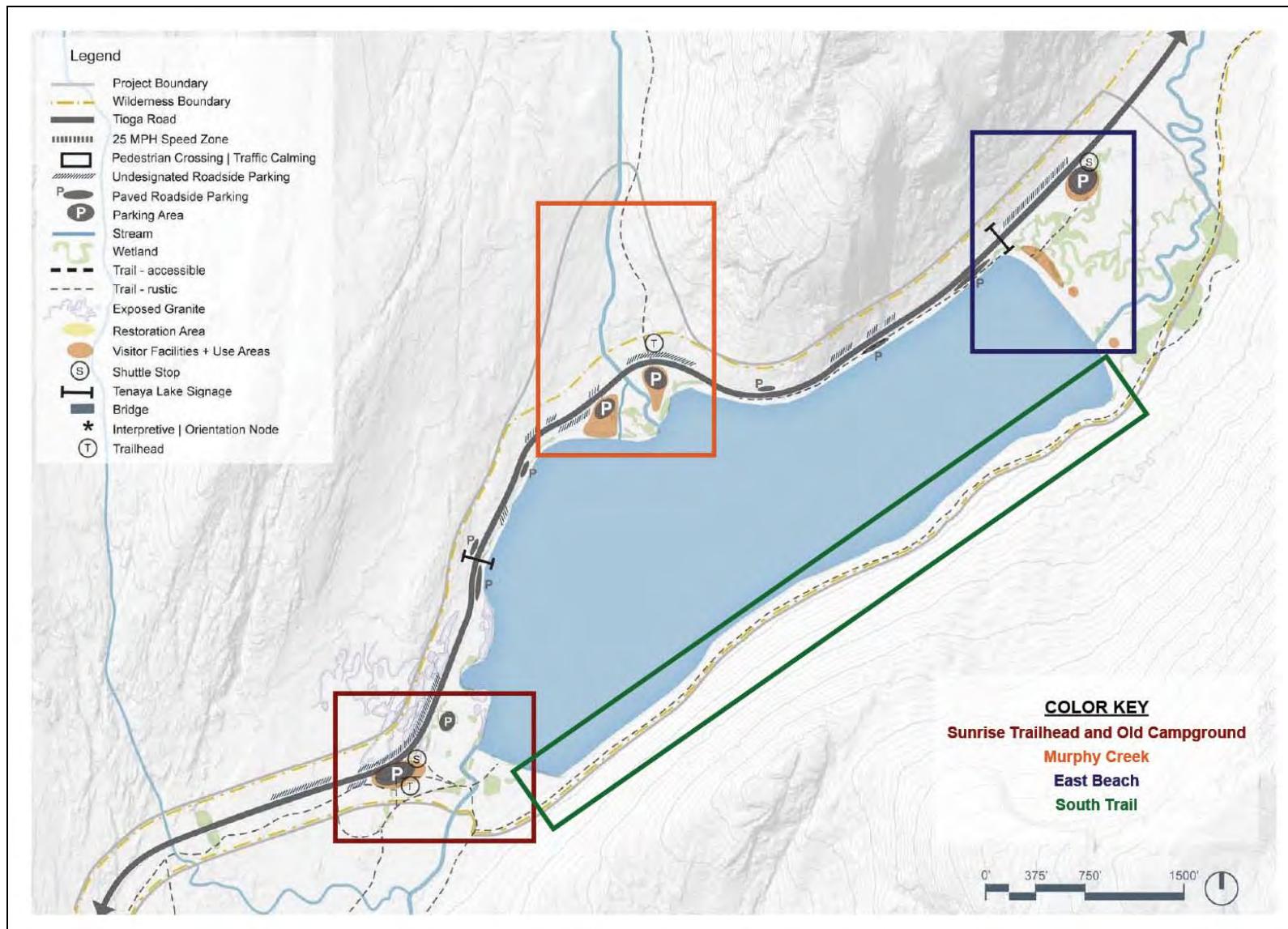
Murphy Creek. The Murphy Creek area is a braided alluvial fan divided into east and west sections by its main channel flowing from north to south into Tenaya Lake. It is located on the northern side of the lake, at a mid-point roughly halfway between the Sunrise Trailhead /Old

Campground and East Beach focus areas. The Murphy Creek Trailhead is located on the northern side of Tioga Road.

East Beach. This area is located on the northeastern area of the lake, and includes a parking area, beach access trail, large sandy beach, access to wilderness trails leading to Tuolumne Meadows and Sunrise High Sierra Camp, and the Tenaya Creek inlet to the lake.

South Trail. This area consists of a narrow strip along the southern edge of the lake, including a wilderness footpath leading to Tuolumne Meadows and Sunrise High Sierra Camp.

Figure ES-1. Tenaya Lake Area Overview



Alternative 1: No Action

Under the No Action Alternative, the Tenaya Lake area would not be improved, except for continuation of existing restoration projects, emergency repairs, and routine and periodic maintenance activities. Designated and undesignated parking would remain uncontrolled (space for 411 standard vehicles) and a reduction in roadside parking area is not proposed. The No Action Alternative would continue to result in routine repair and maintenance actions, including removal of vault toilet waste, trash, and recyclables; hazard tree abatement; and snow removal.

Actions Common to All Action Alternatives

All action alternatives would include the following common elements:

- Each action alternative includes ecological restoration. This would include revegetation and restoration of hydrological function and biological diversity in denuded areas. The pedestrian impact on natural areas would be reduced by removing or reorganizing and better delineating pathways. Ecological restoration will take place in areas that have been disturbed in the past which may include areas where there has been abandoned infrastructure, removal of pavement, denuded and compacted soil, and soil erosion.
- Each action alternative includes modifications to designated parking areas and roadside parking on the southern side of Tioga Road. Existing, undesignated parking (approximately 15 spaces) on the northern side of Tioga Road would remain under all alternatives.
- A picnic area would be located adjacent to the southeastern edge of the East Beach parking area. Existing facilities would be relocated and improved. Several groups of picnic tables would remain under the trees at the beach area similar to what currently exists. Pedestrian/boardwalk crossings over wetland areas would consist of 15- foot long wood/steel crossings with concrete footings.
- An existing asbestos water pipe extending from a non- operating well near the East Beach parking area along the southern edge of Tioga Road to Sunrise Trailhead would be removed. The existing well would remain.
- The vault toilet located closest to the lake in the Murphy Creek area would be removed and replaced by a new toilet in an upgradient location outside of seasonally flooded areas.
- Proposed drainage facilities and infrastructure would include installation of new culverts as a part of parking area, trail, and roadside improvements. Strategies such as using vegetation and strategic boulder cluster placement to dissipate hydrologic energy will be employed to improve existing culvert performance where erosion patterns and other related issues occur. All action alternatives propose to retrofit culvert outlets with energy dissipation strategies that will disperse concentrated flows and mitigate erosion at those points.
- Biofiltration would be constructed within and surrounding each parking area. Along Tioga Road between Sunrise Trailhead and Murphy Creek, an approximately 8,000-square foot linear biofiltration area would be located between the south edge the road and

the pedestrian path. Between Murphy Creek and East Beach, a 7,870- square foot, linear biofiltration area is proposed between the south edge of Tioga Road and the pedestrian path.

- The existing speed limit on Tioga Road would be reduced from 35 to 25 miles per hour (mph) within the Tenaya Lake area. Signage and traffic calming devices are proposed to notify visitors of the change. Modifications within the road surface would not impact snow removal operations.
- Each alternative proposes a delineated shuttle stop at each major node, coupled with strategies for vehicle speed reduction and safety of pedestrian crossing at these shuttle areas.
- Proposed signage would be informative, interpretive, and directional. Signage on Tioga Road would include a gateway sign or element both east and west of the lake area; parking, amenity, and trailhead signs; and notification of the speed reduction zone (25 mph). Temporary signage would be installed during restoration actions.
- Three general classes of trail types are proposed for the Tenaya Lake Area Plan: rustic, stabilized, and accessible. Pedestrian bridges and boardwalks are proposed to improve pedestrian access and avoid sensitive habitat areas.
- The range of allowable day- use activities would not change from current conditions under the proposed plan (with the exception of lit fires in grills and fire pits).

Alternative 2 (Tenaya Confluence)

In addition to the common actions described above, Alternative 2 would significantly reduce roadside parking on the southern side of Tioga Road, include a continuous trail along the northern side of the lake (accessible portion between Murphy Creek and East Beach), and remove culverts and construct a box culvert and pedestrian sidewalk at the Tioga Road/Murphy Creek crossing. Parking areas within the Sunrise Trailhead, Old Campground, Murphy Creek, and East Beach areas would be expanded or improved. The Murphy Creek east parking area would be removed and restored. Total parking capacity would be 215 spaces including: 195 designated spaces within parking areas, five roadside spaces on the southern side of Tioga Road between Sunrise Trailhead and Murphy Creek, and 15 undesignated roadside spaces on the northern side of Tioga Road. This alternative does not include the development of new campground facilities.

Alternative 3 (Tenaya Ecotones)

In addition to the common actions described above, Alternative 3 would reduce Tioga Road southern roadside parking to 15 spaces, include an accessible trail between Murphy Creek and East Beach, relocate the Murphy Creek trail and construct a bridge over Murphy Creek north of Tioga Road, and remove culverts and construct a combined vehicular/pedestrian bridge at the Tioga Road Murphy Creek crossing. Parking areas within the Sunrise Trailhead, Murphy Creek, and East Beach areas would be expanded, including a parking area on the northern side of Tioga Road, west of Murphy Creek. The Murphy Creek east parking area would be removed and restored. Total parking capacity would be 208 spaces including: 178 designated spaces within

parking areas, 15 designated roadside parking spaces on the southern side of Tioga Road, and 15 undesignated spaces on the northern side of Tioga Road. This alternative does not include the development of new campground facilities.

Alternative 4 (Lake Loop)

In addition to the common actions described above, Alternative 4 would eliminate roadside parking on the southern side of Tioga Road; include an accessible trail from the Sunrise Trailhead, along the western side of the lake, to the northern extent of the South Trail; and include a bridge crossing over the Tenaya Lake outlet. Parking areas within the Sunrise Trailhead, Murphy Creek (east and west), and East Beach areas would be expanded, including parking areas on the northern side of Tioga Road in the Sunrise Trailhead area. The Old Campground parking loop would be removed and restored. Total parking capacity would be 214 spaces, including: 199 designated spaces within parking areas and 15 undesignated spaces on the northern side of Tioga Road. This alternative does not include the development of new campground facilities.

Alternative 5 (Immersive Nodes)

Alternative 5 would retain 45 roadside parking spaces, include the development of 10 primitive campsites on the northern side of Tioga Road, relocate the Murphy Creek trail and construct a bridge over Murphy Creek north of Tioga Road, and remove culverts and construct a 25-foot vehicular bridge at the Tioga Road/Murphy Creek Crossing. The Sunrise Trailhead parking area would be improved and expanded, and a new parking area would be constructed on the northern side of Tioga Road adjacent to the proposed campsites. The Murphy Creek and East Beach parking areas would be expanded, including a parking area west of Murphy Creek on the northern side of Tioga Road. The Murphy Creek east parking area would be removed and restored. Total parking capacity would be 251 spaces, including: 206 designated spaces within parking areas, 45 designated spaces along Tioga Road, and 15 undesignated spaces on the northern side of Tioga Road.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

CEQ Regulations, implementing the NEPA and the NPS NEPA guidelines, require that “the alternative or alternatives which were considered to be environmentally preferable” be identified (CEQ Regulations, Section 1505.2). Environmentally preferable is defined as “the alternative that will promote the national environmental policy as expressed in the NEPA Section 101. This means the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources” (CEQ 1981).

Section 101 of NEPA states that it is the continuing responsibility of the Federal Government to...
(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice; (5) achieve a balance between population and resource use which will permit high

standards of living and a wide sharing of life's amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Upon full consideration of the elements of Section 101 of NEPA, Alternative 2 (Tenaya Confluence) represents the Environmentally Preferable Alternative for the Tenaya Lake Area Plan. The conclusion is analyzed in detail in Chapter 3.

ORGANIZATION OF THIS ENVIRONMENTAL ASSESSMENT

The contents of this document are as follows:

Chapter 1: Purpose and Need– This chapter includes a discussion of the project's purpose and need, planning context, and issues and concerns that are and are not addressed in this EA.

Chapter 2: Alternatives– This chapter describes the alternatives for the proposed action, two action alternatives, and one No Action Alternative. It also discusses alternatives considered but dismissed.

Chapter 3: Affected Environment and Environmental Consequences– This chapter provides a description of the affected environment of the proposed action for each alternative. This chapter also presents the methods and analysis of the potential impacts for each topic under each alternative.

Chapter 4: Consultation and Coordination– This chapter summarizes the consultations undertaken in the preparation and review of this document.

Chapter 5: List of Preparers and Reviewers– This chapter lists the names and qualifications of the individuals who have contributed to this document.

Chapter 6: Glossary and Acronyms – This chapter defines the technical terms and acronyms used in this document.

Chapter 7: Bibliography – This chapter lists the references cited in this document.

In addition, **appendices** to this document augment and provide supplemental information to that presented in the above sections.

CHAPTER 1: PURPOSE AND NEED

INTRODUCTION

Yosemite National Park was created in 1890 by the U.S. Congress and, since then, visitors to the park have grown to approximately four million per year. The park aims to preserve natural resources and scenic beauty and to make these resources available to visitors through adequate recreational and interpretive opportunities, services, safety, and recreational facilities. The park offers a broad spectrum of recreation opportunities, including access to and availability of such activities as swimming and wading, horseback riding, hiking, backpacking, camping, rock climbing, fishing, sightseeing, photography, nature study, bicycling, and stock use. The diverse range of recreational and interpretive opportunities found within the park encourages unique visitor experiences.

Tenaya Lake is a magnificent High Sierra lake surrounded by granite domes, lodgepole forests, and Yosemite's vast wilderness. It is the largest natural lake in Yosemite. Because of its remarkable scenic qualities, its inviting blue water, and its proximity to Tioga Road, Tenaya Lake is one of the most popular destinations for summer visitors in Yosemite. Yosemite National Park has developed the Tenaya Lake Area Plan to address key issues related to resource impacts, visitor use, and visitor safety. The plan includes conceptual designs for ecological restoration areas, parking areas, trails, access improvements, visitor facilities, and shuttle stops.

PURPOSE OF PROPOSED PROJECT

The purpose of the Tenaya Lake Area Plan is to guide management actions by the National Park Service (NPS) in order to protect resources and provide opportunities for appropriate high-country visitor experiences at Tenaya Lake.

NEED FOR PROPOSED PROJECT

Key issues, which demonstrate the need for the proposed project include:

Resource Impacts. Existing trails traverse sensitive archeological resources. The East Beach trail and paved section of the Sunrise Trailhead interrupt hydrological patterns, including wetland habitat. The lack of wayfinding and interpretive materials has led to the creation of spur trails within sensitive resource areas (i.e., special- status vegetation, wetland habitat, and archeological resource deposits) and missed visitor opportunities and experiences. Evidence of visitor-adaptation to seasonal flooding includes spur trails and trail widening, which has resulted in vegetation and bank trampling, soil compaction, and erosion at East Beach and Sunrise Trailhead areas.

Visitor Use. Current issues include roadside parking congestion; unclear signage regarding parking areas, trails, use of watercraft, and facilities; missing connections between facilities and use areas; and no clear sense of arrival. Parking areas are not adequately sized or designed to effectively accommodate the range of vehicles (i.e., personal vehicles, recreational vehicles, trailers, shuttles, and tour buses). The Murphy Creek picnic area is poorly designed. The Tenaya

Lake Campground was closed circa 1980 due to poor site selection, seasonal flooding, and water quality and sewage problems associated with a high water table.

Visitor Safety. Key visitor safety issues include no crosswalks, lack of adequate paths between the Sunrise Trailhead and Murphy Creek areas, and close proximity of pedestrians to moving traffic on Tioga Road. The current design of parking areas creates potential safety hazards including ingress and egress on blind curves, and undesignated shuttle/tour bus areas.

PROJECT OBJECTIVES AND GOALS

The following objectives were developed based on review of public comments and input from the NPS project team. The objectives of the project were used in the development of the action alternatives for the Tenaya Lake Area Plan:

1. Provide a framework for restoring and protecting natural systems in and around Tenaya Lake;
2. Protect cultural resources; and
3. Improve visitor enjoyment and increase safety while achieving desired resource conditions.

The 1980 NPS *General Management Plan* (GMP) identifies goals and actions pertaining to visitor use of Tioga Road campgrounds and picnic areas (including the Tenaya Lake area), but few of these goals have been implemented. Affirmation or adjustment of these goals is needed to better meet visitor and resource needs. GMP goals and actions relating to Tenaya Lake include the following:

- Retain 50 campsites (status quo at the time the GMP was adopted);
- Retain picnic areas at their present location and capacity;
- Eliminate volunteer parking from Tioga Road;
- Limit parking to established use levels at backcountry trailheads;
- Pave and delineate parking; and
- Restore damaged areas at parking sites and roadsides.

The 1980 GMP set forth direction for future management in this area, and these goals are considered in the EA. The No Action Alternative and the four "action" alternatives are evaluated for fulfilling the GMP visitor enhancement and resource protection strategies. The proposed actions amend the GMP goal to eliminate all parking along Tioga Road. In the alternatives analyzed, parking capacity along Tioga Road ranges from 15 to 45 vehicles. Currently peak parking is 251, and median parking is 200 vehicles. Mitigations for resource protection and visitor safety improvements are presented for each alternative.

Alternative 5 includes the development of 10 primitive, walk-in campsites on the north side of Tioga Road, which amends the GMP recommendation of retaining 50 campsites. Alternatives 2, 3, and 4 recommend not reintroducing camping into Tenaya Lake. An analysis of potential resource impacts related to campground development is included in this document.

In addition, the following goals were identified based on an assessment of the purpose and need for the project:

Improve Visitor Enjoyment and Increase Safety by:

- Providing great visitor use areas at the lake that retain the existing rustic and natural character that is so highly valued by the public;
- Providing safe, appropriate parking for visitor amenity areas;
- Clarifying to visitors where different amenities are located to decrease confusion;
- Decreasing traffic congestion along Tioga Road; and
- Providing accessibility to day use areas for visitors with disabilities.

Provide a Framework for Restoring and Protecting Natural Systems, Cultural Resources, and Visitor Enjoyment In and Around Tenaya Lake by:

- Restoring impacted areas;
- Protecting water quality of Tenaya Lake;
- Better delineation of visitor use areas to protect plant communities and cultural resources;
- Providing well-sited bear-proof food storage lockers and appropriate garbage/recycling facilities; and
- Preserving significant view opportunities.

Prescribe Appropriate User Capacity by:

- Evaluating existing use and resource conditions;
- Addressing appropriate parking needs for cars, motorcycles, recreational vehicles (RV), tour buses, and shuttle buses; and
- Addressing needs for accessible parking spaces.

POLICY AND PLANNING CONTEXT

Below is a summary of applicable laws, executive orders, policies, and other plans. The proposed action was evaluated and determined to be consistent with the 1980 GMP and other applicable laws, executive orders, policies, and plans.

National Park Service Policy and other Relevant Guidance

National Park Service Organic Act of 1916

The NPS Organic Act directed the U.S. Department of the Interior and the NPS to manage units of the national park system “to conserve the scenery and natural and historic objects and wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” (16 United States Code [USC] § 1 et seq.). The Organic Act provides overall guidance for the management of Yosemite National Park.

The Organic Act establishes the management responsibilities of the NPS. Although Congress has given the NPS management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that park resources and values be left unimpaired, unless a particular law directly and specifically provides otherwise. This cornerstone of the Organic Act establishes the primary responsibility of the NPS and ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them. NPS *Management Policies* (2006) provides guidance on addressing impairment.

A written impairment determination is included in the analysis of impacts for each of the alternatives. Per NPS *Management Policies* (2006), an impairment determination is included for each resource topic potentially affected by the alternatives except visitor experience, park operations, and socioeconomics. In addition, per Interim Impairment Guidance issued July 6, 2010, a stand- alone impairment determination for the preferred alternative is included in an appendix to this EA.

1970 National Park Service General Authorities Act (As Amended in 1978—Redwood Amendment)

The Redwood Amendment (National Park Expansion Act of 1978) mandates that the NPS conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been well- known, except as may have been or shall be directly and specifically provided by Congress. This act prohibits the NPS from allowing any activities that would cause derogation (*impairment*) of the values and purposes for which the parks have been established (except as directly and specifically provided by Congress in the enabling legislation for the parks). Therefore, all units are to be managed as national parks, based on their enabling legislation and without regard for their individual titles. Parks also adhere to other applicable federal laws and regulations, such as the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA), the Wilderness Act, and the Wild and Scenic Rivers Act. To articulate its responsibilities under these laws and regulations, the NPS has established management policies for all units under its stewardship.

National Park Service Management Policies (2006)

NPS *Management Policies* (2006) is the basic Service- wide policy document of the NPS. A key policy identified in the document specifically applies to the development and implementation of the Tenaya Lake Area Plan:

1.4.3 The NPS Obligation to Conserve and Provide for Enjoyment of Park Resources and Values *The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values. However, the laws do give the Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.*

The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. The enjoyment that is contemplated by the statute is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. This is how courts have consistently interpreted the Organic Act.

Wilderness Act of 1964 (16 USC § 1131 et seq.)

The Wilderness Act of 1964 established the National Wilderness Preservation System “to assure that an increasing population, accompanied by expanding settlement and growing mechanization, [does] not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, ... [by securing] for the American people of present and future generations the benefits of an enduring resource of wilderness.” Federal agencies are required to administer designated wilderness “for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness. Under the act, wilderness areas are devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

Under Section 4(c) of the Act, certain uses are prohibited in wilderness. The Act states that “...there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.” NPS uses a Minimum Requirements Analysis to determine if proposed actions that include 4 (c) prohibitions are allowed under the act. These actions must be the minimum required for administering the area and include using the minimum tool to accomplish the goals and objectives for managing the wilderness.

National Park Service Director’s Orders

The following NPS Director’s Orders are applicable to the Tenaya Lake Area Plan project:

- Director’s Order 2: Park Planning
- Director’s Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making
- Director’s Order 28: Cultural Resources Management
- Director’s Order 41: Wilderness Preservation and Management
- Director’s Order 50B: Occupational Safety and Health
- Director’s Order 77- 1: Wetland Protection

- Director's Order 83: Public Health
- Director's Order 87a: Park Road Standards

Other Applicable Federal Laws, Policies, and Executive Orders

The National Historic Preservation Act of 1966, Section 106 (16 USC § 470 et seq.)

Section 106 of the NHPA directs federal agencies to consider the effects of their actions on properties that are eligible for, or included on, the National Register of Historic Places (NRHP). Historical sites, objects, districts, historic structures, and cultural landscapes; archeological resources; and traditional cultural properties (TCPs) that are eligible for listing on the NRHP are known as historic properties. Yosemite National Park's Section 106 review process is governed by the 1999 *Programmatic Agreement Among the NPS at Yosemite, the California State Historic Preservation Officer, and the Advisory Council for Historic Preservation regarding the Planning, Design, Construction, Operations and Maintenance, Yosemite National Park* (1999 PA) (NPS 1999) developed in consultation with associated American Indian Tribes and the National Trust for Historic Preservation. The NHPA Section 106 review process for this project is integrated into this document. The analysis of impacts to historic properties included in Chapter 3 complies with Section 106.

The Archeological Resources Protection Act of 1979 (ARPA; 16 USC 470aa- 470ll)

The Archeological Resources Protection Act (ARPA) prohibits unauthorized excavation of archeological sites on federal land, as well as other acts involving cultural resources, and implements a permitting process for excavation of archeological sites on federal or Indian lands (see regulations at 43 Code of Federal Regulations [CFR] 7). ARPA also provides civil and criminal penalties for removal of, or damage to, archeological and cultural resources. The analysis of impacts to historic properties included in Chapter 3 complies with ARPA.

The Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001 et seq.; see regulations at 43 CFR 10)

The Native American Graves Protection and Repatriation Act (NAGPRA) provides for the protection and repatriation of Native American human remains and cultural items and requires notification of the relevant Native American tribe upon accidental discovery of cultural items. The analysis of cultural resources included in Chapter 3 complies with NAGPRA.

The American Indian Religious Freedom Act of 1979 (AIRFA; 42 USC 1996)

The American Indian Religious Freedom Act (AIRFA) preserves, for American Indians and other indigenous groups, the right to express traditional religious practices, including access to sites under federal jurisdiction. Regulatory guidance for AIRFA is lacking, although most land managing federal agencies have developed internal procedures to comply with AIRFA. The analysis of cultural resources included in Chapter 3 complies with AIRFA.

Executive Order No. 13007: Indian Sacred Sites

Executive Order 13007 directs federal agencies with statutory or administrative responsibility for the management of Federal lands, to the extent practicable, permitted by law to accommodate

access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. The analysis of cultural resources included in Chapter 3 complies with Executive Order 13007.

The following federal laws and executive orders are applicable to the Tenaya Lake Area Plan project:

- National Environmental Policy Act (1969) (42 USC 4341 *et seq.*)
- National Historic Preservation Act (1966) (16 USC 470, as amended)
- The American Indian Religious Freedom Act of 1979 (42 USC 1996)
- The Archeological Resources Protection Act of 1979 (16 USC 470aa- 470ll)
- Clean Water Act (33 USC § 1241)
- Clean Air Act (as amended) (42 USC § 7401 *et seq.*)
- Endangered Species Act (16 USC 1531 *et seq.*)
- Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001- 3013)
- Secretary of the Interior's Guidelines for Architectural and Engineering Documentation (36 CFR Part 61)
- Wilderness Act (1964) (Public Law 88- 577)
- Wild and Scenic Rivers Act (16 USC 1271- 1287, as amended) (Public Law 90- 542)
- Executive Order 11593: Protection and Enhancement of the Cultural Environment
- Executive Order 11990: Protection of Wetlands
- Executive Order 12898: Environmental Justice
- Executive Order 12902: Energy Efficiency and Water Conservation at Federal Facilities
- Executive Order 13007: Indian Sacred Sites
- Executive Order 13101: Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition
- Executive Order 13123: Greening the Government Through Efficient Energy Management
- Executive Order 13148: Greening the Government Through Leadership in Environmental Management

Yosemite National Park Planning Context

Planning in the NPS takes two different forms: general management planning and implementation planning. General management plans are required for national parks by the National Park and Recreation Act of 1978. The purpose of a general management plan is to set a “clearly defined direction for resource preservation and visitor use” (NPS 1998) and provide general directions and policies to guide planning and management in the park. The NPS GMP (1980) is the overall planning document for Yosemite National Park.

Implementation plans and projects, which tier off the NPS GMP and other park plans, focus on “how to implement an activity or project needed to achieve a long- term goal” (NPS 2001). Implementation plans may direct specific projects as well as ongoing management activities or programs, and provide a more extensive level of detail and analysis.

Yosemite National Park General Management Plan of 1980

The GMP is the overall planning document for Yosemite National Park. The GMP sets forth five broad goals for management of the park as a whole:

- Reclaim priceless natural beauty
- Allow natural processes to prevail
- Promote visitor understanding and enjoyment
- Markedly reduce traffic congestion
- Reduce crowding

1999 Programmatic Agreement Among the National Park Service at Yosemite, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Planning, Design, Construction, Operations, and Maintenance of Yosemite National Park

Yosemite National Park's NHPA Section 106 review process is governed by the 1999 PA. Under this agreement, the park has the responsibility to review and approve undertakings that are determined to have no effect or no adverse effect to historic properties that are not National Landmarks without further review by the State Historic Preservation Office (SHPO) or the Advisory Council, provided the stipulations of the agreement have been fulfilled. The agreement applies to undertakings performed by NPS lessees, permittees, concessionaires, cooperators, and park partners. The 1999 PA provides standard mitigation measures to resolve adverse effects on historic properties in consultation with SHPO, the public, and American Indian tribes. It also requires Yosemite National Park to "make every reasonable effort to avoid adverse effects to Historic Properties identified . . . through project design, facilities' location or other means" and to document avoidance alternatives through the NEPA process (NPS 1999).

Yosemite Resources Management Plan (1993)

The NPS *Yosemite Resources Management Plan* (1993) describes the status of park natural and cultural resources and recommends actions and programs needed to accomplish the legislative mandates applicable to the NPS and the park.

Yosemite National Park Vegetation Management Plan (1997)

The NPS *Yosemite National Park Vegetation Management Plan* (1997) established broad objectives for park vegetation management. Descriptions of plant communities, management issues, and management strategies and techniques were identified for achieving desired conditions for park vegetation communities. As construction projects are implemented, existing vegetation needs to be salvaged and held on- site for short- duration projects or placed in temporary in- park holding facilities until construction is completed. Seeds, seedlings, or cuttings need to be collected. Site- specific integrity needs to be protected.

Fire Management Plan (2004)

The *Yosemite National Park Fire Management Plan* (2004b) is a fundamental strategic document that guides the full range of fire management related activities in the park, as directed and

permitted under the 2001 Federal Fire Policy and NPS Director's Order 18. The specific purposes of the plan are to:

- Identify and implement methods to restore and maintain park ecosystems and ecosystem processes that allow fire to play its natural role in the ecosystem, both as wildland fire and prescribed fire.
- Reduce the risk of fire to cultural resources (e.g., historic buildings, pictographs) through fuels reduction, prescribed burning, or fire suppression to prevent fires from damaging cultural resources. Fire will also be used as a tool to manage cultural landscapes.
- Reduce the risk of catastrophic fire, including near the wildland/urban interface (communities, government and commercial buildings, and other developed areas), while continuing to reverse the adverse effects from past fire suppression and prevention activities.
- Execute a fire management program that provides a safe environment for firefighters and the public, including safe operations and fire management related facilities (helibases, fire camps, fire stations).

PUBLIC INVOLVEMENT

Public involvement is a key component of the NEPA process. In this process, the general public, federal, state, local agencies, tribes, and organizations are provided an opportunity to identify issues and concerns regarding the potential effects of the proposed action. The opportunity to provide this input is called "scoping."

In the fall of 2008, public scoping was conducted by the NPS as part of the early development of the Tenaya Lake Area Plan. Members of the public were invited to submit comments on the Tenaya Lake Area Plan for a period spanning from September 4 to October 18, 2008. The NPS accepted comments submitted by email, U.S. mail, and fax. The NPS provided information about the plan and the public scoping period through the following means:

1. A press release describing the intent to begin the public involvement process for the proposed plan was published by the Mariposa Gazette on August 29, 2008.
2. The scoping announcement was included in the Yosemite National Park Electronic Newsletter, which has about 7,000 subscribers.
3. The scoping announcement was included in the park's Daily Report throughout the public scoping period.
4. The scoping period was announced via the park's website.
5. The Area Plan's fact sheet was made available at Visitor Centers within the park.
6. Information regarding the project was disseminated monthly at Yosemite National Park Open House held in the Yosemite Valley auditorium.

Invitations to the open house were included in the public scoping announcement and the Area Plan's fact sheet. Twenty- five scoping responses (including emails and letters) were received during the public scoping period. These responses were carefully reviewed and individual ideas were identified and assigned a code according to the subject matter addressed. These discrete individual ideas are known as public comments. The public responses consisted of 170 discrete public comments. The public comments were then grouped into 87 concern statements. The public concern statements were used to identify common themes expressed by individuals or groups requesting particular lines of action by the NPS.

The public concerns were then screened to determine whether a concern pertained to the purpose and need for this project and the level of action required by the park's interdisciplinary team and/or park management. The plan's interdisciplinary team is composed of park specialists from a variety of backgrounds including recreation planning, resource management and science, wilderness, public information, environmental compliance, and visitor use/social science. The plan's interdisciplinary team reviewed the concern statements and used them to aid in the development of alternatives. Copies of public comment letters and the *Public Scoping Report* (July 2009) can be found on the project website at: <http://www.nps.gov/yose/parkmgmt/tenaya.htm>. Issues, concerns, and comments received are included in Table 1-1:

Table 1-1. Public Issues, Comments, and Concerns

Topic	Comment or Concern
Planning Process and Policy	Preserve Yosemite unchanged for future generations.
	Focus on park protection rather than park revenues.
	Clarify what NPS wants to improve through the Tenaya Lake Area Plan.
	Develop concepts/plans that address crowding and development.
	Ensure that a variety of overnight accommodations are available to an economically diverse visitor population.
	Limit facility and infrastructure development.
	Cease this planning process.
	Consider all internal and public scoping comments and concerns prior to any decision making for the Tenaya Lake Area Plan.
	Conduct a park-wide user capacity study prior to any further planning efforts.
	Continue to develop an integrated, comprehensive plan for Tenaya Lake.
	Suspend all planning efforts until major national and local economic, political, and emergent issues are less threatening to our basic needs.
	Build a small walk-in and a small drive-through campground at Tenaya Lake.
	Reduce impacts to natural resources by providing better signage for trails and amenities.
	Address overcrowding in the park, rather than attempting to accommodate everyone.
	Re-think planning efforts as not to violate NEPA or WSRA.

Topic	Comment or Concern
Planning Process and Policy (continued)	Ensure that future cyclic maintenance is considered for new facilities proposed in this plan.
	Address user capacity (overcrowding) rather than accommodating all types and quantities of visitor use, with the use of special funds.
	Extend the public scoping period to allow a full thirty days for comments.
	Should not extend scoping period because more comments may not be submitted.
Resources	Provide a summary describing visitor use, visitor safety, and resource impacts in the Tenaya Lake area.
	Proceed with plans to reduce visitor impacts, upgrade problematic restrooms, and reroute social trails.
Ecosystem Processes	Should not propose changes that blast into existing rock.
	Assign "no-park" and "no walk" boundaries around Tenaya Lake, so that areas can recover without limiting number of visitors.
	Should not establish a campground at Tenaya Lake.
Water Resources	Protect water quality that could be contaminated through improper human waste disposal.
Vegetation	Conduct a study to determine if the transition from meadow to lodgepole forest (east of lake) is natural or human-induced.
	Apply Yosemite Valley restoration techniques to the east end of Tenaya Lake.
Air Quality	Should not advocate the use of diesel-fueled transportation in Yosemite Valley, or elsewhere.
Scenic Resources, Visual Quality	Maintain the scenic quality of Tenaya Lake by keeping human development as unobtrusive as possible.
	Protect the Tenaya Lake scenic viewshed by reducing private vehicle access in the view shed.
	Design facilities in this area that discourage high levels of use.
Cultural Resources	Note that Chief Tenaya was an Ahwahnee Indian rather than a Miwok.
Visitor Experience	Avoid designing Tenaya Lake in such a way that all visitors can be accommodated.
	Avoid replacing campers with day-users at Tenaya Lake.
Access	Allow climbers to park along roadsides and access routes.
	Stringently manage vehicular traffic and foot traffic.
	Consider that climbers park in Tenaya Lake area lots and road shoulders to access climbs.
Recreation	Maintain and expand picnic opportunities, but vehicle access should be carefully controlled to reduce soil impacts.
	Consider designating the beach on the east side of the lake as a picnic area.
	Provide BBQ grills that do not allow material to litter the beach and pose a fire hazard.

Topic	Comment or Concern
Recreation (continued)	Manage excessive impacts of picnicking close to the lake.
	Create designated foot paths from parking lot to east end of lake and restore all other social trails.
	Should not build a bridge over Tenaya Creek for Sunrise Trailhead access, because this will increase use impacts to the beach on the opposite shore.
	Limit facility and infrastructure development and allow for a limited number of walk-in campsites at Tenaya Lake.
	Replace campsites that have been lost.
	Avoid establishing camping at Tenaya Lake.
	Avoid establishing camping at Tenaya Lake, but should consider alternative sites.
	Provide camping opportunities at Tenaya Lake.
	Consider the impacts of making Tenaya Lake area trails more accessible and evident to visitors.
	Manage vegetation impacts on the west end of Tenaya Lake.
Visitor Services	Upgrade parking areas, toilets, picnic tables, and fire pits.
	Reduce development on the north shore of Tenaya Lake
	Limit upgrades and trail construction around Tenaya Lake unless it is needed for environmental reasons.
	Should not build or develop any more infrastructure at Tenaya Lake.
	Build parking lots in non-riparian areas, or in areas where other structures have been removed.
	Ensure that interpretive signs and pamphlets contain accurate information with regard to history of the Yosemite-Mono Lake Paiute Indian Community.
	Minimize the placement of signs and interpretive displays at Tenaya Lake.
	Build a foot bridge over Tenaya Creek at the Tenaya Lake outlet.
	Avoid providing any commercial services at Tenaya Lake.
	Reduce the commercial tour bus service at Tenaya Lake.
The Sound Environment	Reduce road level noise (especially motorcycles) by reducing the speed limit, or by providing road-side berms.
Transportation and Parking	Consider parking issues along Tioga Road and related visitor safety issues.
	Reduce the commercial tour bus activity on roadside at east end of Tenaya Lake.
	Create parking space in order to alleviate roadside parking at Tenaya Lake.
	Consider the impacts to riparian habitat associated with development of new parking areas at Tenaya Lake.

Topic	Comment or Concern
Transportation and Parking (continued)	Relocate parking into the Lodgepole tree cover in limited areas outside of congressionally designated wilderness.
	Manage roadside parking for all recreational users along the Highway 120 corridor, not only areas that are accessed by climbers.
	Consider the environmental impacts of developing additional parking areas at Tenaya Lake.
	Establish a Tuolumne shuttle stop in a paved turn-out for its sole use (no other parking allowed).
	Improve egress and ingress from Tioga Road and day use areas at Tenaya Lake.
	Reduce speed limit in the Tenaya Lake area.
Park Operations	Should not address management of traffic and congestion in this scoping period.
	Improve the infrastructure and restore the natural features at Tenaya Lake.
	Improve the Tenaya Lake area by cleaning public toilets and emptying tanks more frequently.
	Approach the modest facility development component of this planning effort with a sustainable perspective.

Issues and Concerns Addressed in this Document

All of the above issues and concerns were considered in the planning process and/or are addressed in this document except for those identified under the next heading.

Issues and Concerns Out of Scope of this Project

The following issues and concerns were considered out of scope of this project because: 1) the issue is precluded by existing regulations and policies; or 2) the issue is considered under a separate planning process.

Planning Process and Policy

- Continue to develop the Yosemite Transportation Plan.

Ecosystem Processes

- Continue its strategies for managing visitor use at Tenaya Lake.

Access

- Address the park- wide carrying capacity and create a reservation system.
- Establish user carrying capacity limits and enforce them at the entrance gates.
- Address the park- wide carrying capacity and limit access.
- Address the park- wide carrying capacity for areas accessible by car or by bus.

Socioeconomic Considerations

- Increase entrance fees for commercial buses to reduce congestion at Tenaya Lake.

Recreation

- Designate the southeast beach of Tenaya Lake as "clothing optional."

Transportation

- Re- locate Tioga Road away from the Tenaya Lake.

CHAPTER 2: ALTERNATIVES

INTRODUCTION

This chapter describes in detail the various alternatives proposed for the Tenaya Lake Area Plan. The comprehensive alternatives development process, which involved American Indian, public, and National Park Service (NPS) staff input over an 18- month period, is also discussed and presents the rationale for ultimately choosing the alternatives retained for further analysis in this Environmental Assessment (EA). A comparison of the Action and No Action Alternatives is provided in Table 2- 2.

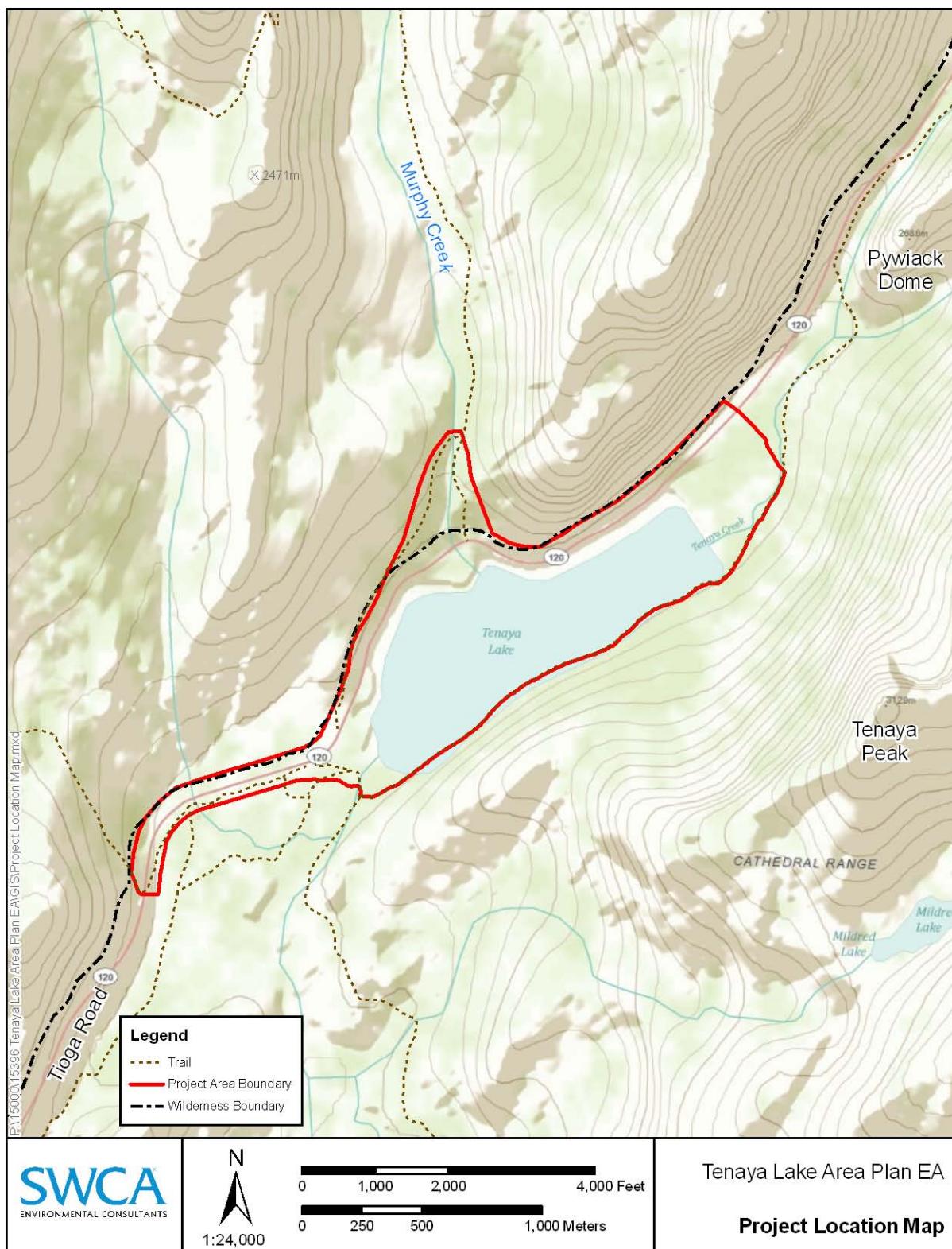
Project Location

Tenaya Lake is located within Yosemite National Park, adjacent to Tioga Road, approximately 2 miles northeast of Olmsted Point, and 7 miles southwest of Tuolumne Meadows (refer to Figures 2- 1 and 2- 2). Existing uses include parking areas, visitor facilities, trail systems, backcountry trailheads, and a variety of visitor use opportunities (refer to Table 2- 2 and the No Action description below). In addition to the lake, the dominating habitat type is lodgepole pine forest. Additional habitats include tributary and outlet creeks (Tenaya Creek, Murphy Creek, and unnamed watercourses), and their associated wetland and riparian habitat corridors. The lake is surrounded by Yosemite's unique geology, including monolithic granite domes, slabs, and glacial erratics.

Figure 2-1. Project Vicinity Map



Figure 2-2. Project Location Map



ALTERNATIVES CONSIDERED

The alternatives considered in this analysis include Alternative 1 (No Action Alternative), Alternative 2 (Tenaya Confluence – Preferred Alternative), Alternative 3 (Tenaya Ecotones), Alternative 4 (Lake Loop), and Alternative 5 (Immersive Nodes). Each of the action alternatives provides a varied visitor experience and response to user capacity and parking demands, while protecting natural and cultural resources.

For the purposes of this plan, the Tenaya Lake area has been divided into five distinct areas described below, and as shown in Figures 2- 3 through 2- 6:

Tioga Road. This area consists of the roadway, roadside parking, shoulder, and pedestrian path between Sunrise Trailhead and Murphy Creek (Tioga Road West) and between Murphy Creek and East Beach (Tioga Road East).

Sunrise Trailhead and Old Campground. This area is located in the northwestern portion of the lake, and includes the Sunrise Trailhead parking area, an asphalt parking/horse trailer/stock loop, associated trails, picnic area, lake access, and the Tenaya Creek lake outlet.

Murphy Creek. The Murphy Creek area is a braided alluvial fan divided into east and west sections by its main channel flowing from north to south into Tenaya Lake. It is located on the northern side of the lake, at a mid- point roughly halfway between the Sunrise Trailhead /Old Campground and East Beach focus areas. The Murphy Creek Trailhead is located on the northern side of Tioga Road. Picnic areas and a beach are located south of the road.

East Beach. This area is located on the northeastern area of the lake, and includes a parking area, beach access trail, picnicking, a large beach, and the Tenaya Creek inlet to the lake.

South Trail. This area consists of a narrow strip along the southern edge of the lake, including a wilderness trail leading to Tuolumne Meadows to the east and Sunrise High Sierra Camp to the south.

Each alternative's description includes a summary of the proposed ecological restoration, visitor uses, facilities, amenities, and improvements to be located within each of these areas. Associated exhibits include *conceptual* plans for the Tenaya Lake area, and enlarged conceptual exhibits for the Sunrise Trailhead and Old Campground, Murphy Creek, and East Beach sub- areas.

Description of Alternatives

Alternative 1: No Action

Under the No Action Alternative (refer to Figure 2- 3), the Tenaya Lake area would not be improved, except for continuation of existing restoration projects, emergency repairs, and routine and periodic maintenance activities. Uncontrolled parking has resulted in vegetation loss and soil compaction adjacent to parking areas and along Tioga Road. This has created space for approximately 411 standard vehicles (assuming a 20- foot space per vehicle). NPS studies document peak parking demand at 251 vehicles, and median parking demand during peak periods is just under 200 vehicles (Pettebone 2009, DEA 2006). Under this alternative, areas disturbed by

uncontrolled parking would remain. This alternative does not propose a reduction in roadside parking areas. The No Action Alternative would continue to result in routine repair and maintenance actions, including removal of vault toilet waste, trash, and recyclables; hazard tree abatement; and snow removal.

Across the entire site, no evidence was found to indicate that increased stormwater flows resulting from unnatural impervious surfaces such as roadways and parking areas are creating a significant hydrologic burden on Murphy Creek, Tenaya Creek, or Tenaya Lake (Sherwood 2010).

Hydrologic conditions due to snowmelt and runoff within each key area are discussed below. The tributary watershed on the north side of the lake is comprised largely of steep, barren rock face, which overwhelms drainage infrastructure when combined with stormwater runoff from paved surfaces. Water quality impacts from development, include:

- Erosive flows from concentrated stormwater runoff at culvert outlets;
- Denuded soil in areas of uncontrolled pedestrian access;
- Pollutant loading from roadway and parking area stormwater runoff; and
- Pollutant loading from an overflowing vault toilet.

Natural hydrologic flow patterns are interrupted in certain places by elevated roadway, parking, and pathway surfaces. A network of culverts exists to convey flows across those physical flow barriers; there is some visual evidence that certain culverts do not have adequate hydraulic capacity to convey design flows, and concentrated discharges from culvert outlets create erosive forces during storm events. Stormwater runoff from the roadways and parking areas, which does not receive any formal water quality treatment, contains some amount of heavy metals, hydrocarbons, and other automobile- associated pollutants such as antifreeze. Denuded soil created by uncontrolled pedestrian traffic represents another threat to the health of Tenaya Lake by reducing the biofiltrative capacity of the landscape and exposing the soil to erosion from wind, rain, and surface water flows.

This Alternative would not address visitor use, parking quantity or availability, and visitor safety issues associated with the location and design of existing trailheads, parking areas, driveway intersections with Tioga Road, and directional signage. Existing trails would remain in their current location. Erosion and vegetation trampling within wetlands and creek banks may continue to occur. While site- specific natural and cultural resource protection and restoration plans could be implemented under this Alternative, a comprehensive plan would not be developed. A summary of existing uses, which would remain in their current state, is provided below, and in Table 2- 3.

Tioga Road

Approximately 50,086 square feet of dirt and paved shoulders provide space for approximately 271 standard vehicles between Sunrise Trailhead and the East Beach parking area. A narrow, asphalt sidewalk (in disrepair) is located at the southern edge of Tioga Road between the East Beach pull-out and Murphy Creek.

Site drainage flows southerly from pockets of mountainside tributary areas along the full length of Tioga Road. Stormwater flow is constricted at culvert inlets on the north side of Tioga Road, which serve as control points and discharge concentrated flows on the south side of Tioga Road. Tioga Road forms a causeway between Sunrise Trailhead and Murphy Creek, capable of storing

large volumes of backwater north of the roadway during heavy storm events, and culverts along this stretch discharge to informal drainage ways in naturalized areas that slope down to the lake. East Tioga Road interrupts sheetflow cascading down Polly Dome, and stormwater is captured in a shallow, informal ditch at the base of the dome and is then conveyed across Tioga Road by occasional culverts that discharge into the rip- rap embankment between the road and the lake. It is currently unknown whether culverts along Tioga Road have adequate capacity to convey flows from the design storm. Concentrated outflows from the culverts are a source of minor, periodic erosion in the informal drainage ways conveying stormwater into Tenaya Lake.

Sunrise Trailhead and Old Campground

Parking area capacity includes approximately 38 spaces within a 9,250- square foot paved area at the Sunrise Trailhead. An existing shuttle stop is located at the eastern end of the parking area. A 10,900- square foot, paved loop located in the old campground area is used for stock and horse trailer loading and parking. When not in use by park staff and American Indian activities, the Old Campground loop provides approximately 22 visitor parking spaces. Existing facilities to remain include one vault toilet stall, two dumpsters, and 10 bear boxes (bear- proof food lockers). The trail system includes the Sunrise trailhead to which leads to the Sunrise High Sierra Camp, Clouds Rest, the John Muir Trail, and other wilderness trails. The beginning of the trail crosses through the creek outlet of Tenaya Lake, where a series of low, informal stepping stones provide access through low water. Additional improvements include a raised, paved pathway (causeway), drainage culverts under Tioga Road, and signage.

Site drainage flows southeasterly from a relatively small mountainside tributary area of 10 acres through a series of culverts across Tioga Road, across the site, and into Tenaya Lake or its outlet creek. Stormwater flow is constricted at culvert inlets on the north side of Tioga Road, which serve as control points and discharge concentrated flows on the south side of Tioga Road. Those concentrated outflows are a source of minor, periodic erosion in the informal drainage ways conveying stormwater into Tenaya Lake.

The outlet creek of Tenaya Lake flows southwesterly across the Sunrise/Clouds Rest trail. Flow in this creek is not inhibited by any constructed features, and the water course is in a natural, healthy state.

Murphy Creek

Two parking areas (18,500 square feet) east and west of Murphy Creek provide 39 standard parking spaces (total). Shuttles can stop in this location; however, there is not a designated stop, nor a safe or delineated place for visitors to cross Tioga Road. Existing facilities include three vault toilet stalls, one dumpster, two trash/recycling containers, one payphone, 17 picnic tables, seven fire grills, five bear boxes, and two rescue caches. Additional improvements include culverts under Tioga Road and signage. Informal unpaved trails connect picnic areas and lead to the lakeshore. The Murphy Creek trailhead is located on the northern side of Tioga Road and provides access to destinations in Yosemite Wilderness such as the Grand Canyon of the Tuolumne, Ten Lakes, Tuolumne Peak, and various alpine loop hikes. The Glen Aulin High Sierra Camp is also accessible from this trail.

Site drainage flows southerly across the lake. Murphy Creek facilitates upper elevation stormwater and snowmelt flow towards Tenaya Lake. The Murphy Creek visitor use area is located on a braided alluvial fan centered around the main channel of Murphy Creek, which is

conveyed under Tioga Road by a series of four culverts before traversing the fan and discharging into Tenaya Lake. The culverts provide control points for the main channel, stabilizing the flow course and restricting its ability to shift during high flow events. Preliminary analysis indicates, however, that the hydraulic capacity of those four culverts is only adequate to convey stormwater and snowmelt flows equal to the two- year storm without creating backwater conditions. It should be stressed at this time that the hydraulic capacity analysis of the Murphy Creek culverts is cursory and needs to be further informed by specific engineering details and a more in- depth analysis incorporating backwater effects. For very large storms, it appears possible that backwater could overtop Tioga Road, threatening to wash out that section of the causeway, as happened in recent years, and unleash severe erosive potential onto broader areas of Murphy's fan.

Several auxiliary culverts relay stormwater flows across Tioga Road at the east and west ends of the fan and those culverts may provide supplemental hydraulic capacity for the main channel during severe backwater conditions. Concentrated flows discharging from the auxiliary culverts into informal drainage channels are a source of minor, periodic erosion into Tenaya Lake.

East Beach

A 21,760- square foot paved parking area provides approximately 35 standard spaces (not designated or striped). This area also accommodates shuttles and buses, and is also currently used by NPS maintenance for storage of road supplies. Existing facilities include four vault toilet stalls, two dumpsters, nine picnic tables located within the beach area, and three fire/grill pits. An unpaved trail extends from the parking area through wetland habitat to the beach. This trail is seasonally flooded, and there is evidence of trail widening and volunteer trails (soil compaction, denuded vegetation) as visitors attempt alternative paths towards the beach. Logs have been placed over inlets to the lake to provide informal access over high water courses. Additional improvements include culverts under Tioga Road and signage.

Site drainage flows southerly from almost 100 acres of Polly Dome through a series of five culverts across Tioga Road, where it is intercepted by a system of wetlands and the Tenaya Lake inlet creek which flow westerly into Tenaya Lake. Stormwater flow is constricted at culvert inlets on the north side of Tioga Road, which serve as control points for the concentrated flows discharging on the south side of Tioga Road. Those concentrated outflows are a source of minor, periodic erosion at the culvert outlets.

The inlet creek of Tenaya Lake flows southwesterly along the southeast edge of the East Beach site. The main creek channel was not historically mapped in its current location, and the succession of upgradient floodplain from meadow to pine forest both indicate that the current channel may have been excavated in the early to mid 1900's in order to expedite drainage from the upgradient wetland system. Creek flow is uninhibited by any constructed features, and the channel appears stable and in a healthy state (Sherwood 2010).

South Trail

The existing rustic trail extends approximately 6,000 linear feet along the southern edge of Tenaya Lake. This trail extends east to the Tuolumne Meadows area and south to the Sunrise High Sierra Camp and Clouds Rest areas. Site drainage flows northwesterly from hundreds of acres of mountainside area southeast of the lake, across South Trail through a series of occasional culverts, and then discharges onto the southeast banks of Tenaya Lake. Stormwater flow is constricted at culvert inlets on the south side of South Trail, and backwater conditions lead to

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frequent overtopping and considerable erosion of the pathway around those culverts. Concentrated flows discharging onto the southern banks of the lake are a source of minor, periodic erosion at the culvert outlets. There are no jurisdictional or notable creeks along the South Trail.

Actions Common to All Action Alternatives

The following actions would be incorporated into all action alternatives.

Designated and Roadside Parking

Each action alternative includes modifications to designated parking areas and roadside parking on the southern side of Tioga Road. Existing, undesignated parking on the northern side of Tioga Road would remain under all alternatives. All action alternatives would result in overall reduced parking area, compared to existing conditions (refer to Table 2- 1).

Table 2-1. Comparison of Total Physical Parking Capacity

Parking Area	Alt 1 No Action*	Alt 2 Tenaya Confluence	Alt 3 Tenaya Ecotones	Alt 4 Lake Loop	Alt 5 Immersive Nodes
Sunrise Trailhead and Old Campground	60 (1 ADA)	79 (3 ADA)	68 (3 ADA)	89 (4 ADA)	104 (4 ADA)
Murphy Creek	39 (0 ADA)	48 (2 ADA)	40 (2 ADA)	51 (2-3 ADA)	56 (3 ADA)
East Beach	35 (0 ADA)	68 (3 ADA)	70 (3 ADA)	59 (3 ADA)	46 (2 ADA)
Roadside Parking	277	20	30	15	45
TOTAL	411*	215	208	214	251

Note: Parking estimate includes standard, accessible, recreational vehicle, and bus pull-through spaces

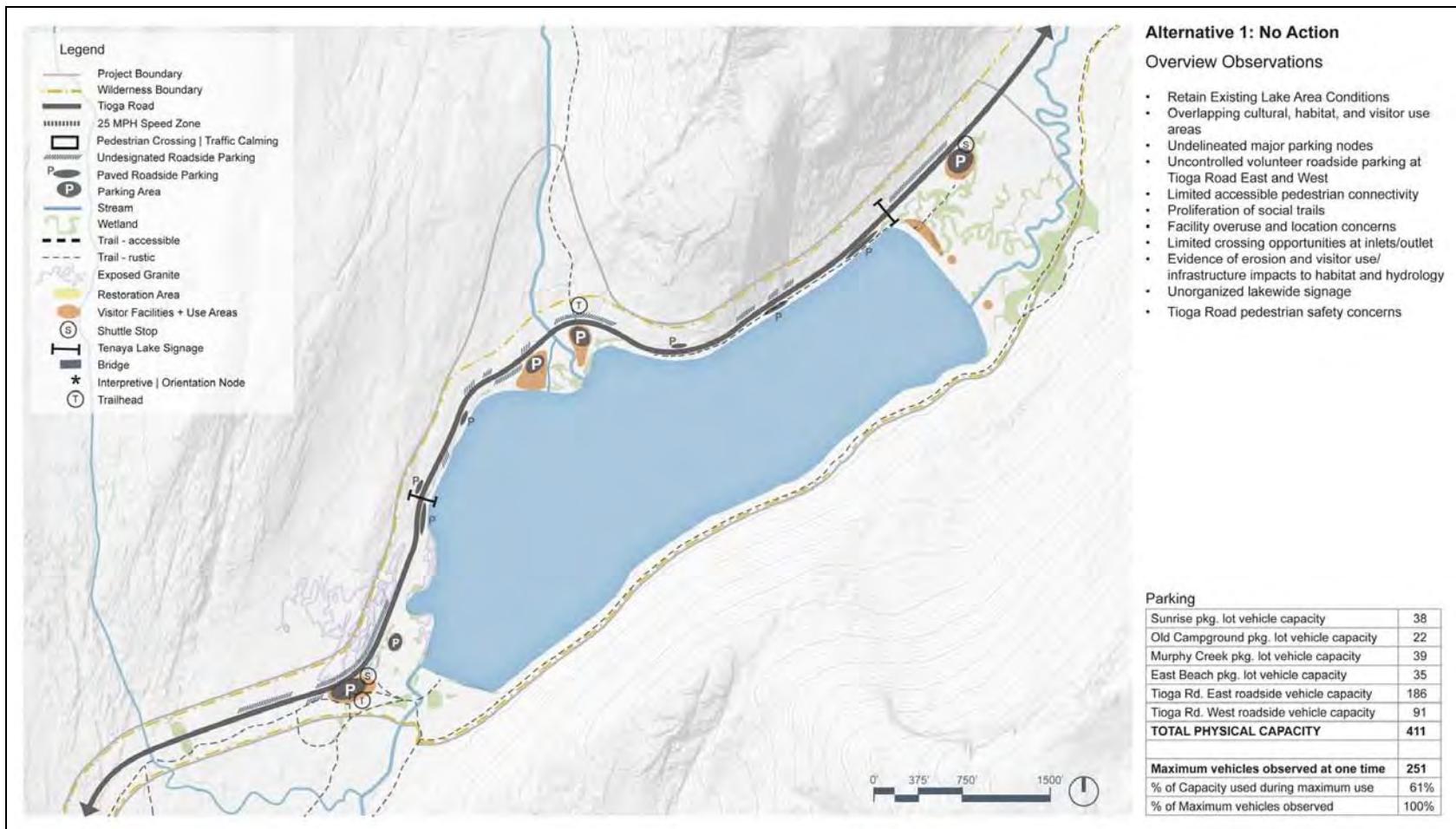
*parking estimate represents physical capacity, maximum observed number of vehicles parked at one time is 251

East Beach Facilities and Boardwalk

In all action alternatives, a picnic area would be located adjacent to the southeastern edge of the parking area. Existing facilities would be relocated and improved to provide a consolidated facilities area central to the re-organized parking area. Four new trash/recycling containers (two located at the trailhead facilities area, and one at each shuttle stop), one additional picnic table, and a pay phone are proposed. Three fire pits/grills would be removed. Several groups of picnic tables would remain under the trees at the beach area similar to what currently exists.

Pedestrian/boardwalk crossings over wetland areas would consist of 15- foot long wood/steel crossings with concrete footings.

Figure 2-3. Alternative 1 No Action Alternative Overview



Alternatives

Figure 2-4. Alternative 1 No Action Alternative Sunrise Trailhead and Old Campground Area

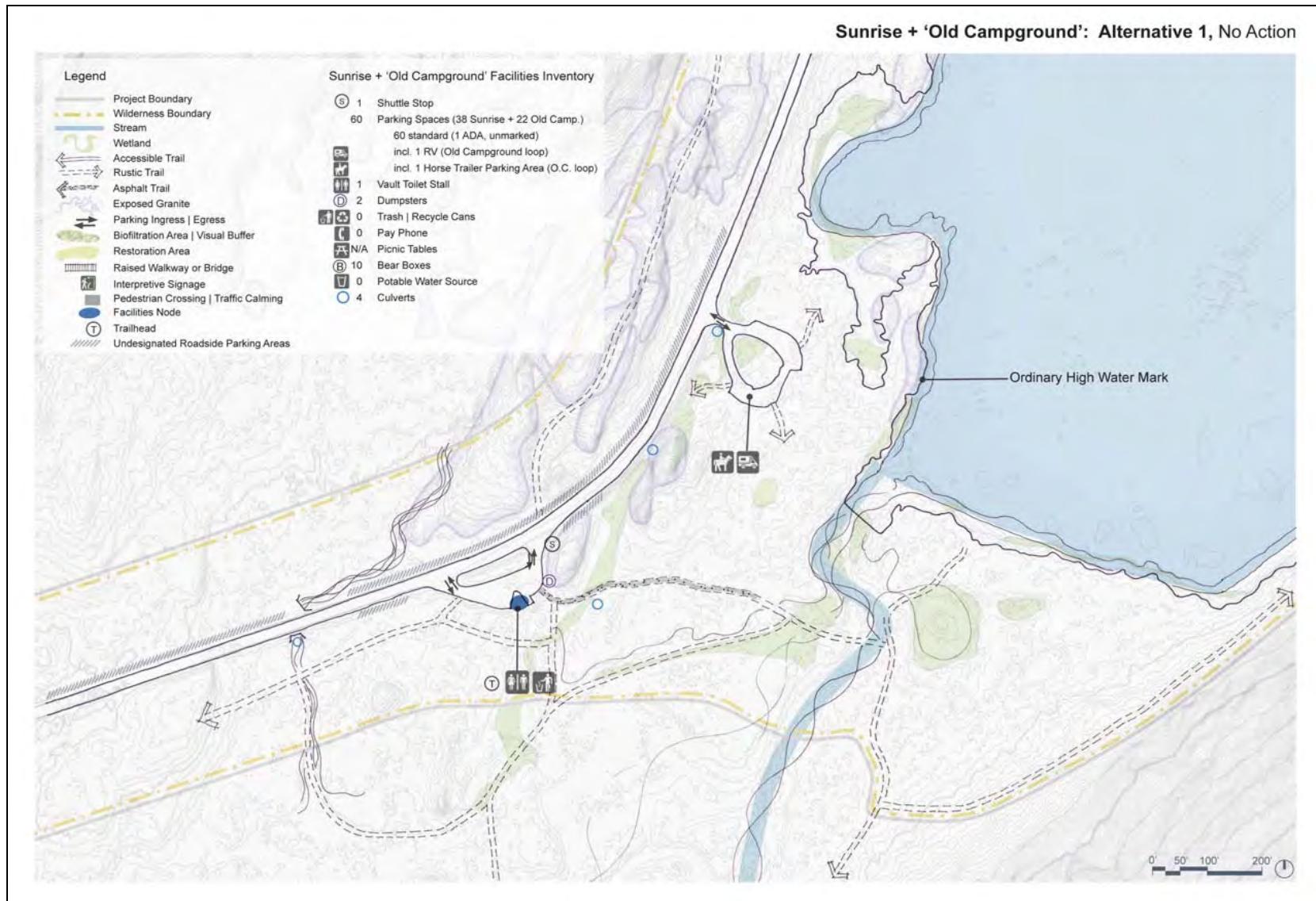
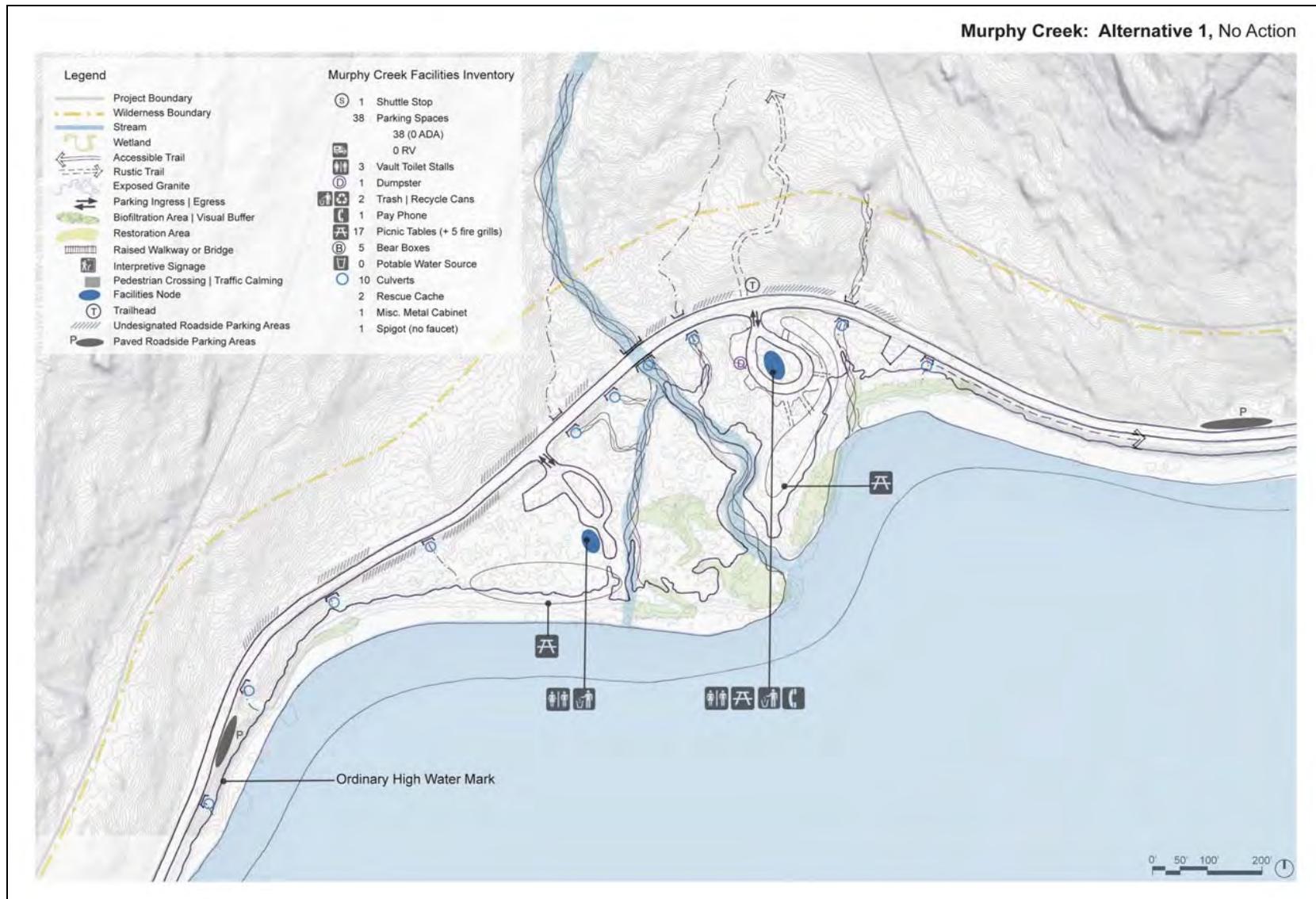
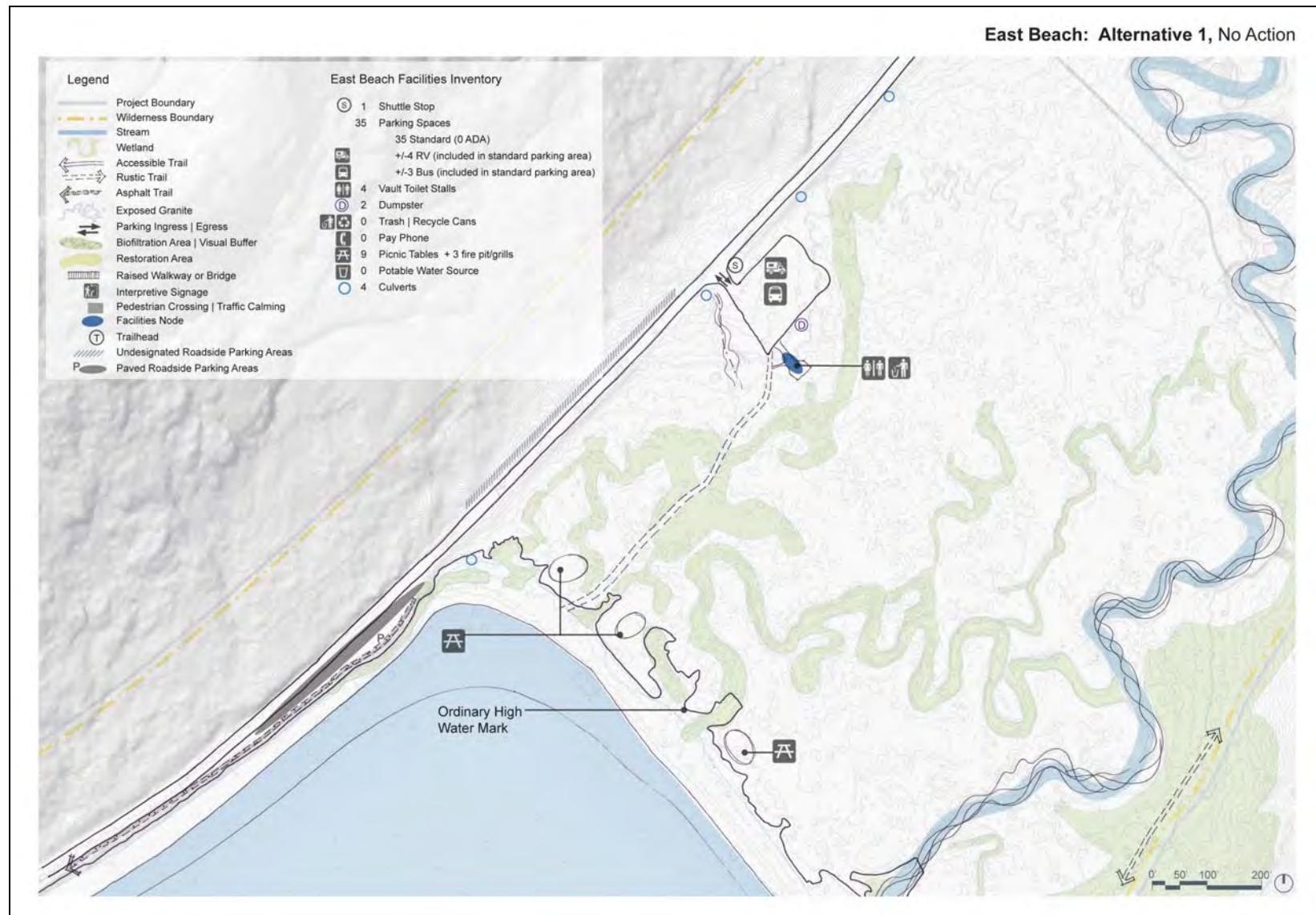


Figure 2-5. Alternative 1 No Action Alternative Murphy Creek Area



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Figure 2-6. Alternative 1 No Action Alternative East Beach



Removal of Existing Water System and Spigot

An asbestos water pipe extends from a non-operating well near the East Beach parking area along the southern edge of Tioga Road to the Sunrise Trailhead area. This existing system would be removed. The existing non-operating well would be capped but retained for future groundwater monitoring. The existing water spigot within the Murphy Creek area would be removed.

Vault Toilet Replacement

The vault toilet located closest to the lake in the Murphy Creek focus area is prone to overflowing and localized flooding in high-water conditions. The overflow of raw sewage poses a serious threat to public health and to water quality in the lake. All alternatives involve the removal of this vault toilet and replacement by a new toilet in an upgradient location adjacent to proposed parking areas and outside of the ordinary high water mark for the lake and seasonally flooded areas. Locating the vault toilet outside of flooded areas would minimize the potential for water contamination, and resolve this current problem.

Drainage Facilities and Infrastructure

The existing drainage infrastructure is comprised of culverts under Tioga Road, and within trail systems. Proposed drainage facilities and infrastructure would include installation of new culverts as a part of parking area, trail, and roadside improvements. On the Sunrise Trail, the existing causeway would be altered to better facilitate drainage.

Biofiltration would be constructed within and surrounding each parking area. These areas consist of a continuous, linear depressed planting basin adjacent to the paved surface and contained on both sides by naturalized side slopes (refer to Figure 2-7). These formalized planting areas blend into the landscape while detaining stormwater temporarily so that coarse particles and associated pollutants can settle out and be filtered by natural physical and biochemical processes. While certain pollutants such as heavy metals will persist in the soil, it is a preferred solution to contain them within the proposed biofiltration areas as opposed to allowing them to flow to and accumulate in the lake. Along Tioga Road between Sunrise Trailhead and Murphy Creek, an approximately 8,000- square foot linear biofiltration area would be located between the south edge the road and the pedestrian path (refer to Figure 2-8). Between Murphy Creek and East Beach, a 7,870- square foot, linear biofiltration area is proposed between the south edge of Tioga Road and the pedestrian path.

Existing Tioga Road culverts would remain, except where specified under each action alternative. The final design of culverts within the road corridor may be determined by the Tioga Road Rehabilitation Project, currently under development. Strategies such as using vegetation and strategic boulder cluster placement to dissipate hydrologic energy will be employed to improve existing culvert performance where erosion patterns and other related issues occur. All action alternatives propose to retrofit culvert outlets with energy dissipation strategies that will disperse concentrated flows and mitigate erosion at those points. During the conceptual design process, several naturally occurring dissipation and dispersal features were identified in the Tenaya Lake area. These features, comprised of native materials and vegetation, were formed slowly over time by natural forces and processes. Integrated engineering solutions were developed based on these natural features to mitigate the impacts of erosive flows at culvert outlets, and they will be applied area-wide with proper consideration to site-specific conditions.

Figure 2-7. Tioga Road Vegetative Buffer and Parking Area Biofiltration Areas

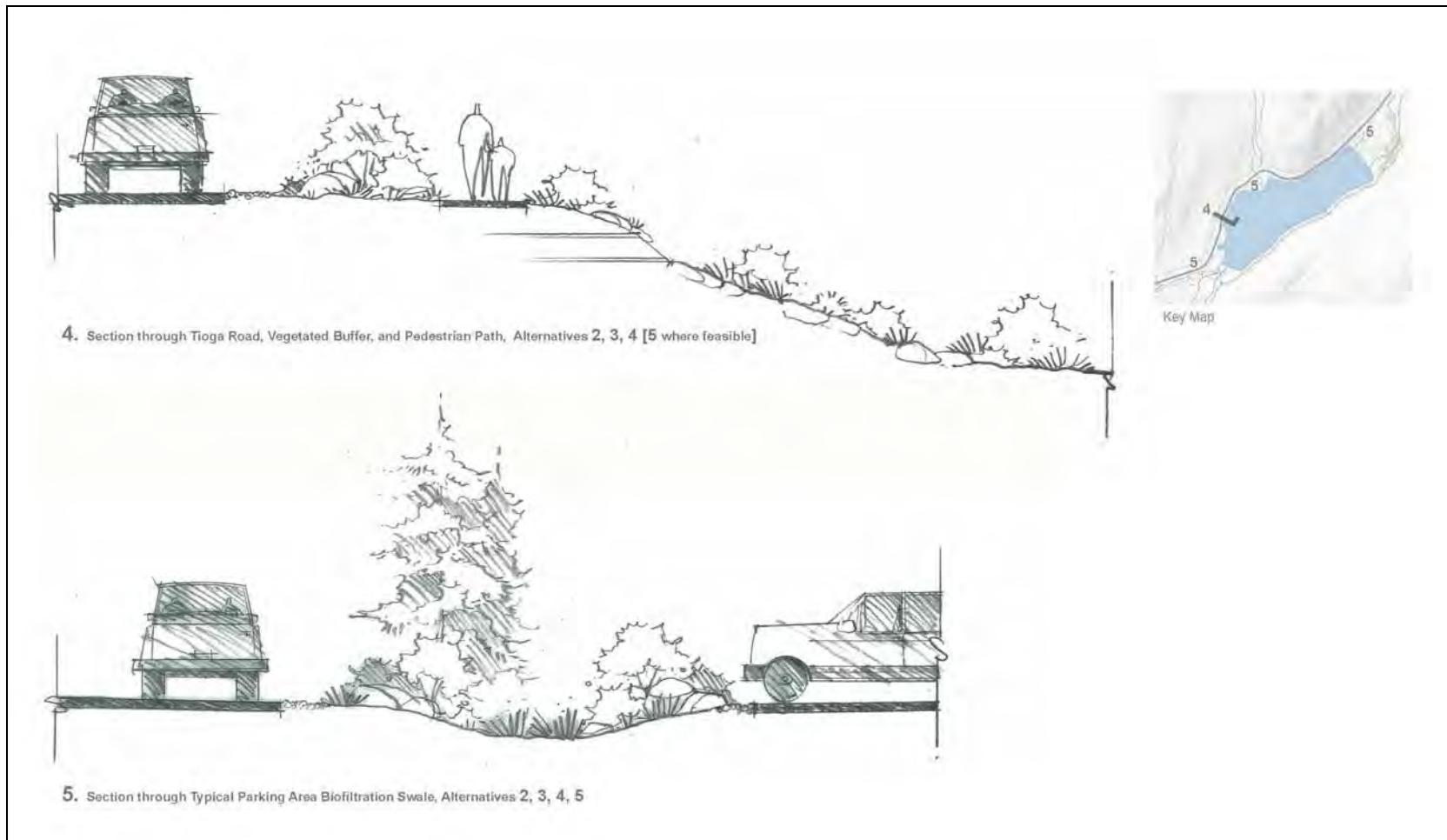


Figure 2-8. Tioga Road Pedestrian Path

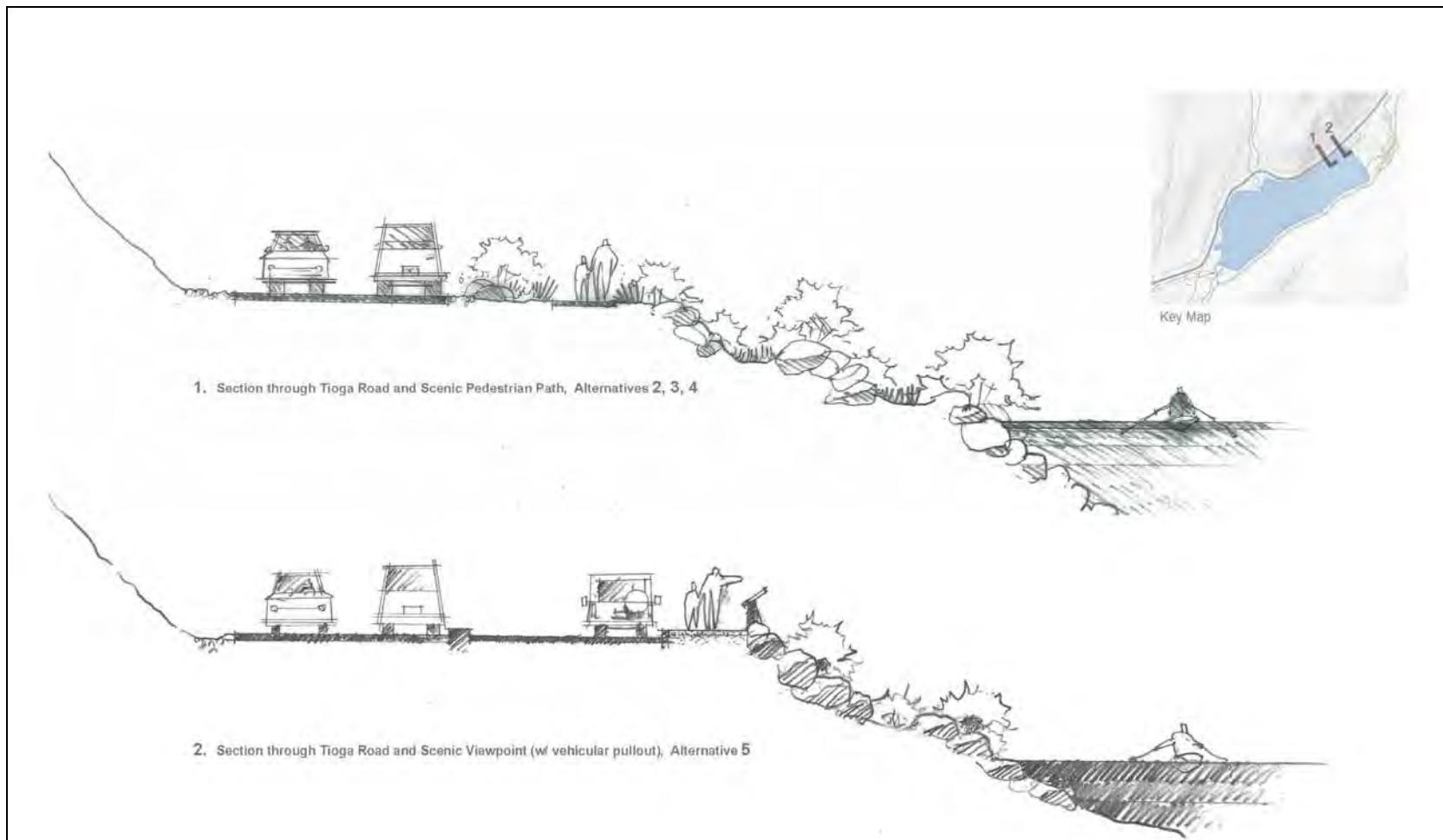


Figure 2-9. Pedestrian Crossing and Shuttle Stops on Tioga Road



Reduced Speed Zone on Tioga Road

The existing speed limit on Tioga Road is 35 miles per hour (mph). Under all alternatives, a continuous 25 mph reduced speed zone is proposed within the Tenaya Lake area. Signage and traffic calming devices are proposed to notify visitors of the change. Traffic calming devices, would be installed at proposed shuttle bus locations at Sunrise Trailhead, Murphy Creek, and East Beach (refer to Figure 2- 9).

Shuttle Stops/Alternative Transportation

Increased visibility and clarity of shuttle bus and other transportation resources is common to all action alternatives. Each alternative proposes a delineated 1,400- square foot shuttle stop at each major node, coupled with strategies for vehicle speed reduction and safety of pedestrian crossing at these shuttle areas (refer to Figure 2- 9).

Interpretive Elements, Signage and Wayfinding

Proposed signage within the Tenaya Lake area would be informative, interpretive, and directional. Signage on Tioga Road would include a gateway sign or element both east and west of the lake area; parking, amenity, and trailhead signs; and notification of the speed reduction zone (25 mph).

Within the Sunrise Trailhead, Murphy Creek, and East Beach areas, road and approach signage would be improved and relocated to consolidate informational and interpretive messaging within the facilities area. Within areas proposed for removal, signage would also be removed or relocated. Trail connection signage would be improved to help guide visitors towards destinations and discoveries. Educational signage would include information discouraging social trails. In some cases, redundant social trailing would be removed to improve natural processes and increase wayfinding clarity. During restoration activities, temporary signage would be installed.

Interpretive elements would be installed at pedestrian nodes and within parking areas, as indicated on the action alternative figures. Signage design and color would tie into the immediate area (e.g., granite base within rocky areas, pre- rusted steel within forested areas, use of blues reflective of the lake, etc.). Orientation and interpretive panels within parking lots would consist of a peeled log design.

Waste and Recyclables Management

All action alternatives incorporate the use of trash cans, dumpsters, and recycling containers within visitor facility areas. The location and quantity of proposed waste and recycling containers are shown in the exhibits for each alternative, and quantified in the text and summary table (refer to Table 2- 3).

Ecological Restoration

Ecological restoration, in various configurations, is a major component of each action alternative. Ecological restoration would include revegetation and restoration of hydrological function and biological diversity in currently impacted areas. The pedestrian impact on natural areas would be reduced by removing or reorganizing and better delineating pathways. Ecological restoration will take place in areas that have been disturbed in the past which may include areas where there has

been abandoned infrastructure, removal of pavement, denuded and compacted soil, and soil erosion. Techniques used to correct these situations may include the following:

- Salvage of topsoil and vegetation using heavy equipment;
- De- compaction of soil using hand tools or heavy equipment;
- Re- contour of natural topography using heavy equipment;
- Replacing salvaged topsoil using hand tools or heavy equipment;
- Re- planting salvaged plants, or re- planting with plants propagated from locally collected native seeds;
- Seeding the area with locally collected native seeds;
- Applying locally collected mulch and forest duff to the area of prior disturbance;
- Control soil erosion using natural materials;
- Move woody debris onto the site to naturalize the appearance of the site; and

Restoration of riparian vegetation and stabilization of stream banks will occur within the Murphy Creek area, and will include the use of local willow pole cuttings (refer to Appendix A, Mitigation Measures and Best Management Practices). Along the South Trail, social trails and denuded lake edges would be restored to reduce and prevent erosion and sedimentation. In addition to biofiltration within parking areas and along Tioga Road, revegetation and restoration is proposed within eroded bank and culverted areas, in a buffer strip between the road and pedestrian path, within denuded and trampled areas between the road and the lake, and in areas converted from roadside parking use (as applicable). The existing rip- rap along the northeastern edge of the lake would be improved by the strategic removal of select boulders, and replacement with vegetated patches within the existing structure.

Trail Construction/ Trail Type

Three general trail types are proposed for the Tenaya Lake Area Plan: rustic; stabilized; and accessible. Rustic trails would consist of hardpack soil, stabilized trails would consist of stabilized crushed rock, and accessible trails would consist of stabilized crushed rock and/or boardwalk. Boulders would be positioned on the lakeside of the trails to allow for resting.

Pedestrian bridges and boardwalks are proposed to improve pedestrian access within the Sunrise Trailhead and Old Campground, Murphy Creek, and East Beach focus areas. The boardwalks are proposed in place of regular trails in wetland areas where a regular path would be submerged during wet conditions. Boardwalks maintain better hydrologic connectivity in wetland areas than do regular pathways, but they also create a more permanent obstruction to vegetation growth within their footprint. Pedestrian bridges over creek channels are proposed in certain alternatives. If these bridges are constructed so that they do not encumber the creeks' floodways, then they should create no significant hydrological impact. Another critical consideration is to construct the proposed pedestrian bridge in the Murphy Creek focus area closer to the roadway and away from the braided channels in the heart of the alluvial fan, because braided alluvial channels can shift during heavy flows and could wash out the bridge.

Allowable Uses

The Tenaya Lake area provides a variety of visitor uses. The range of allowable day- use activities would not change under the proposed plan (with the exception of lit fires in grills and fire pits). Existing uses include hiking, picnicking, photography, contemplation, and other passive activities. Non- motorized watercraft is allowed within the lake (e.g., kayaks, canoes, and, rafts). Bicycles and motorized vehicles are not allowed outside of parking areas, roadways, and Tioga Road. During the winter season, Tioga Road is closed; however, Tenaya Lake is accessible to visitors on skis and snowshoes. Special event permits are issued for weddings, ceremonies, and other group gatherings on the East Beach. The permit allows for up to 50 people, and prohibits the use of amplified sound and the use of motorized vehicles for the transport of materials to the beach. An average of six permits is granted each year (Clark 2010). Under each alternative, this use would continue with no change.

Project Construction Phasing

Due to the complexities of implementing the wide range of proposed site improvements for the Tenaya Lake area within a short window of time during the open season, phasing of improvements is recommended to achieve overall project goals. Phasing strategies allow site improvements to be staggered so that capacity and visitor experience would only be minimally impacted during construction periods, and project funding can be utilized strategically. Phasing can also enable the dispersal of potential temporary resource impacts during the construction process with the integration of sufficient resource protection measures and subsequent restoration. Phasing decisions directly affect cost, budget, and schedule, allowing smaller portions of work to be executed with available project funding, but every phasing segment potentially requires additional cost in terms of contractor mobilization, labor and administrative costs. In consideration of these many variables, the following phasing strategy is suggested for the site alternatives in order to prioritize project goals for key areas and to develop an implementation sequence that allows the greatest flexibility, preservation of resources, and enhancement of the Tenaya Lake experience. This phasing strategy may be refined as implementation commences.

It is anticipated that the implementation would occur over the next 15- 20 years, depending on availability of funding. It is also possible that not all elements identified in the preferred alternative will be implemented, due to funding constraints. NPS will prioritize funding and phasing to focus on elements critical to resource protection and visitor safety. The following potential sequence strategy applies to all of the action alternatives proposed for Tenaya Lake. It should be noted that each Phase could be further divided into sub- phases if required.

Phase 1: East Beach

Initial phases of Tenaya Lake improvements should begin with ecological restoration and refinement at the major site nodes, prior to work along Tioga Road. This sequence allows Tioga Road to provide access, staging and parking capacity for visitors and contractors during the major node restoration and construction activities. The East Beach area is the highest priority for Phase 1 work, and would include wetland and lake bank restoration, trail reconstruction—including boardwalk and footbridge, shuttle stop improvement, parking area expansion and associated roadside parking removal and ecological restoration.

Phase 2: Murphy Creek

Phase 2 might initially include the implementation proposed for Murphy Creek West, while maintaining the current use at Murphy Creek East. The abandonment, facility demolition and removal, and restoration of Murphy Creek East, as proposed in three of the four alternatives, might follow in the same construction season, or possibly in a subsequent phase. Phase 2 would include major work (removal of roadside parking and ecological restoration) on the north side of Tioga Road for Murphy Creek West, concurrent with the major work on the south side of the road. The potential replacement of the culverts with a roadway bridge would best be concurrent with the future Federal Highway Administration (FHWA) improvements for this section of Tioga Road. This phase would include any pedestrian bridges at Murphy Creek as well as complete ecological restoration efforts surrounding these site areas.

Phase 3: Sunrise Trailhead

Improvements at Sunrise Trailhead would follow improvements to East Beach and Murphy Creek, including ecological restoration along the lake bank, Tenaya Creek banks, and visitor use areas. It would also include the reconfiguration of trails.

Phase 4: Tioga Road

Improvements to the major site areas are dependent on Tioga Road for construction access, staging and visitor and contractor parking during the improvement periods. Once the major work is done at the three primary site areas, attention can then be focused on removing and/or organizing roadside parking, creating additional trail links and improvements, and restoring culverts and roadside areas. Parking reconfiguration at the Sunrise Trailhead will occur as part of this phase.

Major work to the road itself, including resurfacing, edge treatments, culvert replacement or rework, and potential vehicular bridges, would ideally be coordinated with the future FHWA improvements for Tioga Road.

Alternative 2: Tenaya Confluence (Preferred Alternative)

Alternative 2, Tenaya Confluence, is designed to avoid and protect sensitive natural and cultural resources and provide for the merge and flow of visitors within and between facility areas. Many existing trails located within ecologically and culturally sensitive areas would be removed and restored to natural conditions. This alternative includes 9.7 acres of ecological restoration within major wetland and riparian areas currently affected by visitor use, creation of volunteer trails, and stormwater erosion. The existing trail system would be realigned to avoid sensitive natural and cultural resources and support protection and restoration. Use of pedestrian bridges and boardwalks over waterways and wetland habitat would restore hydrological function of major waterways.

In addition to restoration actions, this alternative proposes a continuous trail along the north side of the lake connecting all three major facility nodes within the Sunrise Trailhead, Murphy Creek, and East Beach areas. This alternative removes almost all roadside parking on the southern side of Tioga Road (262 spaces), with the exception of five spaces between Sunrise Trailhead and Murphy Creek. This alternative includes a total of 215 parking spaces, including expanded parking in the Sunrise Trailhead, Murphy Creek, and East Beach areas (195 designated spaces total), five roadside spaces on the southern side of Tioga Road, and retaining 15 undesigned spaces on the

northern side of Tioga Road. Accessible trails would be located within the East Beach and Sunrise Trailhead areas, and between Murphy Creek and East Beach. All other trails would be rustic. To better protect natural and cultural resources, minimal facility improvements are proposed within the Sunrise Trailhead, Old Campground, and Murphy Creek areas (refer to Figures 2- 10 through 2- 13). This alternative does not include development of new campground facilities.

Tioga Road

This alternative includes five roadside parking spaces on the southern side of Tioga road between Sunrise Trailhead and Murphy Creek. The remaining roadside parking would be removed, and naturalistic barriers such as boulders would be installed. A 2,400- foot footpath and vegetated buffer would be constructed parallel to Tioga Road, to connect Sunrise Trailhead and Murphy Creek. Pedestrian- only interpretive viewpoints would be located along the trail. Roadway culverts would be redesigned (this may be contingent on the Tioga Road Rehabilitation Project).

Along Tioga Road between Murphy Creek and East Beach, approximately 15 undesignated roadside parking spaces would be retained north of Tioga Road. Naturalistic barriers such as boulders would be installed in other areas to prevent undesignated roadside parking. Pedestrian- only interpretive nodes would be located along the trail. No designated vehicular pull- outs are proposed. The 2,500- foot broken asphalt sidewalk at the south edge of the roadway would be replaced with a vegetated buffer and 2,500- foot accessible trail to connect East Beach and Murphy Creek.

Sunrise Trailhead and Old Campground

Under Alternative 2, a total of 79 designated parking spaces would be provided in this area. The existing parking area would be re- organized and expanded to the west to provide 61 standard, three accessible, and two RV parking spaces. 3,000 square feet of biofiltration would be installed within and adjacent to the parking area. Turn- outs would be located on either side of Tioga Road, and would include a shuttle stop and pedestrian crossing.

The existing paved loop at the Old Campground site would be retained and improved to provide 11 standard parking spaces and two stock/horse trailer spaces. Existing picnic tables would be removed. A biofiltration area would be constructed in the center of the parking loop. This area would continue to support NPS operations and stock staging, and gatherings facilitated by American Indians.

Existing facilities would be re- located and improved to provide a consolidated facilities area central to the Sunrise Trailhead parking area, including the following additional facilities: one additional vault toilet stall; four trash and recycling containers (two at the trailhead facilities area and one at each shuttle stop); and three benches (one at each shuttle stop and one at the trailhead facilities area). Orientation signage, including trailhead and educational interpretive signs, would be provided in the Sunrise Trailhead area to facilitate wayfinding and enhance visitor experience of the area.

Within the Sunrise Trailhead area, existing trails would be re- organized and consolidated to avoid wetland habitat and seasonally flooded areas, and to protect sensitive natural and cultural resources. Where necessary, a boardwalk would be installed to minimize soil compaction and interruptions in hydrological function where the trail crosses wetlands and waterways. All social trails would be removed and designated trails would be maintained to improve natural processes

and better manage visitor use and allow access between the Sunrise Trailhead and Old Campground areas. A 1,100- foot accessible trail would extend from the Sunrise Trailhead parking area to a lakeside viewpoint opportunity, and to the east of the Old Campground loop. A rustic trail would extend both north and south from the Old Campground loop to provide access to the lake, and to provide an alternative connection to the accessible trail. The rustic trail would continue to the south, connecting with the Sunrise Trail and South Trail.

Murphy Creek

Under this alternative, 7.3 acres of ecological restoration would be implemented north and south of Tioga Road. The existing parking area and associated facilities east of Murphy Creek would be removed, and the area would be restored. The western parking area would be re-organized and expanded to the west to provide 46 standard and two accessible spaces. Turn- outs would be located on either side of Tioga Road north of the western parking area, and would include a shuttle stop and a pedestrian crossing to serve the shuttle stop. 3,000 square feet of biofiltration would be installed within and adjacent to the parking areas.

Existing facilities would be re-located outside of the 100- year floodplain, and improved to provide consolidated facilities at the west parking area. The five fire grills would be removed. Additional facilities would include four vault toilet stalls, six trash and recycling containers (four at the facilities node and one at each shuttle stop), five bear boxes, and two rescue caches.

An accessible trail would traverse the Murphy Creek area, and continue towards East Beach parallel to Tioga Road (along the existing sidewalk alignment). The section within the Murphy Creek area would be approximately 1,774 feet, and would include a sidewalk over the proposed box culvert at the Murphy Creek crossing south of Tioga Road (refer to Figure 2-14). A portion of the Murphy Creek Trail north of Tioga Road would be relocated to protect sensitive resources. The existing Murphy Creek main channel culverts under Tioga Road would be removed, and replaced with a box culvert to allow restoration of the natural Murphy Creek hydrology.

East Beach

The existing parking area would be re-organized and expanded to provide an additional point of egress/ingress, and 61 standard and three accessible parking spaces. A pull- through parking and circulation route would be provided for four tour buses or RVs. The eastern parking area would have a decomposed granite (or similar) surface. 4,500 square feet of biofiltration would be installed within and adjacent to the parking area. Turn- outs would be located on either side of Tioga Road, and would include a shuttle stop and a pedestrian crossing.

Existing facilities would be relocated or improved to provide a consolidated facilities area adjacent to the parking area. Additional facilities would include four trash and recycling containers (two at trailhead facility areas and one at each shuttle stop), 10 picnic tables, and one communal picnic table. Orientation signage, including trailhead and educational interpretive signs, would be provided in the East Beach area to facilitate wayfinding and enhance visitor experience of the area.

A 980- foot accessible trail would extend southwest from the parking area, connecting with the accessible path parallel to Tioga Road. Naturalized stone steps leading from the trail to the water would be provided (refer to Figure 2-15). The existing trail from the parking area to East Beach would be removed, and 1.2 acres of wetland restoration would occur in the surrounding area. An

840- foot accessible trail including boardwalk sections would extend south from the parking area to the East Beach, terminating at a communal picnic area. This communal area would be available on a first- come, first- serve basis. A 905- foot rustic trail would extend from the picnic area towards the South Trail. The existing, informal log crossing over Tenaya Creek would remain.

South Trail

Under this alternative, the existing 6,000- foot trail would remain rustic. Trail sections and culverts would be maintained, repaired, and replaced as needed.

Figure 2-10. Alternative 2 Tenaya Confluence Overview

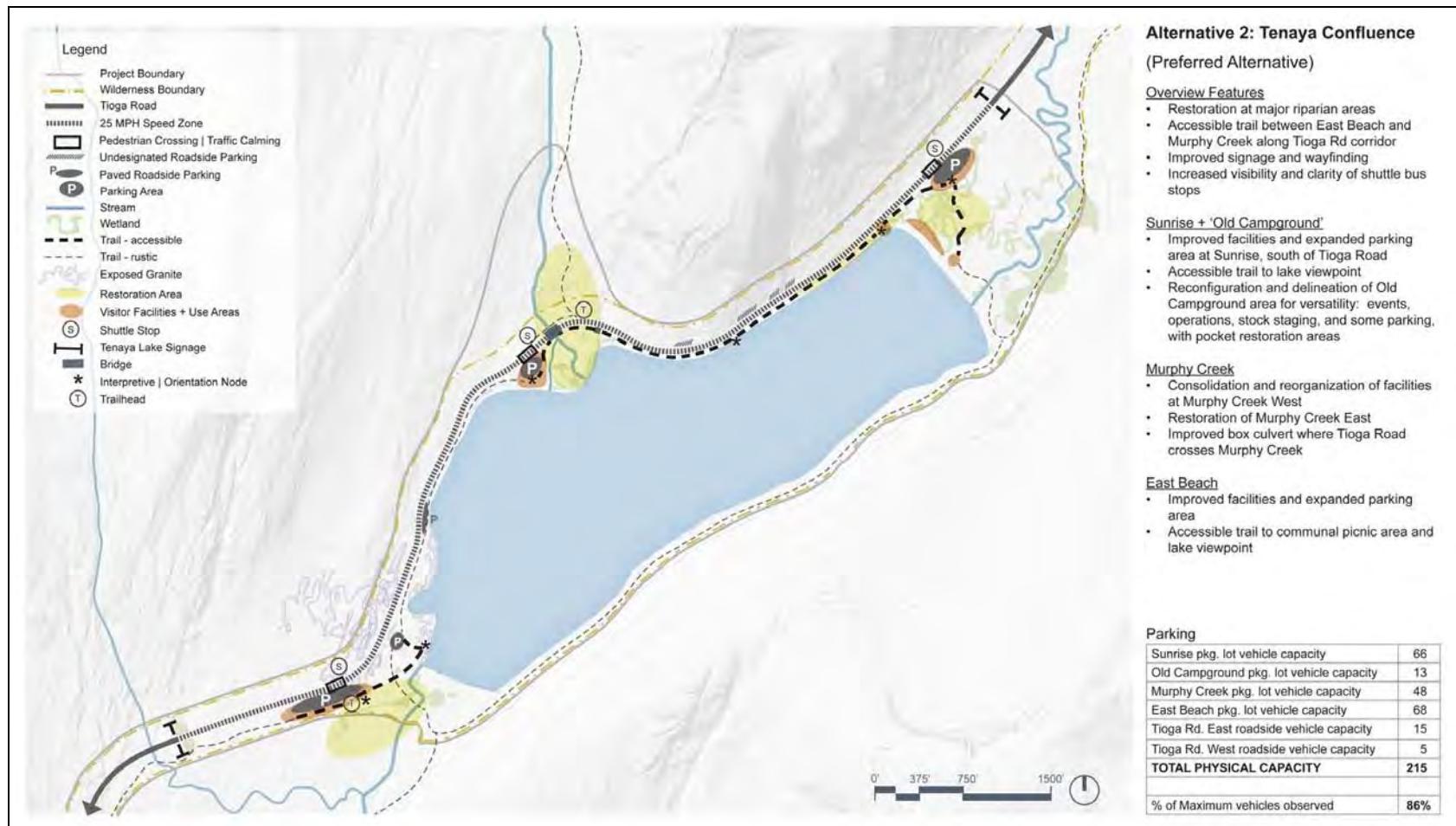
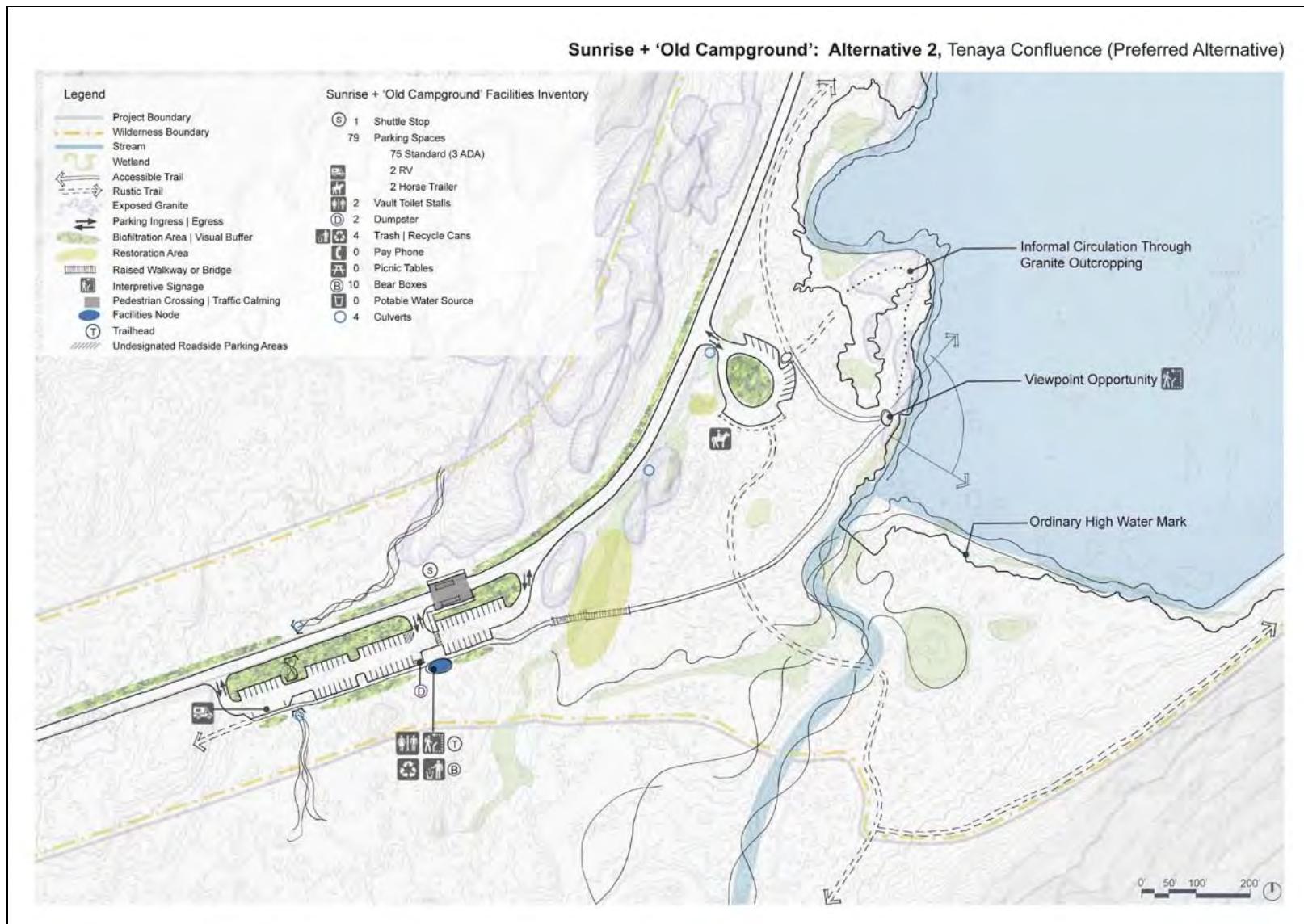


Figure 2-11. Alternative 2 Tenaya Confluence Sunrise Trailhead and Old Campground



Alternatives

Figure 2-12. Alternative 2 Tenaya Confluence Murphy Creek

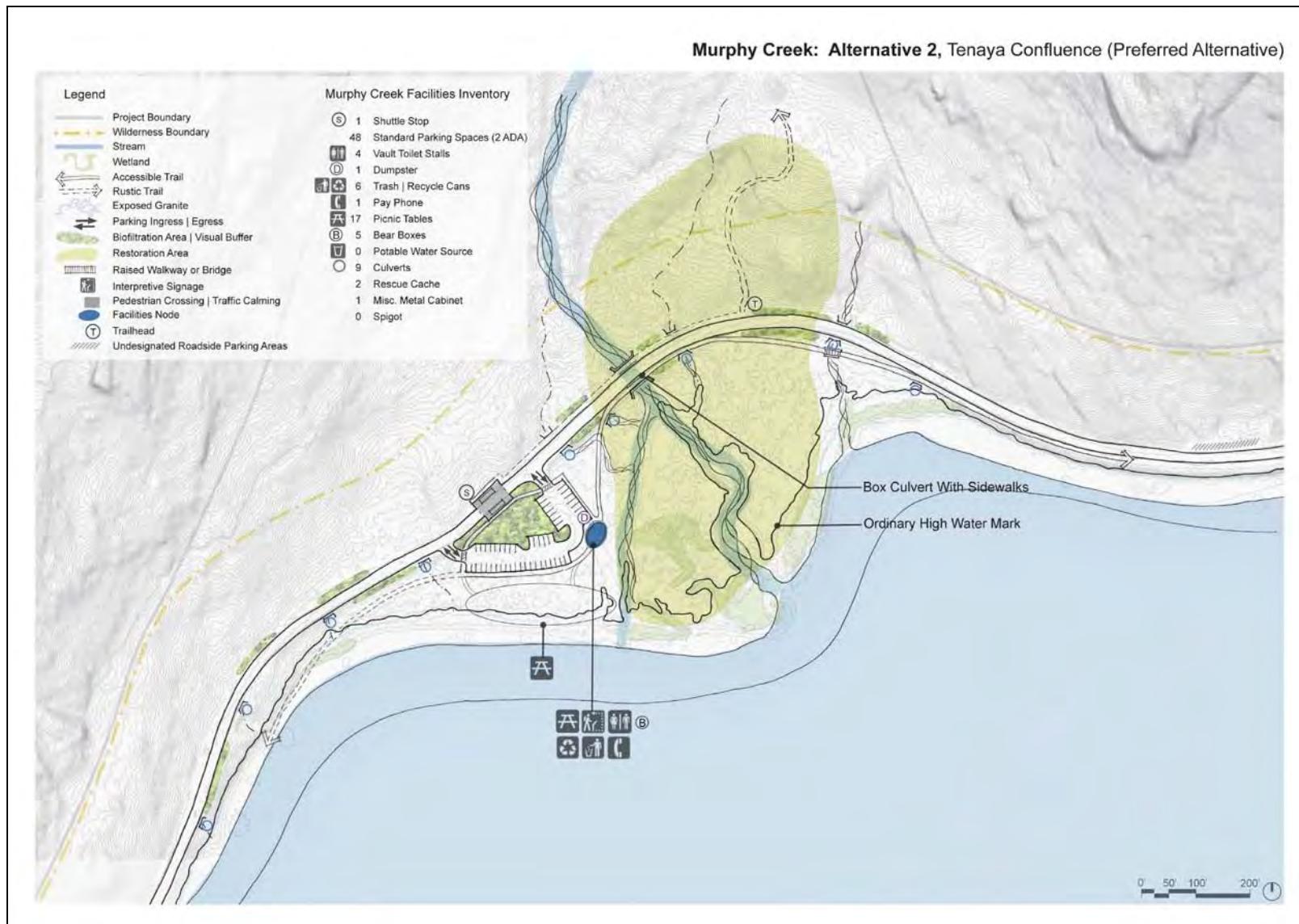
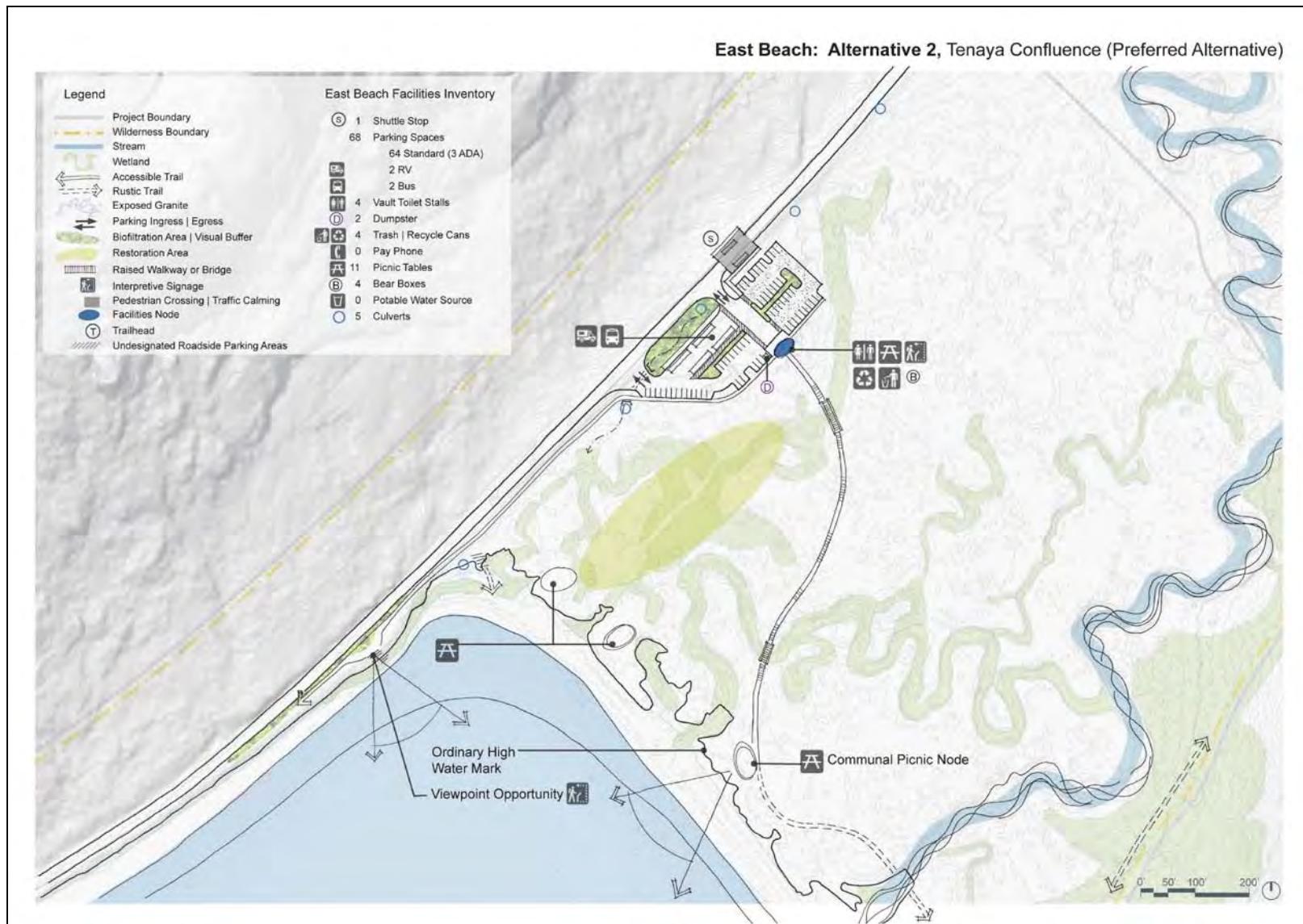


Figure 2-13. Alternative 2 Tenaya Confluence East Beach



Alternatives

Figure 2-14. Alternatives 2, 4, and 5 Murphy Creek Pedestrian Bridge



Figure 2-15. Alternatives 2, 3, 4, and 5 Tioga Road Stepped Water Access



Alternative 3: Tenaya Ecotones

Under this alternative, Tenaya Ecotones, each area would possess a distinctive character, while including similar design features, such as minimal trail development and rustic creek crossings. This alternative includes 9.8 acres of ecological restoration, and developed areas would be located to protect key ecological and cultural resources. This alternative includes parking areas at Sunrise Trailhead, Old Campground, Murphy Creek, East Beach, 15 undesignated spaces on the northern side of Tioga Road, and 15 designated spaces on the southern side of Tioga Road. Approximately 247 roadside spaces would be removed. The proposed trail system includes an accessible connection between Murphy Creek and East Beach. Rustic trails are proposed between Murphy Creek, Sunrise Trailhead, and South Trail. Minimal improvements are proposed within the Sunrise Trailhead, Old Campground, and Murphy Creek areas (refer to Figures 2- 18 through 2-21). This alternative does not include development of new campground facilities.

Tioga Road

Along Tioga Road, between Sunrise Trailhead and Murphy Creek, approximately 6,000 square feet of the road shoulder would be restructured to provide 15 roadside parking spaces within three areas, including one accessible space. Naturalistic barriers would be installed to prevent undesignated road shoulder parking opportunities on the southern side of Tioga Road. One paved scenic turn- out would be provided. The existing (currently abandoned) compacted, 4,550- foot trail north of Tioga Road would be restored. A rustic, 3,050- foot trail would be constructed parallel to and south of Tioga Road.

Along Tioga Road, between Murphy Creek and East Beach, all roadside parking along the southern edge of the road would be removed, and naturalistic barriers would be installed. Approximately 10 to 15 roadside parking spaces along the northern edge of Tioga Road would remain. One designated pedestrian lake access and viewpoint would be installed near East Beach, and two interpretive nodes would be installed along the roadway. No designated vehicular turn-outs are proposed. The 2,500- foot broken asphalt sidewalk along the southern edge of Tioga Road would be removed and replaced with a vegetated buffer and 2,500- foot accessible path to connect East Beach and Murphy Creek.

Sunrise Trailhead and Old Campground

Under this alternative, the existing parking area south of Tioga Road would be expanded and reorganized to accommodate 61 standard, three accessible, and two RV parking spaces. A 3,000- square foot biofiltration area, which may include sub- drainage piping, overflow structures, and drainage rock) would be constructed around the parking area to filter stormwater and reduce erosion. Turn- outs would be located on either side of Tioga Road, and would include a shuttle stop and a pedestrian crossing to connect the Sunrise Trailhead parking area, shuttle stop, and the re- established wilderness trail that leads to Murphy Creek.

The existing paved parking area and vehicular loop within the Old Campground Loop would be retained to provide two parking spaces. The loop would be repaired, and a gate would be installed on the existing steel post to limit public access when necessary. The existing roadside trail would be connected with a rustic, designated path leading to the lakeshore.

Existing facilities, including one vault toilet stall, two dumpsters, and 10 bear boxes, would be relocated. Proposed facilities would include an additional vault toilet stall, four trash/recycling

containers (two at the trailhead facilities area, and one at each shuttle stop), three benches (two at the shuttle stop and one at the trailhead facilities area). The existing picnic table within the Old Campground Loop would be removed.

Existing trails in the Sunrise Trailhead area would be re-organized and consolidated including: removal of 1,610 feet of existing compacted trail; construction of a 1,440- foot accessible trail, 1,000- foot rustic trail, and 150 feet of accessible boardwalk; and improved stepping stones across 100 feet of Tenaya Creek.

Murphy Creek

The existing eastern parking area would be removed, and would be part of a large restoration area. The western parking area would be reconfigured to provide 26 standard spaces, two accessible spaces, two RV spaces for day- use visitors, and an adjacent road- side pull- off area. Turn- outs would be located on either side of Tioga Road near the western parking area, and would include a shuttle stop and a pedestrian crossing to serve the shuttle stop and to connect the relocated Murphy Creek Trailhead. An overnight- use, pull- through, 10- space parking area would be installed on the northern side of Tioga Road. 2,000 square feet of biofiltration would be installed around the parking areas.

Existing facilities would be relocated to the parking areas west of Murphy Creek, and would include one additional vault toilet stall and four additional trash/recycling containers (two at each facilities node, and one at each shuttle stop). A metal cabinet would be removed.

The infrastructure at each creek/road intersection would be improved to enhance hydrological function. A 25- foot, combined vehicular and pedestrian bridge would be constructed where Tioga Road crosses Murphy Creek (refer to Figure 2- 20). The bridge would consist of reinforced concrete and would comply with Yosemite's Design Guidelines. A 50- foot wood bridge with stone abutments would be constructed over Murphy Creek north of Tioga Road. This bridge would be constructed to meet NPS stock crossing standards.

A 1,280- foot accessible trail consisting of stabilized crushed rock or boardwalk would be constructed to provide access to the designated picnic area, and the north lake trail between Murphy Creek and East Beach. On the north side of Tioga Road, approximately 1,680- feet of trail would be removed, and the Murphy Creek Trailhead and associated signage would be relocated to the west side of Murphy Creek, consisting of 1,710 feet of new trail. The existing rustic trail between Murphy Creek and Sunrise Trailhead would be improved by stabilizing critical areas and reducing erosion.

East Beach

The existing East Beach parking area would be re-organized and expanded to the southwest. The parking area would provide 60 standard spaces, three accessible spaces, and four RV spaces). Two driveways would be installed to facilitate ingress and egress, and a pull- through circulation route for three tour buses would be provided. Turn- outs would be located on either side of Tioga Road, and would include a shuttle stop and a pedestrian crossing. 4,000 square feet of biofiltration area would be installed within and around the parking area.

The existing, 500- foot trail would be removed, and wetland restoration would occur in the surrounding area. Approximately 1,500 feet of accessible trail is proposed. A new, accessible trail

Alternatives

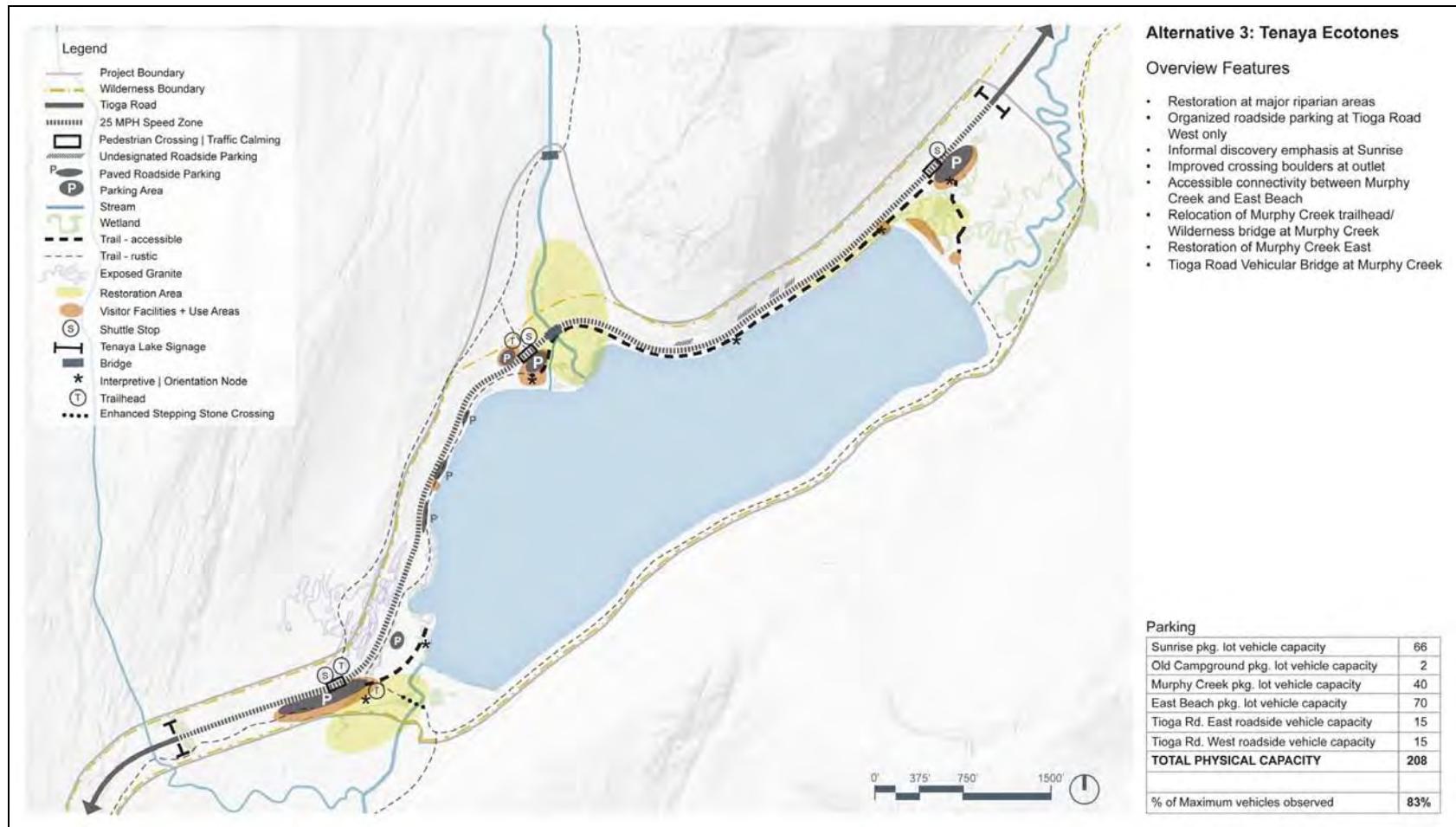
would extend southeast avoiding the wetland area, and towards the beach. Pedestrian crossings and/or boardwalks would be installed where the trail traverses wetlands and water courses (approximately 60 feet total). A communal picnic area with table and benches would be located at the southern trail terminus near the lake. This communal area would be available on a first- come, first- serve basis.

A second accessible trail would extend west from the parking area, parallel to Tioga Road. Naturalized stone stairs would connect the trail to the lake, providing access to the water. The surrounding area would be revegetated. The existing, informal log crossing over Tenaya Creek would remain.

South Trail

Access and signage to the South Trail from both East Beach and Sunrise Trailhead would be improved, which may include the construction of steps. The 6,000- foot rustic trail would remain rustic, and NPS would continue to maintain, repair, and replace trail sections and culverts.

Figure 2-16. Alternative 3 Tenaya Ecotones Overview



Alternatives

Figure 2-17. Alternative 3 Tenaya Ecotones Sunrise Trailhead and Old Campground

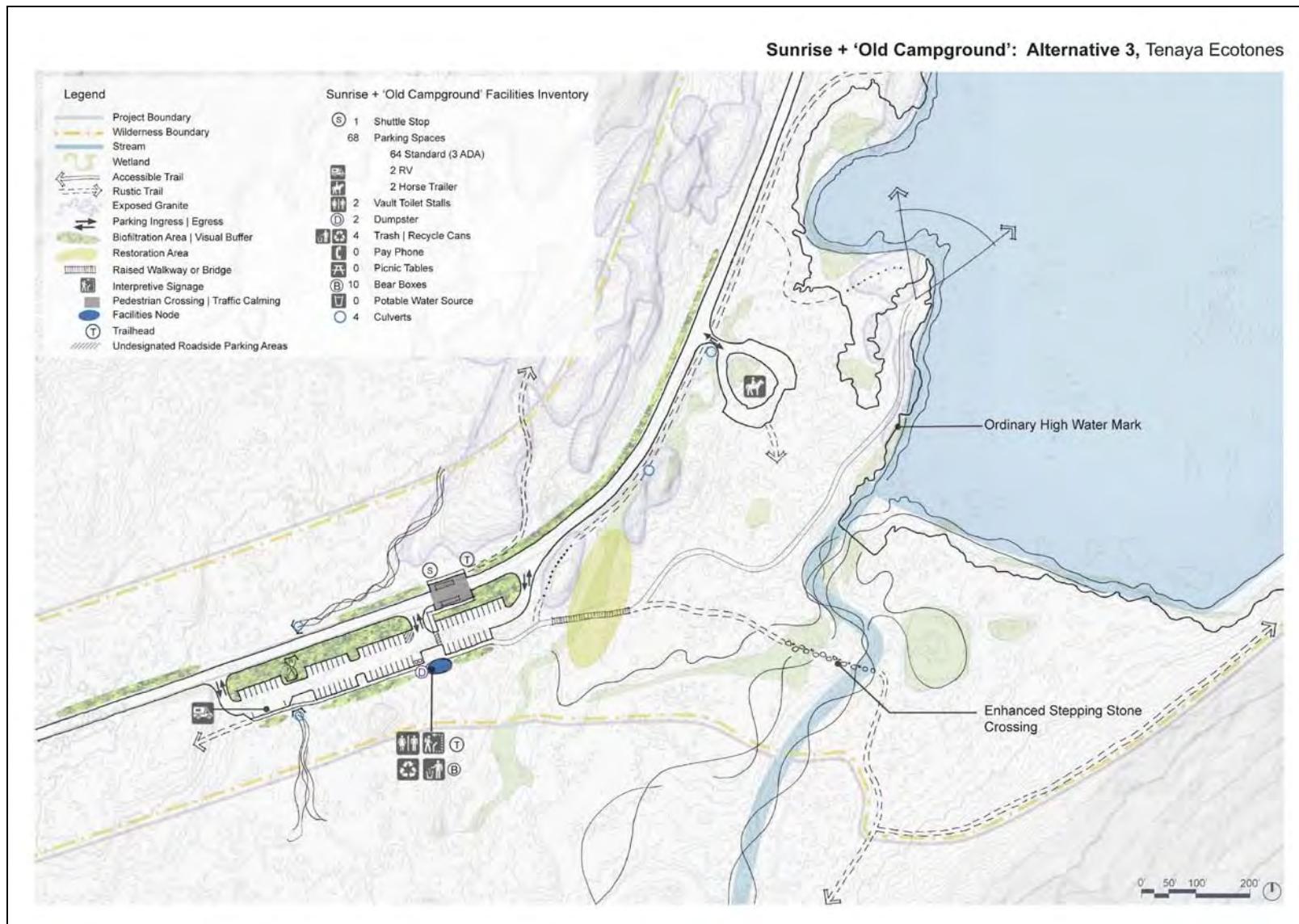
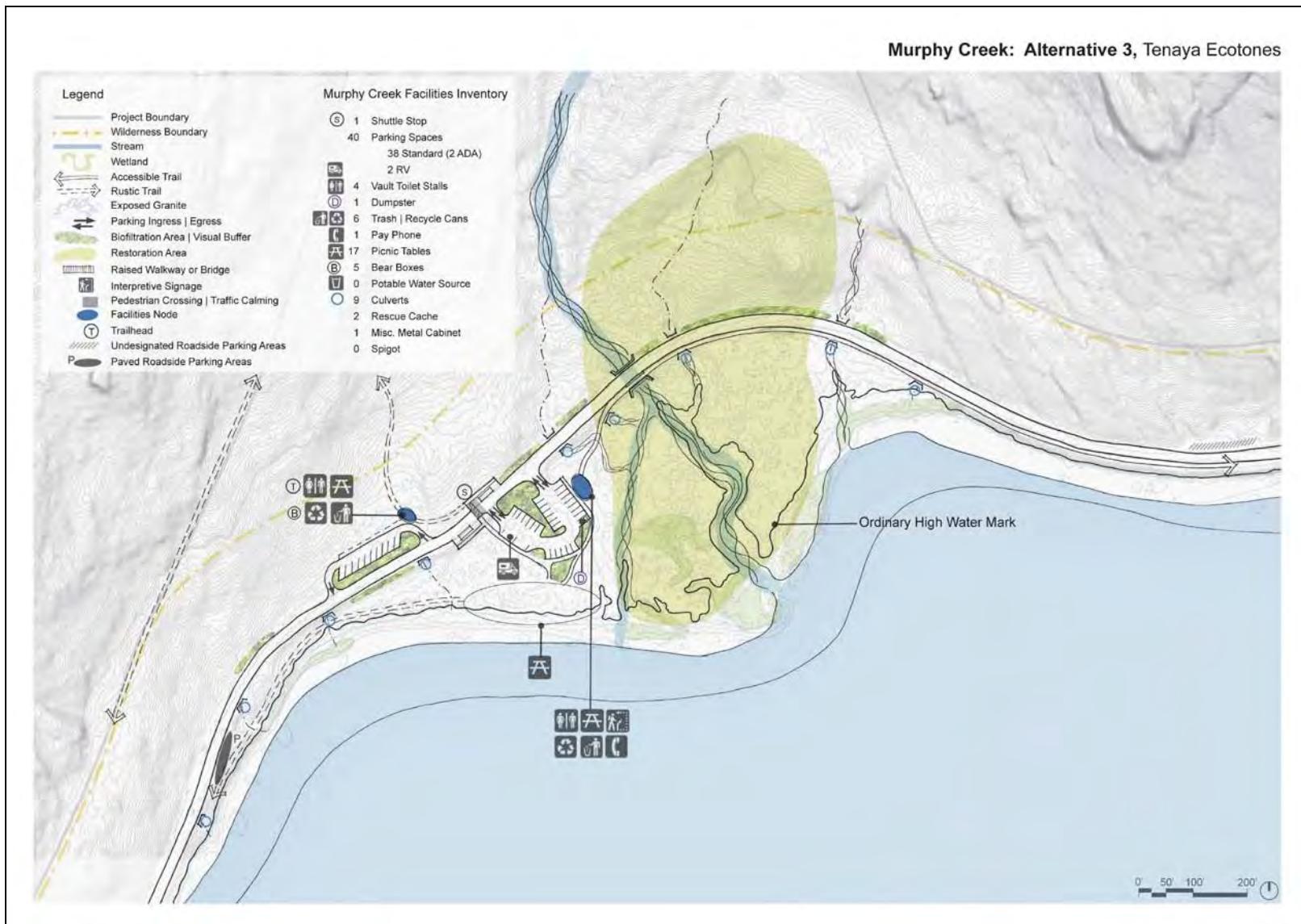


Figure 2-18. Alternative 3 Tenaya Ecotones Murphy Creek



Alternatives

Figure 2-19. Alternative 3 Tenaya Ecotones East Beach

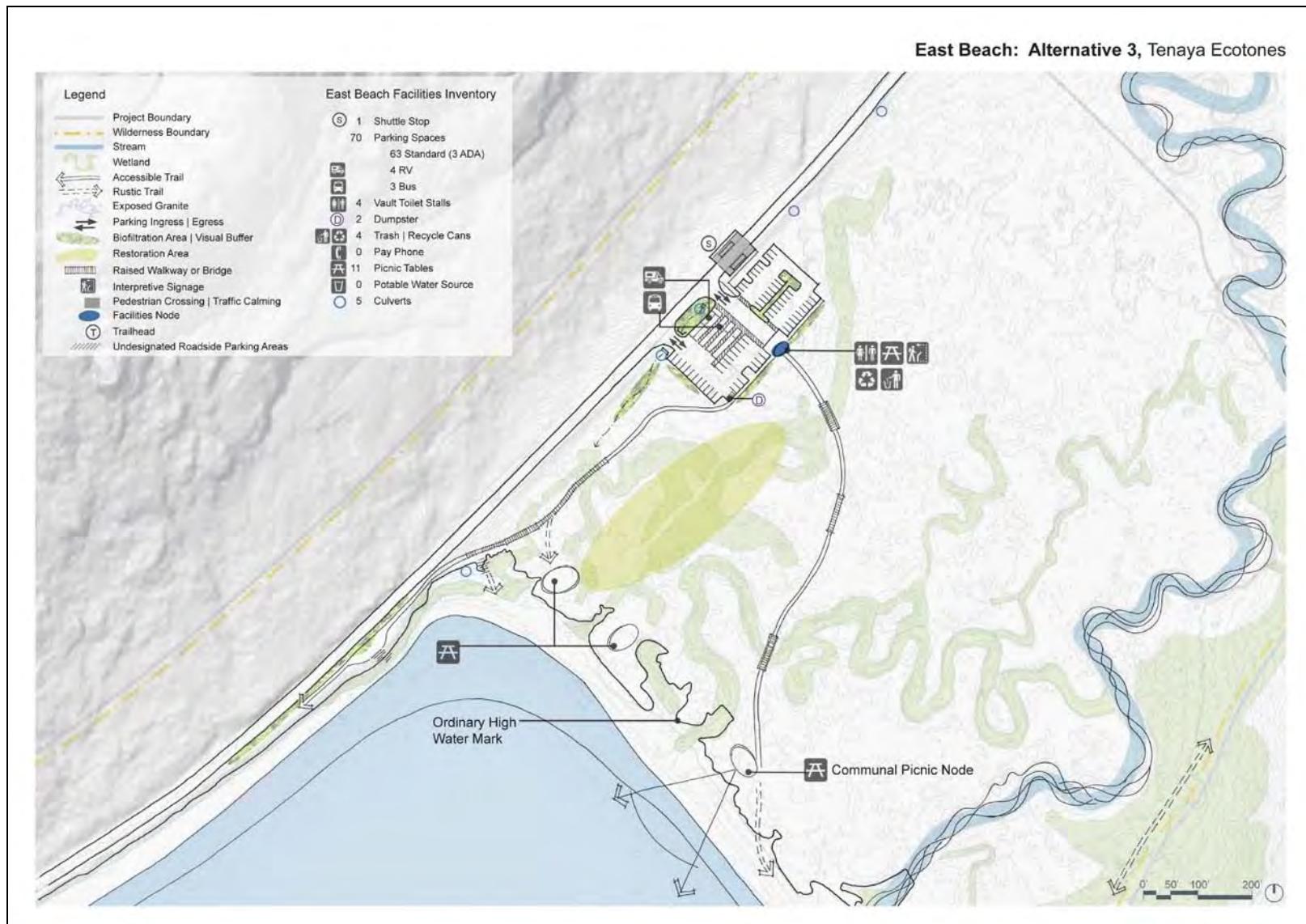


Figure 2-20. Alternatives 3 and 5 Murphy Creek Vehicular Bridge



Alternative 4: Lake Loop

The intent of Alternative 4 is to provide a lake loop experience, and dissipate visitor density around the lake. Approximately six acres of ecological restoration is proposed. Under this alternative, concentrated parking areas are proposed at Sunrise Trailhead, Murphy Creek, and East Beach, totaling 199 spaces. All roadside parking on the southern side of Tioga Road would be removed (262 spaces), consistent with the 1980 *General Management Plan* (GMP); approximately 15 undesignated parking spaces on the northern side of Tioga Road would remain. The proposed trail system includes an accessible connection between Sunrise Trailhead and East Beach. The South Trail, and its connections to Sunrise Trailhead and East Beach, would be stabilized, including strategic reconstruction to provide a smoother, more consistent surface (refer to Figures 2- 21 through 2- 24). This alternative does not include development of new campground facilities.

Tioga Road

Along Tioga Road between Sunrise Trailhead and Murphy Creek, all roadside parking would be removed, and naturalistic barriers would be installed. A 2,400- foot accessible trail and vegetated buffer would be constructed parallel to Tioga Road, to connect Sunrise Trailhead and Murphy Creek. Pedestrian- only interpretive viewpoints would be located along the trail.

Along Tioga Road between Murphy Creek and East Beach, approximately 15 undesignated roadside parking spaces would be retained north of Tioga Road. Naturalistic barriers would be installed in other areas to prevent undesignated roadside parking. Pedestrian- only interpretive nodes would be located along the trail. No designated vehicular pullouts are proposed. The 2,500- foot broken asphalt sidewalk at the south edge of the roadway would be replaced with a vegetated buffer and 2,500- foot accessible trail to connect East Beach and Murphy Creek.

Sunrise Trailhead and Old Campground

The existing parking area would be expanded and re- organized to the south to provide 58 standard, four accessible, two RV parking spaces, and two spaces for stock/horse trailers. A new parking area would be constructed north of Tioga Road to provide 23 standard spaces. Turn- outs would be located on either side of Tioga Road near the southern parking area, and would include a shuttle stop and a pedestrian crossing. A second pedestrian crossing would provide access across Tioga Road between the northern and southern parking areas. A designated shuttle stop would be installed in two roadside pull- outs on each side of Tioga Road near the southern parking area. 4,500 square feet of biofiltration area is proposed within and adjacent to the parking areas.

Existing facilities would be relocated and/or improved to provide a consolidated facilities area central to the southern parking area. Additional facilities would include: a vault toilet stall; four trash and recycling containers (two located at the trailhead facilities area, and one at each shuttle stop); and three benches (one at each shuttle stop and one at the trailhead facilities area).

Existing trails would be re- organized and consolidated, and boardwalks would be constructed where trails traverse wetlands. Social trails would be discouraged by signage. 2,600 feet of existing compacted trail would be removed and restored. A new 3,400- foot accessible trail and 275 feet of boardwalk would extend east from the southern parking area towards a lake viewpoint, and to an improved connection to the South Trail. An approximately 80 to 100- foot long steel and wood

pedestrian bridge, with stone abutments, is proposed across Tenaya Creek to connect to the South Trail and the Sunrise High Sierra Camp/Clouds Rest Trail (refer to Figure 2- 25). The bridge would be designed to accommodate pedestrian loads only; stock and horses would continue to use the existing stream crossing.

The existing 10,900- square foot Old Campground parking loop, picnic tables, and parking-related culverts would be removed and restored. An accessible trail parallel to Tioga Road would connect Sunrise Trailhead to Murphy Creek.

Murphy Creek

The existing parking area west of Murphy Creek would be re- organized and expanded to the west to provide 31 standard, three accessible, and two RV parking spaces. Designated pull- out parking areas for oversized vehicles and RVs would be constructed north of the parking area, along both sides of Tioga Road. The existing parking area east of Murphy Creek would be re- organized and improved to accommodate 15 standards spaces for overnight use. The size of the area would be limited to the existing clearing to minimize tree loss. An accessible lake viewpoint would be constructed immediately south of the west parking area. 3,000 square feet of biofiltration would be located within the parking areas. Turn- outs would be located on either side of Tioga Road, and would include a shuttle stop and a pedestrian crossing at the apex of the curve of Tioga Road to serve the shuttle stop and provide a connection to the Murphy Creek trailhead.

Existing facilities would be relocated and improved to provide consolidated facilities at the reorganized west parking area. Additional facilities would include one vault toilet stall, one dumpster, and six trash/recycling containers (two at each facilities node and one at each shuttle stop). The facilities at the east parking area would be retained.

An accessible 1,774- foot trail and 185- foot boardwalk would be constructed to provide access through the Murphy Creek Area, and connect to the Tioga Road pedestrian path. Three wood and steel pedestrian bridges (approximately 15, 15, and 40 feet each) would be constructed on stone abutments to traverse Murphy Creek, associated wetlands, and an unnamed waterway. The Murphy Creek Trailhead on the north side of Tioga Road would remain in its existing location.

East Beach

The existing East Beach parking area would be re- organized and expanded to the southwest to provide 52 standard, three accessible, and four RV parking spaces. Two ingress/egress driveways would be constructed. A picnic area would be constructed at the southeast edge of the parking area. 4,500 square feet of biofiltration would be constructed within and adjacent to the parking area. Turn- outs would be located on either side of Tioga Road, and would include a shuttle stop and a pedestrian crossing.

Existing facilities would be relocated and/or improved to provide a consolidated facilities area central to the parking area. Additional picnic areas would be located near the beach area, including a boardwalk platform and communal picnic area with table and benches (50 square feet total) at the southern trail terminus near the lake. This communal area would be available on a first- come, first- serve basis.

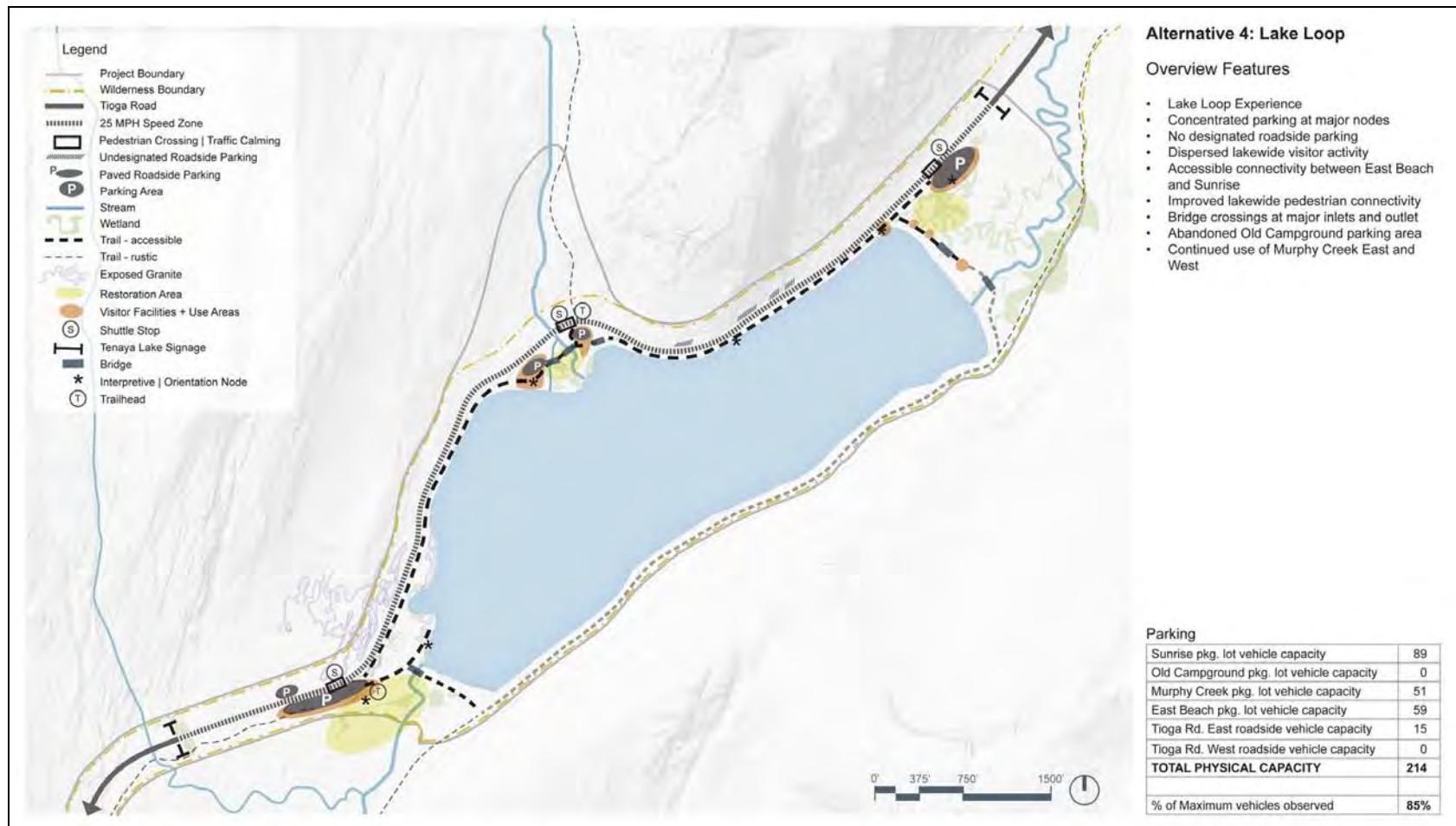
The existing, 500- foot trail would be removed, and wetland restoration would occur in the surrounding area. A new, accessible, 725- foot trail would be routed parallel to the beach, and

along Tioga Road. No pathways are proposed through the wetland area. A 905- foot rustic trail would continue south, crossing Tenaya Creek via a 50- foot span wood and steel pedestrian bridge (refer to Figure 2- 26). The bridge would be stabilized by stone abutments. An approximately 980- foot stabilized, accessible trail would extend west from the parking area to connect with a pathway adjacent to Tioga Road. Pedestrian crossings and/or boardwalks would be constructed where the trail traverses wetlands and water courses (approximately 60 feet total). Naturalized stone stairs would be provided along the northeast edge of the lake to provide access to the water.

South Trail

Access and signage from East Beach to the South Trail would be improved, and may include the construction of steps or ramps. The trail would be strategically stabilized or enhanced to accommodate sight- impaired visitors, but would remain rustic in character. The 6,000- foot trail and associated culverts would be maintained, repaired, and replaced where needed.

Figure 2-21. Alternative 4 Lake Loop Overview



Alternatives

Figure 2-22. Alternative 4 Lake Loop Sunrise Trailhead and Old Campground

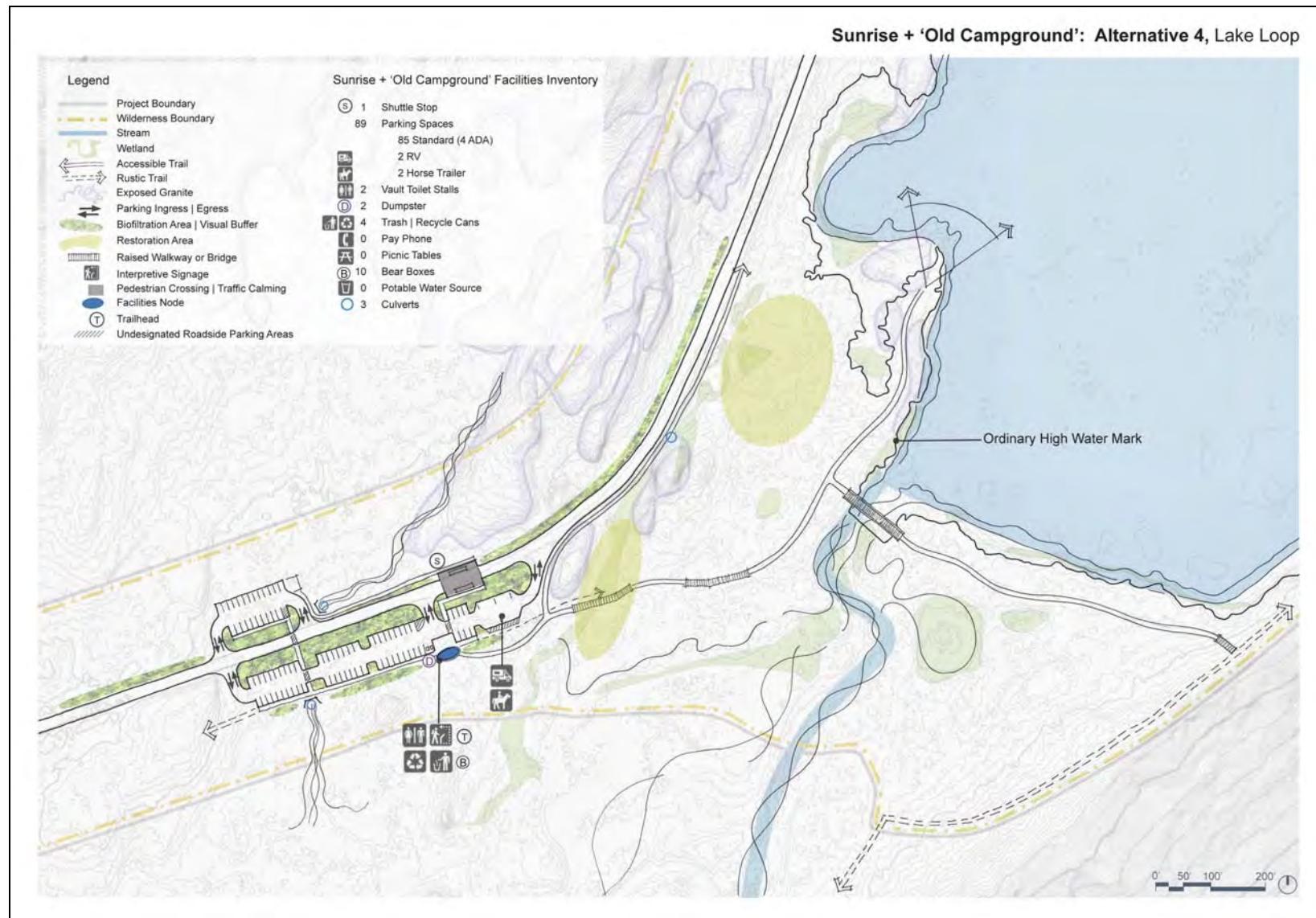


Figure 2-23. Alternative 4 Lake Loop Murphy Creek

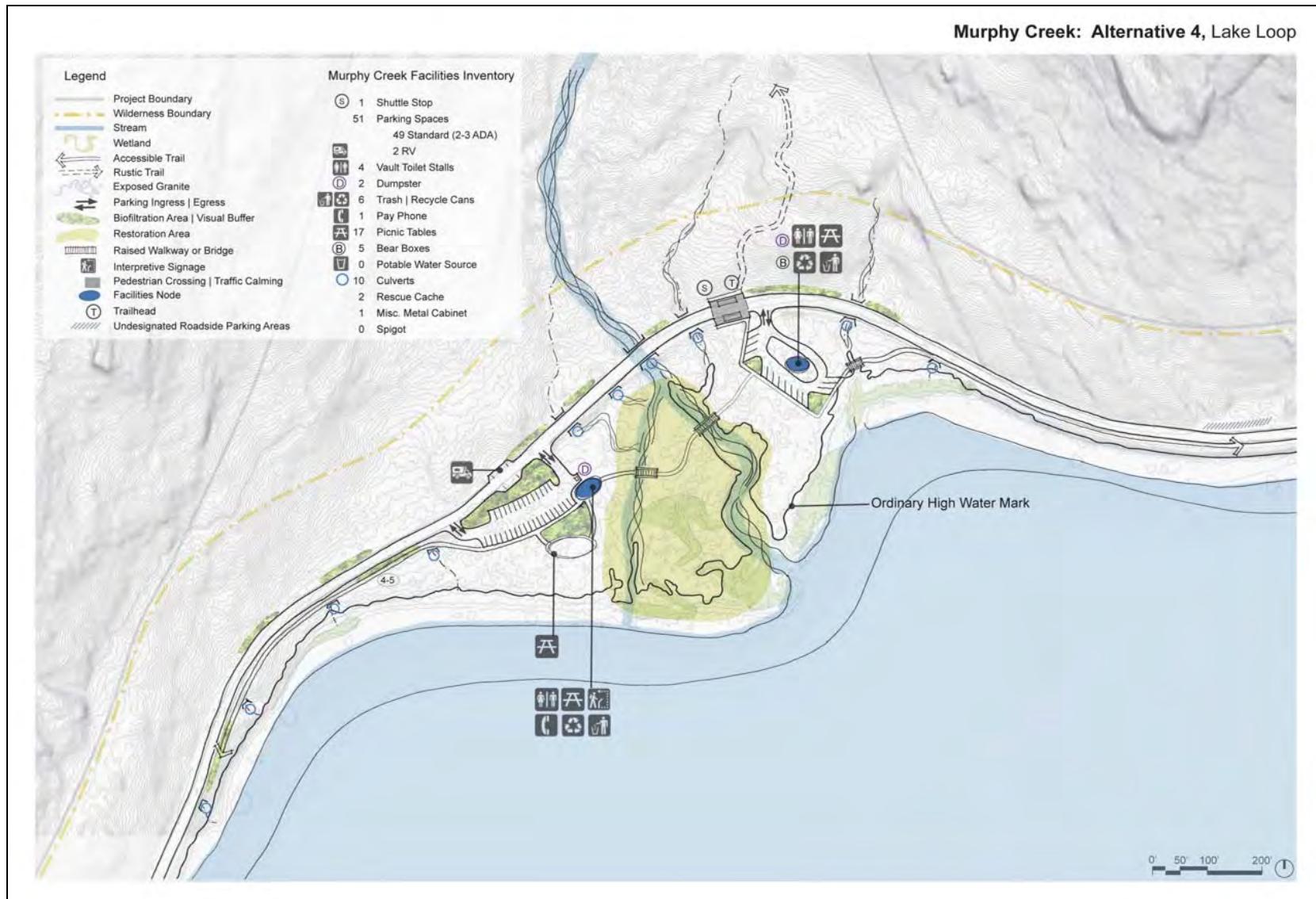


Figure 2-24. Alternative 4 Lake Loop East Beach

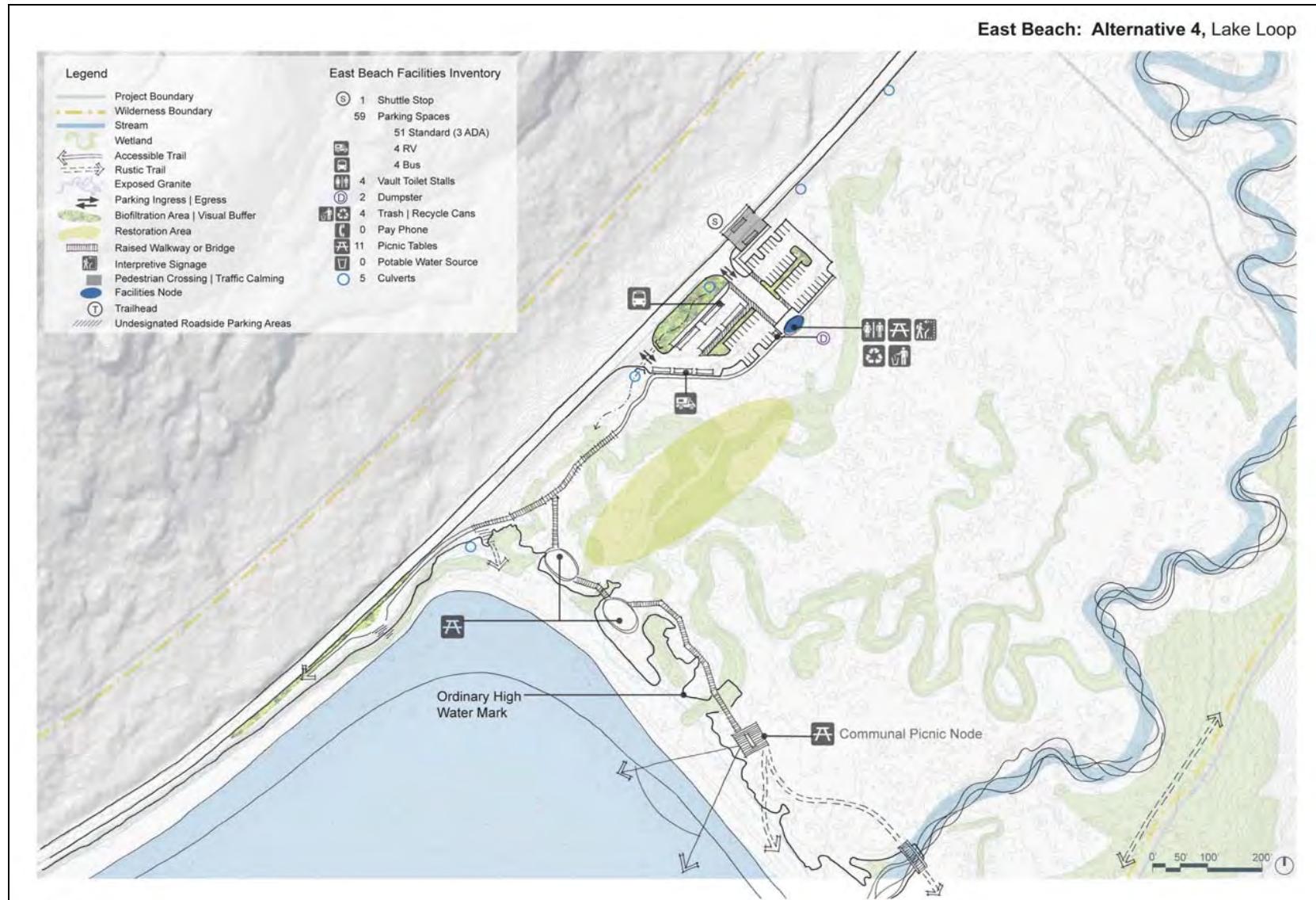
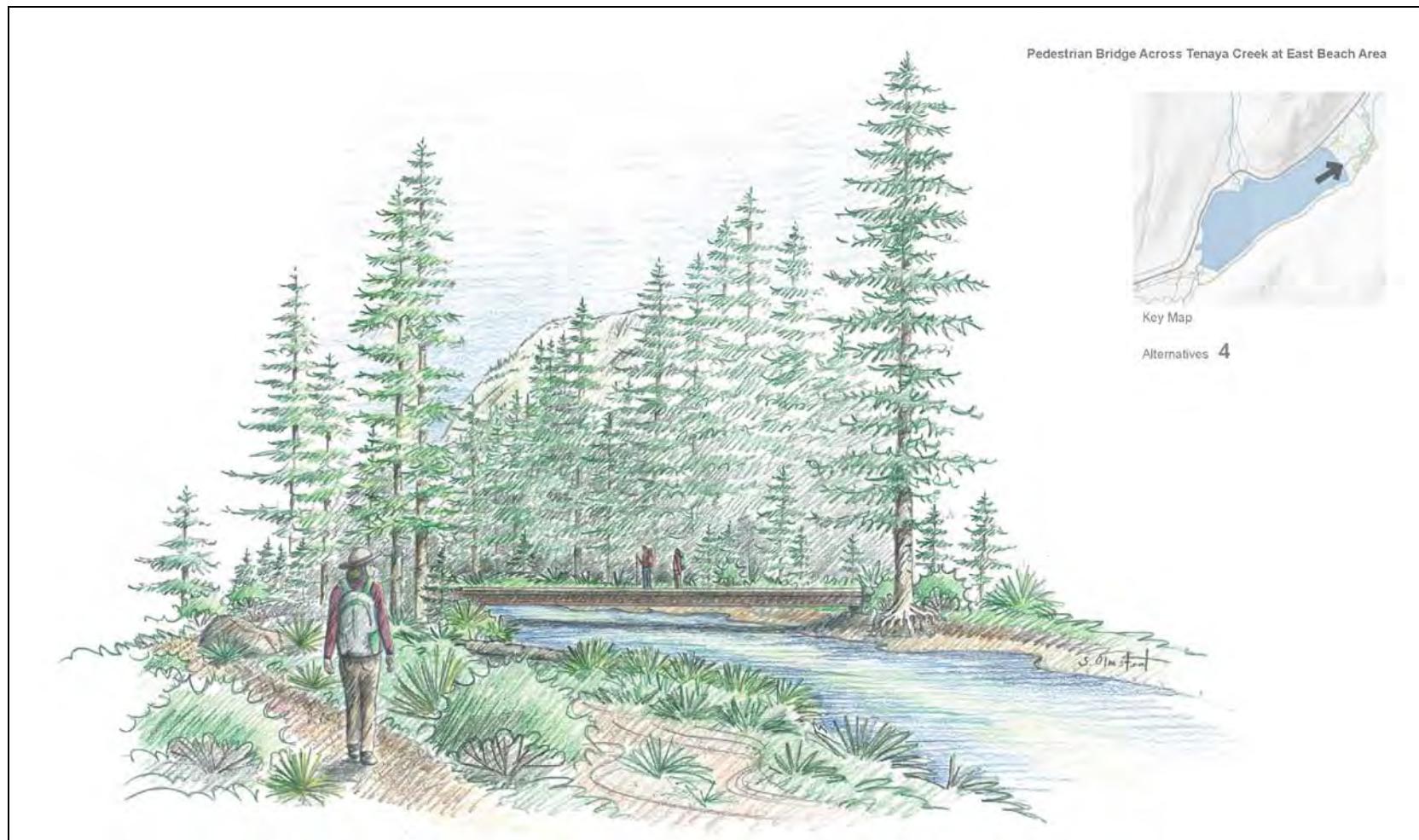


Figure 2-25. Alternative 4 Bridge Over Tenaya Lake at Sunrise Trailhead Area



Figure 2-26. Alternative 4 East Beach Bridge Over Tenaya Lake Inlet



Alternative 5: Immersive Nodes

Alternative 5 proposes an independent collection of the major site nodes, characterized by accessible trail experiences within the East Beach, Murphy Creek, and Sunrise Trailhead areas, and connected by rustic trails between these areas. Approximately 9.6 acres of ecological restoration is proposed. Ten, primitive, walk- in sites are proposed on the north side of Tioga Road, within the Sunrise Trailhead area. Under this alternative, 251 parking spaces are proposed, which would match the maximum observed, peak, parked vehicle count at Tenaya Lake. This alternative would include the highest parking capacity including parking areas at Sunrise Trailhead, Murphy Creek, East Beach (206 total spaces), and organized roadside parking (45 spaces) along Tioga Road (east and west) (refer to Figures 2- 27 through 2- 30). Approximately 232 roadside spaces would be removed from the southern side of Tioga Road; 10 to 15 undesignated parking spaces on the northern side of Tioga Road would remain.

Tioga Road

The road shoulder between Sunrise Trailhead and Murphy Creek would be restructured to provide 15 roadside parking spaces (including one accessible space) on the southern side of the road. Approximately 8,000 square feet would be designated for parking. Naturalistic barriers would be installed to prevent undesignated shoulder parking opportunities. Two scenic paved turn- outs would be constructed on the southern side of Tioga Road. Under this alternative, 4,550 feet of an existing trail would be restored, north of Tioga Road, and a new 3,050- foot rustic trail would be located parallel to the southern edge of Tioga Road.

Along Tioga Road, between Murphy Creek and East Beach, the road shoulder would be restructured to provide 15 parking spaces (including one accessible space) on the southern side of the road. Approximately 8,000 square feet would be designated for parking. Naturalistic barriers would be installed to prevent undesignated shoulder parking opportunities. The existing undesignated roadside parking north of Tioga Road would be retained. Two designated pedestrian lake access points/viewpoints would be constructed on the southern side of Tioga Road, adjacent to roadside parking. A 7,870- square foot, linear biofiltration area would be constructed between the southern edge of Tioga Road and the pedestrian path/trail. The 2,500- foot broken asphalt sidewalk at the southern edge of the roadway would be removed and replaced with a vegetated buffer and 2,500- foot rustic trail to connect the proposed roadside pullouts, East Beach and Murphy Creek.

Sunrise Trailhead and Old Campground

Under Alternative 5, the existing parking area would be re- organized and expanded to the west to provide 68 standard, three accessible, and two RV parking spaces. A new 21- space parking area would be developed on the north side of Tioga Road, including 10 day- use spaces and 11 overnight spaces. 3,000 square feet of biofiltration would be installed within and adjacent to both parking areas. Turn- outs would be located on either side of Tioga Road adjacent to the larger parking area, and would include a shuttle stop. Two pedestrian crossings are proposed; one at the shuttle stop, and the second at the entrance to the northern parking area.

The existing paved Old Campground loop would be retained and improved to provide eight standard parking spaces and two stock/horse trailer spaces. Existing picnic tables would be removed.

This alternative includes the development of 10 primitive, walk- in campsites on the north side of Tioga Road, east of the northern parking area. The approximate area of disturbance would be 18,000 square feet. Each campsite would be limited to a tent platform and one picnic table. A common, potable water source would be provided at the camping parking area. The water source would consist of a cistern, which would be supplied by a water truck.

Existing facilities would be re- located and/or improved to provide a consolidated facilities area central to the southern parking area, including the following additional facilities: one additional vault toilet stall; four trash and recycling containers (two at the trailhead facilities area and one at each shuttle stop); one picnic table; and three benches (one at each shuttle stop and facilities node). New facilities would be provided at the northern parking area and campground, including two vault toilet stalls, one dumpster; two trash and recycling containers; and 10 bear boxes.

Existing trails would be re- organized and consolidated, and boardwalks would be installed where the trail crosses wetlands and waterways. Social trailering would be removed. A 250- foot rustic trail would extend east from the northern parking area, north of the camping area, to connect with a re- routed section of the Murphy Creek Trail. A 75- foot rustic trail would extend north from the northern shuttle stop to the Murphy Creek Trail, and a 15- foot wood/steel bridge would traverse the waterway north of the shuttle stop. Within the Sunrise Trailhead area, 1,610 feet of existing compacted trail would be removed and restored. A new, 1,250- foot accessible trail would extend from the northern parking area pedestrian crossing to the southern parking area, and continue east towards the lake. A 20- foot span pedestrian bridge would provide access across the creek west of the southern parking area. Near the turn- off for the Sunrise High Sierra Camp/Clouds Rest Trail, the accessible trail would continue for 440 feet as a boardwalk northeast towards the lake. A 100- square foot viewing platform and bench would be installed at the lake edge. This location would also serve as a designated access point for non- motorized watercraft. An approximately 925- foot, rustic, loop trail would extend from the viewing platform along the lakeshore, and loop around past the Old Campground loop, and back to the platform. An approximately 400- foot rustic trail would connect the roadside trail to the loop trail. The existing stepping stone path across Tenaya Creek and rustic trail connection to the South Trail would remain.

Murphy Creek

Under this alternative, the existing parking area and associated facilities east of Murphy Creek would be removed, and the area would be restored. The western parking area would be re-organized and expanded to the west to provide 38 standard, three accessible, and two RV spaces for day- use visitors. A new, 13 space parking area would be constructed on the north side of Tioga Road for overnight Yosemite Wilderness users. Turn- outs would be located on either side of Tioga Road, and would include a shuttle stop and a pedestrian crossing west of Murphy Creek to serve the shuttle stop and to connect to the relocated Murphy Creek trailhead and new overnight parking area. 3,000 square feet of biofiltration would be installed within and adjacent to the parking areas.

Existing facilities would be re- located and/or improved to provide consolidated facilities at the west parking area. The seven fire/grill pits would be removed. Additional facilities would include one vault toilet stall, two rescue caches, and six trash/recycling containers (two at each facilities node, one at each shuttle stop). Facilities proposed within the overnight- use parking area north of Tioga Road would include: two vault toilet stalls; trash and recycling containers; and bear boxes.

A 1,870- foot accessible loop trail would be constructed within the Murphy Creek area. Approximately 175 feet of boardwalk would traverse sensitive and wetland areas, and two 15- foot wood/steel pedestrian bridges would provide access over creek channels (15 feet each). Approximately 600 feet of rustic trail would connect the accessible loop to the roadside path east of Murphy Creek. A 25- foot pedestrian bridge would be constructed over the waterway east of Murphy Creek. Approximately 430 feet of rustic trail is proposed to extend from the western parking area west along the lakeshore. The Murphy Creek Trailhead, 550 feet of rustic trail, and associated signage would be re- located to the west side of Murphy Creek, and a 50- foot span wood bridge with stone abutments would be constructed over Murphy Creek north of Tioga Road. This bridge would meet NPS stock crossing standards.

East Beach

The existing parking area would be re- organized and expanded to provide an additional point of egress/ingress, and 40 standard, two accessible, and two RV parking spaces. A pull- through parking and circulation route would be provided for two tour buses. 3,000 square feet of biofiltration would be installed adjacent to the parking area. Turn- outs would be located on either side of Tioga Road, and would include a shuttle stop and a pedestrian crossing near the northern shuttle stop. Five roadside spaces would be provided within a turn- out on the southern side of Tioga Road.

Existing facilities would be relocated and improved to provide a consolidated facilities area adjacent to the parking area.

The existing trail from the parking area to East Beach would be restored. A 1,340- foot accessible trail would extend southwest from the parking area to the lakeshore, adjacent to Tioga Road. A 1,150 accessible, interpretive trail would provide a loop from the parking area to East Beach, and would continue north towards Tioga Road. Within the loop, three 15- foot pedestrian crossings would be constructed over wetlands and water courses. A 190- foot rustic trail would extend from the roadside parking area southwest, adjacent to the lake. Naturalized stone steps and a designated non- motorized watercraft launch would be provided in this location adjacent to Tioga Road. A boardwalk platform and communal picnic area with table and benches (50 square feet total) would be installed near the lake. This communal area would be available on a first- come, first- serve basis.

South Trail

Under this alternative, the existing 6,000- foot rustic trail would remain. Trail sections and culverts would be maintained, repaired, and replaced as needed.

Alternatives

Figure 2-27. Alternative 5 Immersive Nodes Overview

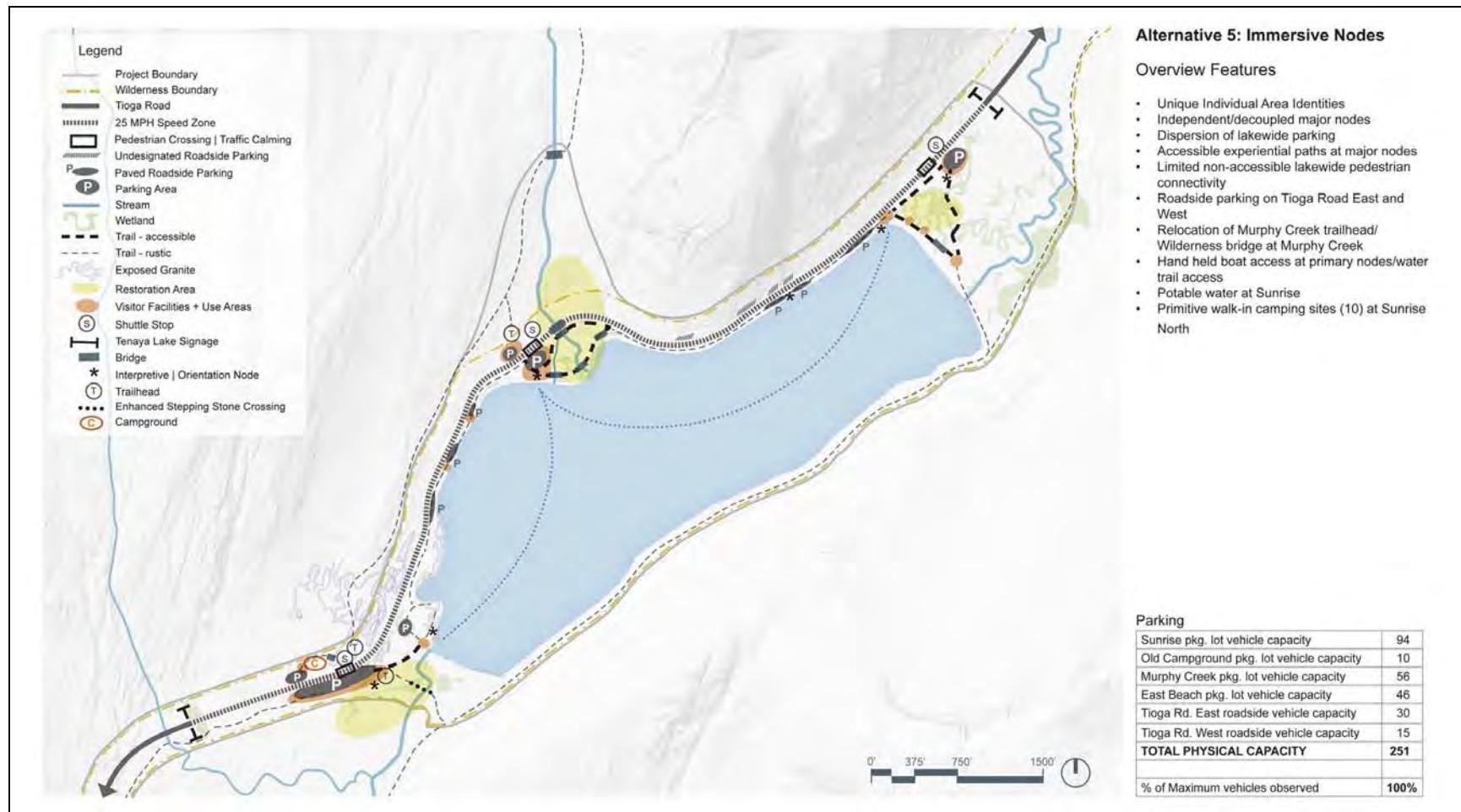
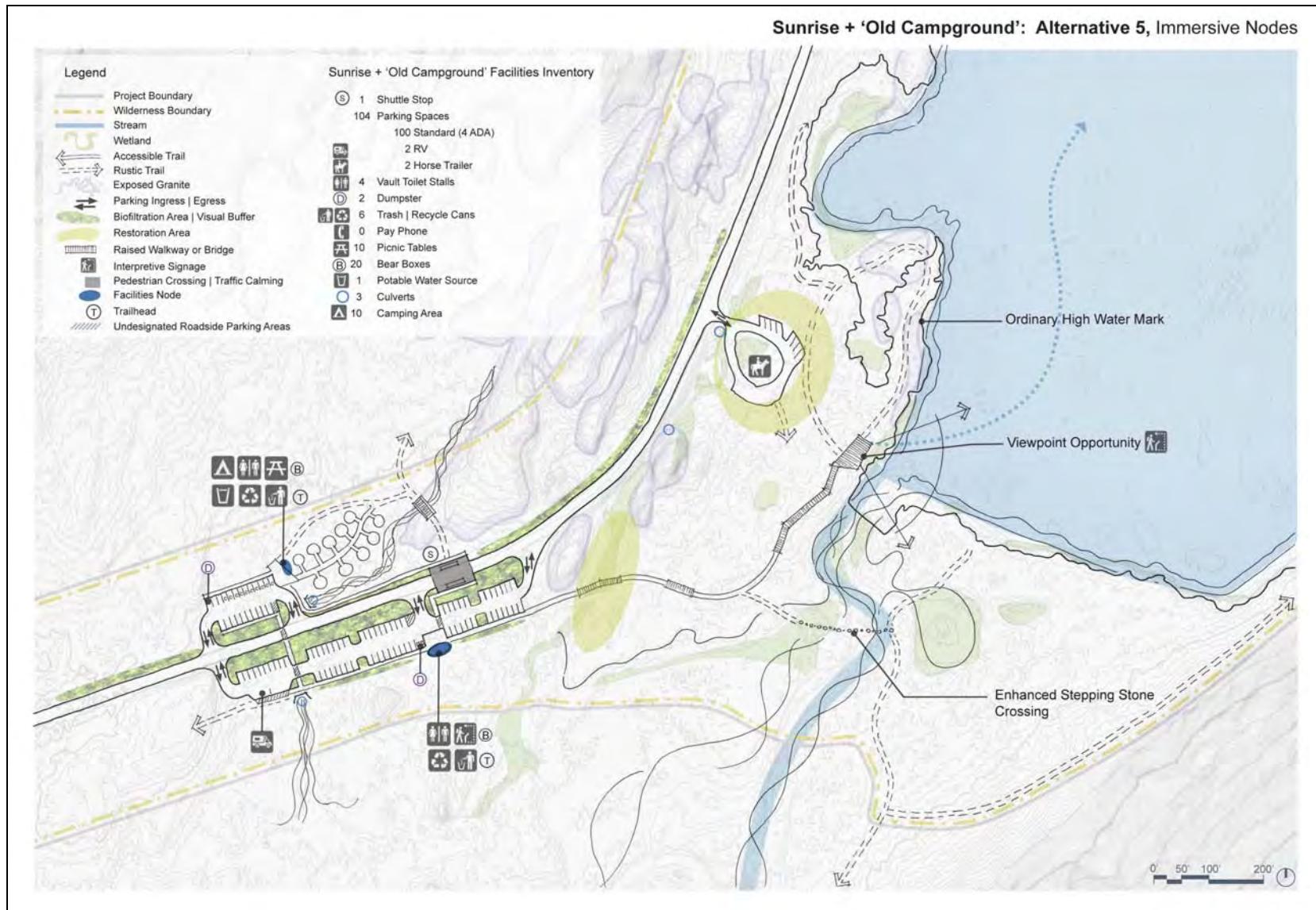


Figure 2-28. Alternative 5 Immersive Nodes Sunrise Trailhead and Old Campground



Alternatives

Figure 2-29. Alternative 5 Immersive Nodes Murphy Creek

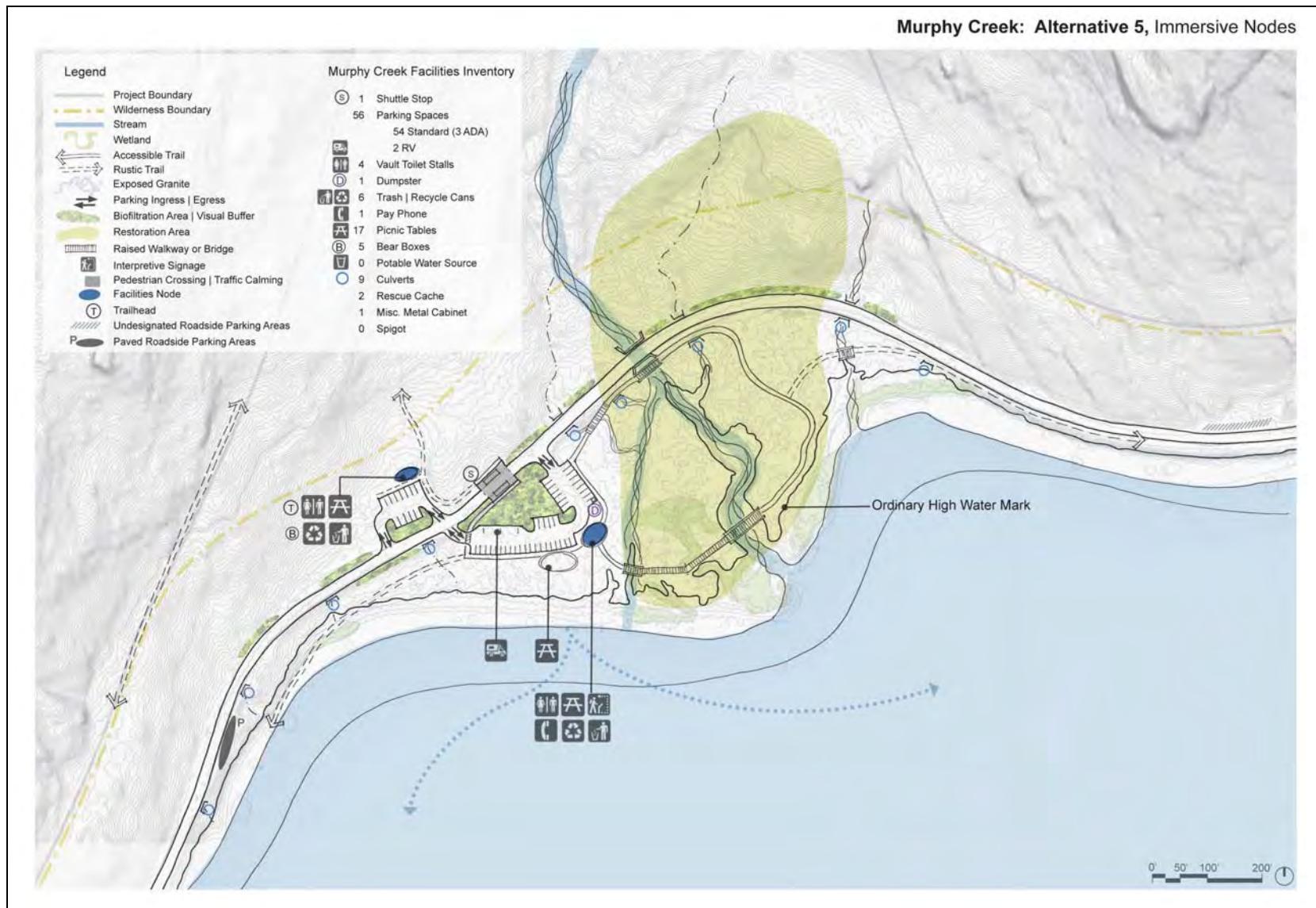
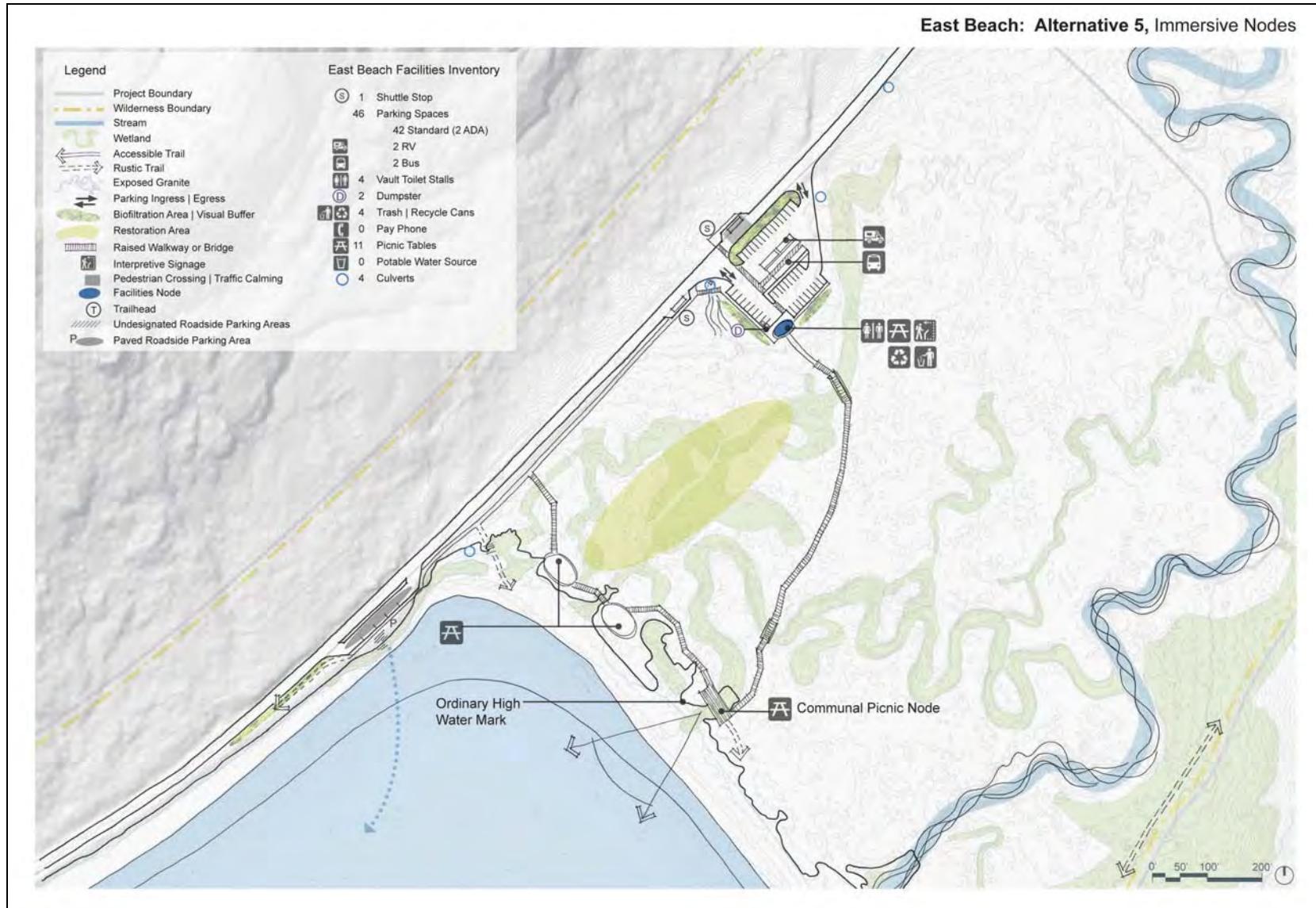


Figure 2-30. Alternative 5 Immersive Nodes East Beach



Actions Considered But Dismissed

The comprehensive alternatives development process, which involved public and NPS staff input over an 18-month period, ultimately led to the alternatives retained for further analysis in this EA. Several other site and design alternatives were considered, but dismissed from further analysis for the following reasons: (1) they were technically or economically infeasible; (2) they did not meet the purpose and need; (3) they conflicted with other park policies and goals; and/or (4) they would have unacceptable levels of environmental impacts. A discussion of the alternatives development process follows.

Alternatives Development Process

The public scoping period for the EA occurred between September 4 and October 18, 2008. The Plan was presented at both Open Houses on October 29 and December 3, 2008, and January 28, 2009 at the East Auditorium in Yosemite Valley. Public comments received during scoping have helped shape the alternatives presented. The *Tenaya Lake Area Plan Public Scoping Report* is available for review on the NPS website at <http://www.nps.gov/yose/parkmgmt/tenaya.htm>. Preliminary conceptual plans and an alternative matrix were developed by the design contractor, Mithun, to assist review of potential alternatives. Alternative workshops were held in the fall of 2009, and in January 2010, which resulted in the development of three action alternatives (Tenaya Ecotones, Lake Loop, and Immersive Nodes). The planning team held a third workshop in February 2010, with the goal of selecting a preferred alternative. During this workshop, a fourth action alternative was developed and identified as the preferred alternative.

A public meeting was held on July 10th, 2010, from 1:00- 5:00 pm, at the Yosemite Visitor Center Auditorium, to present information and hear the public's ideas and concerns regarding the Tenaya Lake Area Plan draft alternatives. Site visits were scheduled during alternatives development on August 11 and 28, 2010.

2010 Choosing by Advantage Workshop

A Value Analysis and Choosing by Advantage (VA/CBA) workshop was conducted on February 16, 2010. The workshop team included Yosemite National Park staff, regional NPS staff, and NPS Denver Service Center (DSC) facilitators. The VA focused on applying value analysis principals to identify which alternative would provide the desired functions for the best value. The team recommended refinements to the alternatives, and development of an additional alternative, to achieve the best balance of life cycle cost, performance, and durability while meeting all required functions.

The evaluation method was CBA. The relative importance of the advantages of each alternative was weighed and costs considered. The VA team identified eight CBA factors (evaluation factors) against which the alternative actions (attributes) were measured to determine enhanced value and reduced cost. The overall goal of the CBA was to provide the rationale for the value- based decision of the selected alternatives. Alternatives were evaluated and ranked using eight factors (see Table 2- 2). These eight factors were:

Factor 1: Maintain and Improve Hydrological Function

Factor 2: Maintain and Improve Condition of Archeology and Traditional Cultural Properties/Practices

Factor 3: Maintain and Improve Condition of Scenic Resources (Views and Design Character)

Factor 4: Maintain and Improve Condition of Vegetation, Wetlands, and Habitat

Factor 5: Provide Visitor Facilities (Shuttle Stops/Service, Restrooms, Trails, Picnic Areas, Campgrounds, Boat Launch)

Factor 6: Provide Visitor Understanding (Interpretation and Orientation)

Factor 7: Protect Public Health, Safety, and Welfare (Pedestrian Crossing, Restrooms, Water, Speed/Visibility)

Factor 8: Improve Operational Efficiency and Sustainability (Operations and Maintenance)

Of the four action alternatives evaluated during the CBA workshop, all were retained. One additional alternative was developed and evaluated during the workshop (Alternative 2, Tenaya Confluence).

Highest Ranked Options

The alternatives were ranked by assigning each item a numerical value and assessing its relative advantage. Participants shared their professional expertise regarding the potential beneficial or adverse effects of each aspect of the alternatives. The highest ranked alternative was Alternative 2, Tenaya Confluence.

Table 2-2. Scoring of Alternatives from the 2010 Choosing by Advantage Workshop

Factors	Alt 1 No Action	Alt 2 Tenaya Confluence	Alt 3 Tenaya Ecotones	Alt 4 Lake Loop	Alt 5 Immersive Nodes
Factor 1: Maintain and Improve Hydrological Function	0	80	90	0	50
Factor 2: Maintain and Improve Condition of Archeology and Traditional Cultural Properties/Practices	0	95	80	0	70
Factor 3: Maintain and Improve Condition of Scenic Resources	0	65	55	55	25
Factor 4: Maintain and Improve Condition of Vegetation, Wetlands, and Habitat	0	70	80	40	70
Factor 5: Provide Visitor Facilities	0	80	50	85	90

Table 2-2. Scoring of Alternatives from the 2010 Choosing by Advantage Workshop

Factors	Alt 1 No Action	Alt 2 Tenaya Confluence	Alt 3 Tenaya Ecotones	Alt 4 Lake Loop	Alt 5 Immersive Nodes
Factor 6: Provide Visitor Understanding	0	70	60	70	70
Factor 7: Protect Public Health, Safety, and Welfare	0	100	75	0	35
Factor 8: Improve Operational Efficiency and Sustainability	0	80	90	45	0
TOTAL	0	640	580	295	410

Options Considered but Dismissed

Several alternative design concepts were considered during the 2008, 2009, and 2010 planning efforts. This section discusses the alternative concepts that were previously considered but dismissed from further analysis for a variety of reasons.

Retain Roadside Parking Capacity

Under this concept, designated parking would be provided to meet the observed peak physical roadside parking estimate (239- 277 vehicles). This option was dismissed because the goals of the project include improved visitor safety, visitor experience, and protection of cultural and natural resources. Allowing roadside parking to remain would not resolve key issues including traffic congestion, poor roadway visibility for both drivers and pedestrians, close proximity of pedestrians to vehicles, water quality concerns due to erosion and vehicle- related pollutants, and impacts to adjacent natural and cultural resources. Providing for expanded parking areas meeting the current observed peak estimate would result in impacts to special- status plant species, vegetation, wetland habitat, and archeological resources.

Re-establish 50 Campsites at Tenaya Lake

This concept would include re- establishment of 50 campsites, which were removed due to adverse water quality issues. Based on further study of the lake and surrounding natural and cultural resources, the area's significant and important features pose a major constraint for the siting of campsites. Primary issues include significant archeological resources, American Indian traditional and contemporary practices, site hydrology and flooding, special- status plant species, and jurisdictional wetland habitat. Creation of a large campsite at the lake would likely adversely affect these resources; therefore, this concept was considered but dismissed. An alternative concept including 10 campsites within a less constrained area was identified and carried forward in the analysis.

Alternative Concepts

Several variations of the action alternatives included trail alignments, infrastructure, and parking area footprints different than the selected action alternatives. These variations were carefully reviewed by NPS resource experts, facility and maintenance staff, and rangers during working charettes (interactive workshops). Input from these experts was reviewed and discussed by the NPS internal review team, the project manager and NEPA compliance specialist, Yosemite Conservancy liaison, and design team. Design options that would adversely affect cultural and natural resources, present operational conflicts with facility and maintenance staff, or conflict with park management policies were dismissed.

COMPARISON OF ALTERNATIVES

A summary comparison of the five alternatives brought forward for review is presented below in Table 2- 3.

Alternatives

Table 2-3. Overview of Alternatives

Area and Element	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
<i>Sunrise Trailhead Area</i>					
Parking and Transportation	Standard spaces: 37 Accessible space: 1 Shuttle stop: 1	Standard spaces: 61 Accessible spaces: 3 RV spaces: 2 Shuttle stops: 2	Standard spaces: 61 Accessible spaces: 3 RV spaces: 2 Shuttle stops: 2	Standard parking spaces: 81 Accessible spaces: 4 RV spaces: 2 Stock: 2 Shuttle stops: 2	Standard spaces: 89 Accessible spaces: 3 RV spaces: 2 Shuttle stops: 2
Facilities (total)	Vault toilet stalls: 1 Dumpsters: 2 Bear boxes: 10	Vault toilet stalls: 2 Dumpsters: 2 Trash/recycling containers: 4 Bear boxes: 10 Benches: 3	Vault toilet stalls: 2 Dumpsters: 2 Trash/recycling containers: 4 Bear boxes: 10 Picnic table: 1 Benches: 3 Pay Phone: TBD	Vault toilet stalls: 2 Dumpsters: 2 Trash/recycling containers: 4 Bear boxes: 10 Picnic table: 1 Benches: 3 Pay phone: TBD	Vault toilet stalls: 4 Dumpsters: 2 Trash/recycling containers: 6 Bear boxes: 20 Picnic tables: 11 Benches: 3 Pay phone: TBD Access point for small watercraft: 1 Camping: Provide 10 primitive walk-in camp sites at new location west of Sunrise Trailhead, north of Tioga Road.
Infrastructure	Stepping stone crossing Culverts: 3 Causeway: 1 Drain: 1	Traffic calming device Pedestrian road crossing: 1 Culverts: 3-4 Biofiltration: 3,000 sf	Improved stepping stone crossing: 100 ft Traffic calming device Pedestrian road crossing: 1	Pedestrian bridge over Tenaya Creek: 80-100-ft Traffic calming device Pedestrian road crossings: 2	Stepping stone crossing Traffic calming device Pedestrian road crossings: 2 Culverts: 3-4

Table 2-3. Overview of Alternatives

Area and Element	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
			Culverts: 3-4 Biofiltration: 3,000 sf	Culverts: 3-4 Biofiltration: 4,500 sf	Drinking fountain: 1 Biofiltration: 3,000 sf
Trails		Accessible: 1,100-ft Boardwalk: 275 ft Removal: 1,610 ft	Accessible: 1,440-ft Rustic: 1,000-ft Boardwalk: 150-ft Removal: 1,610-ft	Accessible: 3,440-ft Boardwalk: 275-ft Removal: 2,660-ft	Accessible: 1,250-ft Rustic: 1,260-ft Boardwalk: 440-ft Removal: 1,610-ft
Area of Disturbance	Impervious: 20,150 sf	Total: 59,100 sf Impervious: 34,300 sf	Total: 59,100 sf Impervious: 34,300 sf	Total: 75,310 sf Impervious: 47,390 sf	Total: 51,550 sf Impervious: 34,540 sf
Ecological Restoration		20,800 sf	20,800 sf	20,800 sf	20,800 sf
Old Campground Area					
Parking and Transportation	Standard spaces: 22	Standard spaces: 11 Stock/horse trailers spaces: 2	Stock/horse trailers spaces: 2	N/A	Standard spaces: 8 Stock/horse trailer spaces: 2
Facilities and Infrastructure	Culvert: 1	Culverts: 1	Culvert: 1	Culvert: 0	Culvert: 1
Ecological Restoration		1,600 sf	0 sf	43,800 sf	25,100 sf
Murphy Creek Area					
Parking and Transportation	Standard spaces: 39	Standard spaces: 46 Accessible spaces: 2	Standard spaces: 36 Accessible spaces: 2 RV spaces: 2	Standard spaces: 46 Accessible spaces: 3 RV spaces: 2	Standard spaces: 51 Accessible spaces: 3 RV spaces: 2
Facilities	Vault toilet stalls: 3 Dumpster: 1 Trash/recycling	Vault toilet stalls: 4 Dumpster: 1 Trash/recycling	Vault toilet stalls: 4 Dumpster: 1 Trash/recycling	Vault toilet stalls: 4 Dumpster: 2 Trash/recycling	Vault toilet stalls: 4 Dumpster: 1 Trash/recycling

Table 2-3. Overview of Alternatives

Area and Element	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
	containers: 2 Pay phone: 1 Picnic Tables: 17 Fire grills: 7 Bear boxes: 9 Rescue cache: 2 Spigot: 1	containers: 6 Pay phone: 1 Picnic tables: 17 Bear boxes: 5 Rescue cache: 2	containers: 6 Pay phone: 1 Picnic tables: 17 Fire grills: 0 Bear boxes: 5 Rescue cache: 2	containers: 6 Pay phone: 1 Picnic tables: 17 Fire grills: 7 Bear boxes: 5 Rescue cache: 2	containers: 6 Pay phone: 1 Picnic tables: 17 Fire grills: 0 Bear boxes: 5 Rescue cache: 2
Infrastructure	Tioga Road/Murphy Creek: culverted crossing Culverts: 10	Tioga Road/Murphy Creek: box culvert Traffic calming device Pedestrian crossing: 1 Culverts: 9 Biofiltration: 3,000 sf	Tioga Road/Murphy Creek: combined 25-ft vehicular/pedestrian bridge Traffic calming device Pedestrian Crossing: 1 Culverts: 9 Biofiltration: 2,000 sf	Traffic calming device Pedestrian crossing: 1 Culverts: 10 Biofiltration: 3,000 ft	Tioga Road/Murphy Creek: 25-ft vehicular bridge Traffic calming device Pedestrian crossing: 1 Culverts: 9 Biofiltration: 3,000 ft
Trails		Pedestrian bridges: one 15 ft Accessible: 1,774 ft Removal: 1,680 ft	Murphy Creek Trail: 50-ft bridge Accessible: 1,280 ft Rustic: 1,710 ft Removal: 1,680 ft	Pedestrian bridges: three, 15, 15, and 40 ft Accessible: 1,774 ft Boardwalk: 185 ft	Murphy Creek Trail: 50-ft bridge Pedestrian bridges: three, 25, 15, and 15 ft each Accessible: 1,870 ft Rustic: 1,580 ft Boardwalk: 175 ft Removal: 1,680 ft
Area of Disturbance	Impervious: 18,550 sf	Total: 45,180 sf Impervious: 29,660 sf	Total: 29,800 sf Impervious: 20,350 sf	Total: 39,500 sf Impervious: 30,110 sf	Total: 45,180 sf Impervious: 29,660 sf
Ecological Restoration		318,400 sf	318,400 sf	113,300 sf	318,400 sf

Table 2-3. Overview of Alternatives

Area and Element	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
East Beach Area					
Parking and Transportation	Standard spaces: 35 Shuttle stop: 1	Standard spaces: 61 Accessible spaces: 3 RV spaces: 2 Bus pull-through: 2	Standard spaces: 60 Accessible spaces: 3 RV spaces: 4 Bus pull-through: 3	Standard spaces: 52 Accessible spaces: 3 RV spaces: 4 Bus pull-through: 4	Standard spaces: 40 Accessible spaces: 2 RV spaces: 2 Bus pull-through: 2
Facilities	Vault toilet stalls: 4 Dumpsters: 2 Picnic tables: 9 Fire pit/grills: 3	Vault toilet stalls: 4 Dumpsters: 2 Trash/recycling containers: 4 Picnic tables: 10 Communal picnic table: 1 Bear box: 4 Pay phone: TBD	Vault toilet stalls: 4 Dumpsters: 2 Trash/recycling containers: 4 Picnic tables: 10 Communal picnic table: 1 Pay phone: TBD	Vault toilet stalls: 4 Dumpsters: 2 Trash/recycling containers: 4 Picnic tables: 10 Communal picnic table: 1 Pay phone: TBD	Vault toilet stalls: 4 Dumpsters: 2 Trash/recycling containers: 4 Picnic tables: 10 Communal picnic table: 1 Pay phone: TBD
Infrastructure	Culverts: 4	Traffic calming device Pedestrian crossing: 1 Culverts: 5 Biofiltration: 4,500 sf	Traffic calming device Pedestrian crossing: 1 Culverts: 5 Biofiltration: 4,000 sf	Traffic calming device Pedestrian crossing: 1 Culverts: 5 Biofiltration: 4,500 sf	Traffic calming device Pedestrian crossing: 1 Culverts: 4 Biofiltration: 3,000 sf
Trails	Tenaya Creek crossing: informal log	Pedestrian crossings: four, 15 ft each Accessible: 980 ft Rustic: 905 ft Boardwalk: 840 ft Removal: 500 ft	Tenaya Creek crossing: informal log Pedestrian crossings: four, 15 ft each Accessible: 1,500 ft Rustic: 305 ft Boardwalk: 300 ft Removal: 500 ft	Tenaya Creek crossing: 50-ft wood/steel bridge Pedestrian crossings: four, 15 ft each Accessible: 980 ft Rustic: 905 ft Boardwalk: 750 ft Removal: 500 ft	Tenaya Creek crossing: informal log Pedestrian crossings: three, 15 ft each Accessible: 1,340 ft Rustic: 190 ft Boardwalk: 1,150 ft Removal: 500 ft

Table 2-3. Overview of Alternatives

Area and Element	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
Area of Disturbance	Impervious: 21,760 sf	Total: 58,760 sf Impervious: 47,610 sf	Total: 49,580 sf Impervious: 20,780 sf	Total: 58,760 sf Impervious: 47,610 sf	Total: 36,150 sf Impervious: 32,680 sf
Ecological Restoration		54,200 sf	54,200 sf	54,200 sf	54,200 sf
South Trail					
Trails	Rustic: 6,000 ft	Rustic: 6,000 ft	Rustic: 6,000 ft Constructed steps	Rustic (improved): 6,000 ft Constructed steps	Rustic: 6,000 ft
Tioga Road West					
Roadside Parking and Turn-outs	Standard spaces: 186	Standard spaces: 5	Standard spaces: 14 Accessible space: 1 Turn-out: 1	N/A	Standard spaces: 14 Accessible space: 1 Turn-outs: 2
Infrastructure and Gateway Signage		Gateway/signage element 25-mph speed reduction zone Biofiltration: 8,000 sf			
Trails		Rustic: 2,400 ft	Rustic: 3,050 ft Restoration: 4,550 ft	Accessible: 2,400 ft	Rustic: 3,050 ft Restoration: 4,550 ft
Impervious Surface	Existing: 24,250 sf	Reduction: 11,650 sf	Reduction: 18,250 sf	Reduction: 12,250 sf	Reduction: 16,250 sf
Tioga Road East					
Roadside Parking and Turn-outs	Standard spaces: 91	Standard spaces: 15	Standard spaces: 15	Standard spaces: 15	Standard spaces: 29 Accessible space: 1

Table 2-3. Overview of Alternatives

Area and Element	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
Infrastructure and Gateway Signage		Gateway/signage element 25-mph speed reduction zone Biofiltration: 7,870 sf			
Trails		Accessible: 2,500 ft Removal: 2,500 ft	Accessible: 2,500 ft Removal: 2,500 ft	Accessible: 2,500 ft Removal: 2,500 ft	Rustic: 2,500 ft Removal: 2,500 ft
Impervious Surface	Existing: 25,836 sf	Reduction: 18,286 sf	Reduction: 18,286 sf	Reduction: 18,286 sf	Reduction: 13,836 sf

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 2-4 summarizes the impacts that would result from implementation of each of the alternatives, including the No Action Alternative. Please see Appendix A for the list of general and resource- specific mitigation measures and best management practices referenced below.

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
Geology, Geohazards, and Soils	No construction-related impacts would occur. Operation-related impacts would include continued erosion and vegetation trampling, and potential expose to rockfall. This alternative would result in a local, long-term, moderate, adverse impact.	Construction-related impacts would include exposure to rockfall, grading, soil compaction, soil erosion, and soil contamination. These effects would be minimized by the implementation of standard BMPs. This alternative would result in localized, short-term, moderate impacts to soils. Implementation of this alternative would produce long-term beneficial impacts as a result of reduced visitor impacts (i.e., bank and vegetation trampling, spur trails), restored and revegetated areas, bank stabilization between Tioga Road and Tenaya Lake, and improved drainage systems, which would minimize exposure and erosion of soils. The long-term effect would be beneficial.			
Hydrology	Impacts to hydrology (water resources and water quality) would remain the same, and no new impacts would occur. Existing impacts would continue, including erosion and subsequent sediment discharge, and untreated stormwater runoff from parking areas and Tioga Road. This alternative would result in a local, long-term, moderate, adverse impact.	Grading and construction activities would potentially result in adverse impacts to water resources, including discharge of sediment and other pollutants. These adverse effects can be mitigated by applying standard BMPs. Construction-related impacts would be local, short-term, moderate, and adverse. Implementation of this alternative would	Grading and construction activities would potentially result in adverse impacts to water resources, including discharge of sediment and other pollutants. These adverse effects can be mitigated by applying standard BMPs. Construction-related impacts would be local, short-term, moderate, and adverse. Implementation of this alternative would	Grading and construction activities would potentially result in adverse impacts to water resources, including discharge of sediment and other pollutants. These adverse effects can be mitigated by applying standard BMPs. Construction-related impacts would be local, short-term, moderate, and adverse. Overall, proposed improvements would	Grading and construction activities would potentially result in adverse impacts to water resources, including discharge of sediment and other pollutants. These adverse effects can be mitigated by applying standard BMPs. Construction-related impacts would be local, short-term, moderate, and adverse. Overall, proposed improvements would

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
		<p>produce long-term beneficial impacts to water quality as a result of reduced visitor impacts (i.e., bank and vegetation trampling, spur trails), restored and revegetated areas, bank stabilization between Tioga Road and Tenaya Lake, improved drainage systems, and biofiltration areas. Proposed structures, including a pedestrian bridge, a box culvert within Murphy Creek would require site specific engineering to ensure that the capacity, size, and location of footings does not interfere with runoff or cause additional flooding. This alternative would not include permanent structures with the floodplain. Raised boardwalks, accessible and rustic trails, and ecological restoration would not interfere with seasonal flood events. The removal of an existing raised and paved trail would facilitate historical hydrological</p>	<p>produce long-term beneficial impacts as a result of reduced visitor impacts (i.e., bank and vegetation trampling, spur trails), restored and revegetated areas, bank stabilization, and improved drainage systems, and biofiltration areas. Replacement of existing boulders (with larger boulders) at the Tenaya Creek outlet may create a "dam effect" during seasonal flooding, resulting in an adverse effect. Proposed structures, including the bridge over Murphy Creek would require site specific engineering to ensure that the capacity, size, and location of footings does not interfere with runoff or cause additional flooding. Overall, the long-term effect would be beneficial; however, effects to hydrology at the Tenaya Creek outlet would be local, long-term, minor, and adverse.</p>	<p>maintain or restore the hydrological flow of creeks and drainages associated with Tenaya Lake. While effects to water quality would be beneficial, minor adverse impacts may occur within the Murphy Creek area due to the continued use of existing culverts, potential backwater conditions during larger flood events, and the potential obstruction of hydrological flows during seasonal flooding at the lake outlet. Proposed bridges within the Murphy Creek and East Beach areas, would require site specific engineering to ensure that the capacity, size, and location of footings does not interfere with runoff or cause additional flooding. Hydrological effects would be mitigated by engineered design and ongoing maintenance within the Murphy Creek area. This alternative would result in a local, long-term, minor, adverse impact.</p>	<p>maintain or restore the hydrological flow of creeks and drainages associated with Tenaya Lake. Replacement of existing boulders (with larger boulders) at the Tenaya Creek outlet may create a "dam effect" during seasonal flooding, resulting in an adverse effect. Proposed structures, including the bridge over Murphy Creek would require site specific engineering to ensure that the capacity, size, and location of footings does not interfere with runoff or cause additional flooding. Construction of a pedestrian bridge south of Tioga Road may obstruct hydrological flows within the Murphy fan. These effects would be mitigated by engineered design and ongoing maintenance within the Murphy Creek area. Operation of the 10 primitive campsites may have an adverse effect on water quality, including</p>

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
		flow in Sunrise Trailhead area, and Tenaya Lake outlet. The Preferred Alternative would not create a potentially hazardous condition associated with flooding at Tenaya Lake. Overall, impacts would be local, long-term, minor, and beneficial. Therefore, the NPS finds the Preferred Alternative to be acceptable under Executive Order 11988 for the protection of floodplains. A statement of findings is included in the appendix.			erosion and discharge of sediment and pollutants into waterbodies. This alternative would result in a local, long-term, minor, adverse impact.
Wetlands	There would be no new impacts to wetlands. Existing impacts on wetlands would continue, including soil compaction and trampling of wetland vegetation. This alternative would have a local, long-term, minor, adverse impact to wetlands.	Construction-related impacts would include soil compaction, disturbance of riparian and wetland vegetation, and potential discharge of pollutants into wetland and riparian habitat. Direct disturbance within wetland habitat would include boardwalk footings, replacement of the Sunrise High Sierra Camp/Clouds Rest Trail boulder crossing (Alternative 3 only), and removal and installation of culverts. Construction-related impacts to wetlands would be local, short-term, moderate, and adverse. Ecological restoration would include revegetation and restoration of hydrological function and biological diversity in denuded areas, including removal, reorganization, and better delineation of pathways. Overall, the design of Alternatives 2 and 3 would	Construction-related impacts would include soil compaction, disturbance of riparian and wetland vegetation, and potential discharge of pollutants into wetland and riparian habitat. Direct disturbance within wetland habitat would include boardwalk and bridge footings, and installation of culverts. Construction-related impacts to wetlands	Construction-related impacts would include soil compaction, disturbance of riparian and wetland vegetation, and potential discharge of pollutants into wetland and riparian habitat. Direct disturbance within wetland habitat would include boardwalk footings, and removal and installation of culverts. Construction-related impacts to	

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
		<p>avoid wetland habitat, and minimize long-term adverse effects. Removal of the Murphy Creek culverts, relocation of the East Beach trail would improve the function, and restoration activities would improve the function of wetlands in the project area. Overall, long-term effects would be local, moderate, and beneficial.</p> <p>Alternative 2 (Preferred Alternative) would have a long-term beneficial impact on the extent, function, and value of wetlands by relocating trails outside of wetland habitat, restoring areas compacted by existing trails, improving interpretive materials to reduce spur trails and promote stewardship, and ecological restoration. Implementation of identified mitigation and best management practices (refer to Appendix A) would prevent impacts to water quality, wetland function and values. Based on the size, type, and quantification of wetland habitat acreage affected by the proposed actions, these actions may be excepted from preparation of a statement of findings under the exceptions a, d, g, and h listed in the NPS Procedural Manual 77-1: Wetland Protection.</p>	<p>would be local, short-term, moderate, and adverse.</p> <p>Ecological restoration would include revegetation and restoration of hydrological function and biological diversity in denuded areas, including removal, reorganization, and better delineation of pathways.</p> <p>Overall, the design of Alternative 4 would avoid wetland habitat, and minimize long-term adverse effects.</p> <p>Relocation of the East Beach trail would improve the function, and restoration activities would improve the function of wetlands in the project area. The hydrologic function of Murphy Creek would not change from current conditions. Overall, long-term effects would be local, moderate, and beneficial.</p>	<p>wetlands would be local, short-term, moderate, and adverse.</p> <p>Ecological restoration would include revegetation and restoration of hydrological function and biological diversity in denuded areas, including removal, reorganization, and better delineation of pathways.</p> <p>Overall, the design of Alternative 5 would avoid wetland habitat, and minimize long-term adverse effects. Removal of the Murphy Creek culverts, relocation of the East Beach trail would improve the function, and restoration activities would improve the function of wetlands in the project area. Overall, long-term effects would be local, moderate, and beneficial.</p>	

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
Vegetation	There would be no new impacts to vegetation under Alternative 1 beyond the current existing use. Existing impacts on vegetation would continue, including vegetation trampling. Routine repair and maintenance actions, including hazard tree abatement, would continue. Long-term impacts would be local minor, and adverse.	Grading and construction activities would result in the direct loss of vegetation and lodgepole pine trees. Temporary impacts including compaction and disturbance of vegetation would occur as a result of equipment and worker foot traffic. Affected habitat types include lodgepole pine and understory, wetland and riparian habitat, and meadow. Impacts would be local, short-term, minor, and adverse. The project design includes trail routing and incorporation of boardwalks and bridges to avoid or minimize permanent impacts to vegetation in the project area. Overall, impacts to vegetation would be local, long-term, minor, and beneficial.			
Wildlife	There would be no new impacts to wildlife under Alternative 1. Existing impacts to wildlife would continue including trampling of vegetative habitat, removal of hazard trees, availability of human food and trash, and noise and visual disturbance associated with human activities and vehicles. Some wildlife mortality also likely results from vehicle travel and parking along Tioga Pass Road. Long-term impacts to wildlife would be local, minor, and adverse.	During construction, the use of equipment, disturbance of vegetative habitat, work within wetland and riparian areas, tree removal activities, and the generation of noise and potentially nighttime light sources would adversely affect wildlife. Affected wildlife may include birds, bats, ground dwelling mammals, and aquatic species. These impacts can be mitigated by implementing standard BMPs and mitigation measures (i.e., pre-construction wildlife surveys, avoidance of nests and roosts, clear delineation of work and staging areas, monitoring when necessary, and restoration of disturbed areas). This alternative would result in local, short-term, minor to moderate, adverse impacts to wildlife. Implementation of proposed trail design and ecological restoration would improve habitat characteristics for terrestrial and aquatic species. The use of bear-proof storage bins, trash, and recycling containers would reduce the potential risk of interaction, and modifications to behavior. Overall, operation of Alternatives 2, 3, and 4 would result in a minor beneficial, long-term effect.	During construction, the use of equipment, disturbance of vegetative habitat, work within wetland and riparian areas, tree removal activities, and the generation of noise and potentially nighttime light sources would adversely affect wildlife. Affected wildlife may include birds, bats, ground dwelling mammals, and aquatic species. These impacts can be mitigated by implementing standard BMPs and mitigation measures (i.e., pre-construction wildlife		

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
					surveys, avoidance of nests and roosts, clear delineation of work and staging areas, monitoring when necessary, and restoration of disturbed areas). This alternative would result in local, short-term, minor to moderate, adverse impacts to wildlife. Implementation of proposed trail design and ecological restoration would improve habitat characteristics for terrestrial and aquatic species. Operation of the proposed camping area on the northern side of Tioga Road would introduce a new night-time use in the immediate area. Human presence may affect wildlife behavior in the area. The use of informational materials, bear-proof storage bins, trash, and recycling containers would reduce the potential risk of interaction, and modifications to behavior; however, consistent control of

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
					visitor practices is not feasible; therefore, potential effects would be local long-term, minor, and adverse.
Rare, Threatened, and Endangered Species	There would be no new impacts to special-status species under Alternative 1. Existing impacts to special-status plants and wildlife would continue, including impacts to vegetation resulting from undesignated trail use, removal of hazard trees, availability of human food and trash, and noise and visual disturbance associated with human activities and vehicles. Long-term impacts would be local, minor, and adverse.	Expansion of parking areas, trail development, and tree removal would affect special-status bats, birds, Pacific Fisher, and Sierra marten (if present). There are no recent records or observances of Pacific Fisher and Sierra marten in the area; however, lodgepole pine is considered suitable habitat for these species. Work within aquatic habitat is unlikely to affect Yosemite toad (the species has not recently been detected in the area). The design of the project would avoid direct impacts to slender lupine. Implementation of mitigation measures, including protection measures, scheduling construction within aquatic habitats outside of the sensitive breeding period, construction monitoring if species are present, and avoidance of nests and roosts would minimize effects. Based on implementation of mitigation measures, implementation of all action alternatives would not likely adversely affect rare, threatened, or endangered species. The design of all action alternatives incorporates avoidance of special-status plants. Improved wayfinding, interpretive materials and signage, and restoration of spur trails would reduce the potential for visitor disturbance of slender lupine. Project design, including ecological restoration would improve habitat characteristics for terrestrial and aquatic species, resulting in a beneficial long-term effect. In the long-term, all action alternatives would not affect rare, threatened, or endangered species.			
Night Sky	Under the No Action Alternative, there are no park-related light sources at Tenaya Lake. Night lighting is intermittently produced by vehicles traveling along Tioga Road, and by visitor lanterns, flashlights, and other mobile light sources at park facilities.	In the short-term, parking area construction, construction staging areas, and facility construction sites would likely be lit during the night for security purposes. These light sources would likely have localized adverse, but minor, impacts on night sky viewing during the period of construction. Short-term impacts would be local, minor, and adverse impact. Under all of the proposed action alternatives, no lighting will be produced in the long-term, beyond the intermittent light presently produced by vehicles traveling Tioga Road, because none of the proposed facilities, trails, or visitor use areas would be artificially lit. Lighting associated with operation of the campground under Alternative 5 would be limited to flashlights and camping lanterns within the 10 sites, which would not generate a significant source of light and glare affecting night sky conditions. Long-term impacts would be local, negligible, and adverse.			

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
	The long-term impact to night sky would be local, negligible, and adverse.				
Scenic Resources	Under the No Action Alternative, there would be no changes to existing park infrastructure, and no changes to current conditions and activities. As seen from Tioga Road, roadside parking on the southern side of the roadway would continue to obstruct views, as seen from moving vehicles, and parked vehicles would continue to be clearly visible as seen from various points around and within the lake. The long-term impact to scenic resources would be local, moderate, and adverse.	The impacts of construction on scenic resources would include visually intrusive light and heavy construction vehicles, equipment, materials, personnel, and construction staging areas visible from Tioga Road and visitor use areas. Surface disturbances within the construction areas would also contribute to a reduction in scenic quality. The short-term impact to scenic resources would be local, minor, and adverse. There would be no impacts to scenic resources caused by operation and maintenance of Alternative 2 beyond those already affecting scenic quality under the No Action Alternative, because the operation and maintenance of the proposed facilities would be similar to those	The impacts of construction on scenic resources would include visually intrusive light and heavy construction vehicles, equipment, materials, personnel, and construction staging areas visible from Tioga Road and visitor use areas. Surface disturbances within the construction areas would also contribute to a reduction in scenic quality degradation. The short-term impact to scenic resources would be local, minor, and adverse. An overall reduction (or removal) of roadside parking along the south side of Tioga Road would improve the viewshed by reducing or removing obstacles, as seen from moving vehicles on the roadway. Pedestrian and accessible access to scenic views would be improved.	The impacts of construction on scenic resources would include visually intrusive light and heavy construction vehicles, equipment, materials, personnel, and construction staging areas visible from Tioga Road and visitor use areas. Surface disturbances within the construction areas would also contribute to a reduction in scenic quality degradation. The short-term impact to scenic resources would be local, minor, and adverse. Structural improvements, including the proposed pedestrian bridges within Sunrise Trailhead, Murphy Creek, and East Beach, would not interfere with views of Tenaya Lake, and the design would be compatible with the setting. None of the actions would include construction of structures tall enough to affect views of the lake and	The impacts of construction on scenic resources would include visually intrusive light and heavy construction vehicles, equipment, materials, personnel, and construction staging areas visible from Tioga Road and visitor use areas. Surface disturbances within the construction areas would also contribute to a reduction in scenic quality. The short-term impact to scenic resources would be local, minor, and adverse. Structural improvements, including the proposed vehicle/pedestrian bridge south of Tioga Road would not interfere with views of Tenaya Lake, and the design would be compatible with the setting. None of the actions would include construction of structures tall enough to affect views of the lake and

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
		presently conducted at Tenaya Lake. Interpretive materials would be complementary to the character of the area. An overall reduction (or removal) of roadside parking along the south side of Tioga Road would improve the viewshed by reducing or removing obstacles, as seen from moving vehicles on the roadway. Pedestrian and accessible access to scenic views would be improved. The long-term impact to scenic resources would be local, minor, and beneficial.	Structural improvements, including the proposed vehicle/pedestrian bridge south of Tioga Road would not interfere with views of Tenaya Lake, and the design would be compatible with the setting. None of the actions would include construction of structures tall enough to affect views of the lake and surrounding geology. The proposed bridge over Murphy Creek north of Tioga Road would not be visible from the road. While visually compatible, the presence of the bridge may contrast with visitor expectations of Wilderness character, resulting in a long-term, moderate, adverse effect.	construction of structures tall enough to affect views of the lake and surrounding geology. The long-term effect would be local, minor, and beneficial.	surrounding geology. The proposed bridge over Murphy Creek north of Tioga Road would not be visible from the road. While visually compatible, the presence of the bridge may contrast with visitor expectations of Wilderness character, resulting in a long-term, moderate, adverse effect. In addition to the long-term, effects discussed under the other action alternatives, development of 10 campsites north of Tioga Road may result in a new visual component, as seen Tioga Road. Views would be partially obstructed by intervening vegetation and lodgepole pine trees. The long-term effect would be moderate and adverse.
Air Quality	Under Alternative 1, air quality would continue to be affected by roadside traffic, shuttle buses, tour buses, and routine facility maintenance. There would no construction-related impacts. Pollutant emissions would	Air quality impacts as a result of the action alternatives would relate primarily to construction equipment emissions and dust generated during construction activities. Effects would be related to heavy equipment and human intrusion and could include dust generation, soil disturbance and compaction, vegetation removal, and excavation, all of which may contribute to an increase in suspended particulate matter. Construction activities in each area are expected to be of relatively short duration. Construction-related GHG emissions would be generated by construction vehicles. Standard BMPs would be incorporated into the action, including use of dust control measures. Construction-related impacts would be local, short-term, minor, and adverse.	Under the action alternatives, air quality would continue to be affected by mobile sources. Operational		

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
	<p>contribute to regional air quality conditions. Mobile source emissions would be generated by vehicles, shuttle buses, tour buses, and park maintenance vehicles both passing through and stopping at Tenaya Lake. Stationary sources in the Tenaya Lake area include fire grills, which emit particulates during use. Continued operation and use of the Tenaya Lake area would have no additional effect on air quality. Impacts to local and regional air quality are expected to long-term, negligible, and adverse.</p>	<p>emissions are not anticipated to significantly change from existing conditions; however, operation of improved shuttle stops and the reduced parking capacity may result in a reduction in individual vehicle trips to the area. The long-term impact would be local, negligible, and adverse.</p>			
Soundscapes	<p>Noise generated by vehicles on Tioga Road and the use of associated visitor amenities would continue to affect ambient noise levels in the Tenaya Lake area. The long-term impact would be local, moderate, and adverse.</p>	<p>Implementation of Alternatives 2, 3, or 4 would result in short-term adverse impacts to the soundscape due to noise associated with the construction activities, including the operation of heavy equipment, voices of construction workers, and noise associated with material hauling vehicles. Such noise could affect nearby recreational users on trails, in nearby meadows and beaches, or at trailheads. The short-term impact would be local, minor to moderate, and adverse.</p> <p>Under Alternative 2 (Preferred), 3, and 4, the volume and type of noise would be redistributed as many vehicles would no longer park at undesignated areas along Tioga Road. Visitors would be redirected to park primarily at Sunrise Trailhead, Murphy Creek, and East Branch and recreate along nearby trails, meadows, and beaches. Noise associated with frequent acceleration and braking as vehicles exit and enter numerous undesignated parking areas along Tioga Road impact the</p>		<p>Implementation of Alternative 5 would result in short-term adverse impacts to the soundscape due to noise associated with the construction activities, including the operation of heavy equipment, voices of construction workers, and noise associated with material hauling vehicles. Such</p>	

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
		<p>soundscape more than at the proposed parking areas where traffic calming features would facilitate quieter vehicle movement. The lower designated speeds (25 mph vs. 35 under the No Action Alternative) would also moderate the noise associated with vehicles. These impacts are expected to be local, long-term, minor, and adverse.</p> <p>Noise associated with cars driving over roadway rumble strips, parking cars, visitors' voices, personal electronics, and pets would contribute to existing noise levels of Tioga Road. Visitor use noises may occasionally dominate the soundscape (such as car alarms and loud voices or music), but are not typically the dominate source of sound in the vicinity (i.e., vehicle noise associated with Tioga Road). The long-term impact would be local, minor, and adverse.</p>		<p>noise could affect nearby recreational users on trails, in nearby meadows and beaches, or at trailheads. The short-term impact would be local, minor to moderate, and adverse.</p> <p>In addition to the long-term effects discussed under the other action alternatives, the operation of 10 campsites would create additional noise, especially during the evening and early morning. The small water craft access may also encourage more activity and associated noise than would otherwise occur. Impacts associated with Alternative 5 would be local, long-term, moderate, and adverse.</p>	
Wilderness	<p>This alternative would require continuing repair and maintenance, and ongoing restoration activities in the Tenaya Lake area. These activities may have an indirect effect on Wilderness, including the generation</p>	<p>Actions within Wilderness would include reconstruction and restoration of a portion of the Murphy Creek Trail. Short-term effects would include noise and dust from construction activities. Use of hand</p>	<p>Actions within Wilderness would include reconstruction and restoration of the Murphy Creek Trail, construction of a 50-foot bridge over Murphy Creek (north of Tioga Road), and restoration of</p>	<p>No project actions would occur in Wilderness. Construction activities in the immediate vicinity of Wilderness would generate noise, which may have an indirect effect on Wilderness areas. Due to distance</p>	<p>Actions within Wilderness would include reconstruction and restoration of the Murphy Creek Trail, construction of a 50-foot bridge over Murphy Creek (north of Tioga Road), and restoration of</p>

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
	<p>of noise. While these activities would have a short-term, adverse effect on Wilderness experience, due to the proximity to Tioga Road, these effects would be negligible. The long-term impact would be local, negligible, and adverse.</p> <p>Routine repairs or maintenance in the vicinity of the Wilderness boundary would have a short-term, negligible effect on visitor experience as a result of noise from repair activities.</p> <p>The reduction in parking areas may limit the available parking for overnight use during peak visitor use periods, resulting in an adverse impact to Wilderness users. Overall, proposed parking areas, wayfinding and interpretive materials, and facilities would provide for improved visitor</p>	<p>tools would be required within Wilderness to minimize these effects. While visitors would likely notice the activities, the activities would be short-term, and limited to the trailhead area, and would not impact Wilderness experience in the backcountry areas. The short-term impact would be negligible and adverse.</p> <p>Routine repairs or maintenance in the vicinity of the Wilderness boundary would have a short-term, negligible effect on visitor experience as a result of noise from repair activities.</p> <p>The reduction in parking areas may limit the available parking for overnight use during peak visitor use periods, resulting in an adverse impact to Wilderness users. Overall, proposed parking areas, wayfinding and interpretive materials, and facilities would provide for improved visitor</p>	<p>the abandoned trail section. Short-term effects would include noise and dust from construction activities. Use of stock to transport equipment and materials, and use of hand tools would be required within Wilderness to minimize these effects; however, use of a helicopter may be required to transport bridge materials, which would generate a substantial level of noise in the immediate area. In the long-term, the presence of the Murphy Creek bridge would clearly be a man-made element, which is inconsistent with the general characteristics of Wilderness. Maintenance may require use of a helicopter, which would generate noise in the immediate area, affecting Wilderness character.</p> <p>The reduction in parking areas may limit the available parking for overnight use during peak visitor use periods, resulting in an adverse</p>	<p>and intervening topography, these short-term effects would be local and negligible. The reduction in parking areas may limit the available parking for overnight use during peak visitor use periods, resulting in an adverse impact to Wilderness users. Overall, proposed parking areas, wayfinding and interpretive materials, and facilities would provide for improved visitor experience, including those stationing at Tenaya Lake while accessing Wilderness and backcountry areas. While the proposed rumble strips would generate noise, the sound would attenuate due to distance and intervening topography. Long-term impacts would be negligible and adverse.</p>	<p>the abandoned trail section. Short-term effects would include noise and dust from construction activities, similar to Alternative 3. In the long-term, the presence of the Murphy Creek bridge and associated maintenance activities may be inconsistent with Wilderness character, similar to Alternative 3. Operation of the camping area proposed under Alternative 5 would generate noise; however, this use would be located outside of Wilderness, near Tioga Road. Due to intervening topography and distance from backcountry Wilderness areas, the effect would be negligible.</p> <p>Proposed visitor facilities would benefit visitor experience, including those stationing at Tenaya Lake while accessing Wilderness and backcountry areas.</p> <p>This alternative would</p>

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
		experience, including those stationing at Tenaya Lake while accessing Wilderness and backcountry areas. While the proposed rumble strips would generate noise, the sound would attenuate due to distance and intervening topography. Long-term impacts would be negligible and adverse.	impact to Wilderness users. Proposed parking areas, wayfinding and interpretive materials, and facilities would provide for improved visitor experience, including those stationing at Tenaya Lake while accessing Wilderness and backcountry areas. This alternative would result in a long-term, moderate, adverse impact.		result in a long-term, moderate, adverse impact.
Historic Properties Archeology	The No Action Alternative is not expected to result in direct disturbance of archeological historic properties. Continued use of trails within culturally sensitive areas has the potential to degrade visually evident resources. This alternative would not result in construction-related impacts to archeological historic properties within the project APE. The No Action Alternative will result in no adverse effect to historic properties.	Under this alternative, ground disturbance would occur within the boundary of the following historic properties: CA-MRP-154/H; CA-MRP-1982H; CA-MRP-442/H; CA-MRP-1952, and CA-MRP-1954/H. Actions proposed under Alternative 2 would have no adverse effect on historic properties with the implementation of appropriate mitigation measures as described in the 1999 Programmatic Agreement, and incorporation of design	Under this alternative, ground disturbance would occur within the boundary of the following historic properties: CA-MRP-154/H; CA-MRP-1982H; CA-MRP-442/H; CA-MRP-1952, CA-MRP-1953, and CA-MRP-1954/H. Actions proposed under Alternative 3 would have no adverse effect on historic properties with the implementation of appropriate mitigation measures as described in the 1999 Programmatic Agreement, and	Under this alternative, ground disturbance would occur within the boundary of the following historic properties: CA-MRP-154/H; CA-MRP-1982H; CA-MRP-442/H; CA-MRP-1952, CA-MRP-1953, and CA-MRP-1954/H. Actions proposed under Alternative 4 would have no adverse effect on historic properties with the implementation of appropriate mitigation measures as described in the 1999 Programmatic Agreement, and	Under this alternative, ground disturbance would occur within the boundary of the following historic properties: CA-MRP-154/H; CA-MRP-1982H; CA-MRP-442/H; CA-MRP-1952, CA-MRP-1953, and CA-MRP-1954/H. Actions proposed under Alternative 5 would have no adverse effect on historic properties with the implementation of appropriate mitigation measures as described in the 1999 Programmatic Agreement, and

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
		features to avoid or minimize direct effects.	incorporation of design features to avoid or minimize direct effects.	incorporation of design elements to avoid or minimize effects.	incorporation of design features to avoid or minimize effects.
Historic Properties Historic Buildings, Structures, and Cultural Landscapes	Implementation of Alternative 1 would result in no effect to historic structures, buildings and cultural landscapes, because no improvements would occur.	There are no historic buildings or cultural landscapes recorded within the APE, therefore there are no construction or operational impacts associated with Alternatives 2, 3, 4, or 5. Based on the design of roadway improvements, these actions would not affect the integrity of the road in a way that would make the property ineligible for listing on the NRHP. Therefore, there would be no adverse effect to the Great Sierra Wagon Road or Tioga Road. None of the action alternatives would include elements that would adversely affect the cultural setting or degrade qualities which may qualify the area for inclusion on the National Register in the future, because scenic views would not be obscured, and proposed structures (boardwalks, bridges, interpretive materials and signs, visitor facilities) would not be located or sized such that they would interfere with historical views of the lake or surrounding geology.			
American Indian Traditional Cultural Properties	Implementation of this alternative would have no effect on TCPs. NPS would continue consultation with American Indian tribes to avoid impacts to TCPs.	Under Alternatives 2 and 3, the construction of facilities and structures would not interfere with the integrity of scenic views, including the lake and surrounding geology. Improvements to trails would not adversely affect the integrity of trails used by American Indians during gatherings, ceremonies, and individual use. Ground disturbance may cause erosion and down-gradient sedimentation; however, standard BMPs would be incorporated into project design to reduce the potential for pollutant discharge into the sacred waters of Tenaya Lake. NPS will consult with American Indian tribes to ensure that construction activities are timed to avoid direct and indirect disturbance of areas and resources (i.e., water, plants) used for tribal activities at the lake. The treatment of resources managed as TCPs in the Tenaya Lake area would continue with ongoing consultation between the NPS and American Indians with traditional cultural ties to the Tenaya Lake area. A no effect determination is appropriate for the Tenaya Lake TCP because construction activities	In addition to the effects discussed under the other action alternatives, Alternative 4 would include direct disturbance and restoration activities are within an area currently used by American Indian tribes for annual activities, including parking, storage of food and materials, portable restrooms, and tables. Relocation of this staging area would be required; other areas would not be affected. NPS will consult with American Indian tribes to assign an alternative area for	Under Alternatives 2 and 3, the construction of facilities and structures would not interfere with the integrity of scenic views, including the lake and surrounding geology. Improvements to trails would not adversely affect the integrity of trails used by American Indians during gatherings, ceremonies, and individual use. Ground disturbance may cause erosion and down-gradient sedimentation; however, standard BMPs would be incorporated into project design to reduce the potential for	

Alternatives

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
		would be timed to avoid direct disturbance of areas and resources used for tribal activities, and operational activities would not affect resources managed under the TCP.	staging during annual events. A no effect determination is appropriate for the Tenaya Lake TCP under this alternative, because construction activities would be timed to avoid direct disturbance of annual areas used for tribal activities, and operational activities would not affect resources managed under the TCP.	pollutant discharge into the sacred waters of Tenaya Lake. NPS will consult with American Indian tribes to ensure that construction activities are timed to avoid direct and indirect disturbance of areas and resources (i.e., water, plants) used for tribal activities at the lake. The treatment of resources managed as TCPs in the Tenaya Lake area would continue with ongoing consultation between the NPS and American Indians with traditional cultural ties to the Tenaya Lake area. A no effect determination is appropriate for the Tenaya Lake TCP because construction activities would be timed to avoid direct disturbance of areas and resources used for tribal activities, and operational activities would not affect resources managed under the TCP.	

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
American Indian Traditional Cultural Practices	<p>Under the No Action Alternative, use of the area would continue. NPS would continue to consult with American Indian tribes, and culturally and religiously significant uses of the area would continue as it does under current conditions. Under Alternative 1, there will be no impact to traditional cultural practices.</p>	<p>Under Alternatives 2 and 3, construction of improvements would generate noise and dust, and would be visually obtrusive. NPS will consult with American Indian tribes to ensure that construction activities are timed to avoid direct disturbance of annual culturally and religiously significant tribal activities at the lake. Other activities, including plant gathering, hiking, and meditation may be adversely affected by construction activity in the area. With continuing consultation, the potential for an adverse effect would be minimized. Therefore, construction activities would result in a local, short-term, minor, adverse impact.</p> <p>Ongoing consultation between the NPS and American Indians with traditional cultural ties to the Tenaya Lake area would continue. Operation of the proposed facilities would be limited to periodic maintenance activities, similar to existing conditions. American Indians present during traditional uses would be exposed to noise generated by the proposed rumble strips, to be located within Tioga Road, approximately 600 feet from a traditional gathering site. Additional sources of noise would include sounds generated by visitors and traffic. Due to distance and intervening topography and forest, it is expected that this additional noise would not adversely affect the integrity of the setting and feeling in this location.</p> <p>Local American Indian tribes would continue to have access to and have use of culturally and religiously significant resources in the Tenaya Lake area. The long-term impact would be local, negligible, and adverse.</p>		<p>In general, effects to traditional cultural practices under Alternative 4 would be similar to those discussed under the other action alternatives; however, direct disturbance and restoration activities are proposed within culturally and religiously significant areas currently used by American Indian tribes for annual activities, including parking, storage of food and materials, portable restrooms, and tables. Consultation with affected tribes would be implemented by NPS to avoid direct disruption of annual events. With continuing consultation, the potential for an adverse effect would be minimized. Therefore, construction activities would result in a local, minor, adverse effect to traditional cultural practices.</p> <p>In the long-term, relocation of a temporary staging area would be required; other uses</p>	<p>Under Alternatives 2 and 3, construction of improvements would generate noise and dust, and would be visually obtrusive. NPS will consult with American Indian tribes to ensure that construction activities are timed to avoid direct disturbance of annual tribal activities at the lake. Other culturally and religiously significant activities, including plant gathering, hiking, and meditation may be adversely affected by construction activity in the area. With continuing consultation, the potential for an adverse effect would be minimized. Therefore, construction activities would result in a Local, short-term, minor, adverse impact.</p> <p>Ongoing consultation between the NPS and American Indians with traditional cultural ties to the Tenaya Lake area would continue. Operation of the proposed facilities would</p>

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
			<p>would not be affected. NPS will consult with American Indian tribes to ensure that construction activities are timed to avoid direct disturbance of annual tribal activities at the lake, and to assign an alternative area for staging during annual events. With continuing consultation, the potential for an adverse effect would be minimized.</p> <p>Ongoing consultation between the NPS and American Indians with traditional cultural ties to the Tenaya Lake area would continue. The long-term impact would be local, minor, and adverse.</p>	<p>be limited to periodic maintenance activities, similar to existing conditions. Local American Indian tribes would continue to have access to and have use of special resources in the Tenaya Lake area. The long-term impact would be local, negligible, and adverse.</p>	
Visitor Experience	There would be no new impacts to visitor experience under Alternative 1. Existing impacts to visitor experience would continue, including visitor crowding caused by limited or inadequate parking, infrastructure, and facilities plus poorly	Implementation of the action alternatives would result in short-term impacts to visitor experience due to construction activity, including the temporary closure of some parking spaces and recreation areas during construction. The quality of experience may diminish due to construction noise and increased congestion as visitors are displaced to other areas of Tenaya Lake and the park where construction activity is not underway. Limited or inconvenient access to Tenaya Lake and its backcountry trailheads may also lead some visitors to choose other destinations outside the park. The short-term adverse impact would be minor to moderate.	While each action alternative includes a different set of parking, facilities, infrastructure, and trail improvements around Tenaya Lake, the overall amount and duration of construction would be similar. For example, a pedestrian bridge would be constructed at Sunrise Trailhead over Tenaya Creek (but would not be in Alternative 2) while at Murphy Creek a pedestrian bridge would not be constructed (but would be in Alternative 2). The overall impact to visitor experience is similar but intensity of impact for specific visitor		

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
	designated paths and limited interpretive resources. Safety issues along Tioga Road would also continue to impact visitor experience. The long-term impact would be moderate and adverse.	<p>groups would vary by location and visitor activity.</p> <p>Under all action alternatives, the visitor experience would benefit from the improved safety and decreased noise associated with a 25 mph speed zone and traffic calming devices along Tioga Road. Drainage infrastructure under Tioga Road and within trail systems would improve safety, contain erosive flows, and capture pollutants to the benefit of drivers, hikers, and swimmers. Trails and signage would also be improved to help guide visitors, provide interpretation, and limit the pedestrian impact on natural areas. Restoration activities would improve aesthetics for visitors.</p> <p>The removal of some amenities (such as fire pits/grills) and the redistribution of others (such as parking, picnic tables, and trails) would be a local, long-term, adverse minor impact. These impacts, though, would be offset by more extensive local, long-term, moderate beneficial impacts to visitor experience, including congestion, safety, crowding, and recreational opportunities associated with improved and expanded parking, infrastructure, facilities, trails, and restoration.</p> <p>The reduction in roadside parking would have an initial adverse effect to visitors expecting to repeat a past experience (i.e., stopping along the road to take a photograph or immediately access the lake); however, the long-term effect would benefit visitor experience by improving views towards and surrounding the lake, consolidating parking areas near visitor facilities and interpretive materials, improving visitor safety by reducing congestion and increasing visibility, and enhancing experience by providing functional signage and interpretive materials.</p> <p>The installation of additional interpretive materials would enhance the visitor experience by clearly identifying facilities, varying degrees and locations of experience opportunities, and unique information about the area and its history. The overall long-term effect would be minor to moderate, and beneficial.</p>			
Park Operations	This alternative would require increasing costs to make emergency repairs to parking lots and facilities, and would allow the continued deterioration of significant natural resources, including wetlands and cultural resources. Park operations costs would increase incrementally	<p>Under the action alternatives, impacts to park operations from construction would be minor and adverse and would result from visitor crowding and inconvenience during construction. There would be an increased risk of accidents on Tioga Road during traffic calming improvements and changes to the parking lots. The short-term impact would be local, minor, and adverse.</p> <p>In the long-term, systematic improvements to the Tenaya Lake area would result in long-term improvements that would benefit park operations. Park law enforcement may experience additional demand for services during peak conditions, when visitors are unable to locate parking. Operation of the camping area (Alternative 5) is not expected to result in a significant additional demand for park maintenance and law enforcement, compared to current conditions. The long-term impact would be moderate and beneficial.</p>			

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
	because the visitor safety issues associated with the location and design of existing trailheads, parking areas, driveway intersections with Tioga Road, and directional signage would not be addressed. The long-term impact would be local, minor, and adverse.				
Transportation	Under the No Action Alternative, the parking and related infrastructure would remain in its existing condition. Parking capacity would remain at current capacity (approximately 239 to 272 vehicles) and the designated speed would remain at 35 mph along Tioga Road. Drivers, passengers, bicyclists, and pedestrians would continue to experience unsafe areas along Tioga Road. More parking would be available than under the action alternatives. Overall, the No Action Alternative would have a local, long-term, moderate, adverse	Alternatives 2, 3, and 4 would result in short-term impacts to transportation along Tioga Road and within parking areas at Tenaya Lake, including temporary road and parking area closures, and traffic delays. Short-term impacts would be local, moderate, and adverse. During operation, visitors would benefit from the improved safety associated with a 25 mph speed zone, traffic calming devices, and drainage infrastructure. Vehicle circulation and wayfinding would be improved. Fewer overall parking spaces would be available. Reduced parking along Tioga Road would reduce traffic congestion and redirect vehicles to the expanded parking at other locations. During peak conditions, approximately 35-40 vehicles may not be accommodated, and these visitors may circulate within the Tenaya Lake area looking for an available parking space, or they may continue on to other destinations within the park. During peak conditions, this would contribute to the increased demand for parking within the park, resulting in a minor adverse impact. The overall long-term impact would be minor to moderate and beneficial.	Alternative 5 would result in short-term impacts to transportation along Tioga Road and within parking areas at Tenaya Lake, including temporary road and parking area closures, and traffic delays. Short-term impacts would be local, moderate, and adverse. In general, operation-related impacts would be similar to Alternatives 2, 3, and 4; however, roadside parking (while reduced from current conditions) would continue to provide designated spaces and turn-outs. The reduced parking along Tioga Road would reduce traffic		

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
	impact on transportation.				congestion and redirect vehicles to the expanded parking at other locations. Parking capacity would equal maximum peak demand. The long-term impact would be minor and beneficial.
Land Use	Under the No Action Alternative, the Tenaya Lake area would not be improved, except for continuation of existing restoration projects, emergency repairs, and routine and periodic maintenance activities. The existing facilities would continue to serve the area, trails would not be improved, and no new parking would be constructed. Existing uses including parking area, visitor facilities, trail systems, backcountry trailheads, and a variety of visitor use opportunities. There would be no impact to land use from the No Action Alternative.	Construction activities would be short-term and localized, and would not affect land use patterns. Construction may cause a slight inconvenience to visitors if areas were closed to visitors during construction. The short-term adverse impact would be negligible. Under Alternatives 2, 3, and 4, no campsites are proposed due to identified natural and cultural resource constraints, which is inconsistent with the GMP. With the exception of Alternative 4, varying degrees of southern side roadside parking are proposed under each alternative, and all action alternatives retain the approximately 10 to 15 spaces on the northern side of Tioga Road. While these actions are potentially inconsistent with the GMP, the overall purpose of each action alternative is to resolve current visitor safety issues, improve visitor experience, and protect and/or restore natural and cultural resources. Therefore, these inconsistencies would not result in an adverse land use impact. All improvements would occur within the natural zone, which is intended to provide for visitor use and enjoyment in ways that would not adversely affect natural environments. The development footprint would be small and would be compatible with the intended land uses for the natural zone. Land use impacts from operation of the action alternatives would be long-term and beneficial.		Construction activities would be short-term and localized, and would not affect land use patterns. Construction may cause a slight inconvenience to visitors if areas were closed to visitors during construction. The short-term adverse impact would be negligible. Only 10 campsites are proposed, and retaining roadside parking is potentially inconsistent with the GMP; however, the overall purpose of each action alternative is to resolve current visitor safety issues, improve visitor experience, and protect and/or restore natural and cultural resources. Therefore, these inconsistencies would not result in an	

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
					adverse land use impact. All improvements would occur within the natural zone, which is intended to provide for visitor use and enjoyment in ways that would not adversely affect natural environments. The development footprint would be small and would be compatible with the intended land uses for the natural zone. Land use impacts from operation of the action alternatives would be long-term and beneficial.
Socioeconomics	Under the No Action Alternative, the parking, infrastructure, facilities, and trails at Tenaya Lake would remain in their existing condition and although necessary maintenance and repairs would continue, no new undertakings would occur. In general, the socioeconomic characteristics are not expected to change measurably. Potential minor adverse effects on tourism as a result of not	Under the action alternatives, multiple new improvements would be constructed throughout the Tenaya Lake area. The construction work force is expected to draw from the regional work force. Therefore, construction spending, and to a lesser degree employment, are expected to have a regional, short-term, minor beneficial impact on the region's economy for the duration of construction. Any regional construction work force would likely result in an increased demand for local, temporary housing. This increased demand would likely exacerbate the current housing shortage, and result in a short-term, negligible adverse impact. Despite potential adverse effects as a result of increased housing, overall impacts to socioeconomics are expected to be beneficial.	Under the action alternatives, the parking, infrastructure, facilities, and trails at Tenaya Lake would be improved. Maintenance and repairs would also be expanded to include the additional elements of each alternative. Socioeconomic characteristics are not expected to change measurably by the implementation of the action alternatives. The minor benefits of the proposed use of the Tenaya Lake area would continue to facilitate visitation and park staff would continue to be employed in maintenance, public safety, interpretation, and backcountry activities. The long-term impact would be minor and beneficial.		

Table 2-4. Summary of Environmental Consequences by Alternative

Designation	Alternative 1 No Action	Alternative 2 Tenaya Confluence	Alternative 3 Tenaya Ecotones	Alternative 4 Lake Loop	Alternative 5 Immersive Nodes
	addressing parking and other visitor services would continue to be offset by the minor benefits of continued use of the Tenaya Lake area in its current condition. The overall impacts to socioeconomics are expected to be negligible and beneficial.				

Alternatives

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CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section of the Tenaya Lake Area Plan Environmental Assessment (EA) describes the existing conditions and the potential impacts of each the five alternatives on the topic areas relevant to the action. The topics were selected based on federal law, regulations, and executive orders; National Park Service (NPS) management policies; and concerns expressed by the public, park staff, or other agencies during scoping and comment periods. The topics analyzed in this EA include the natural, cultural, and social resources that would be directly, indirectly, or cumulatively impacted as a result of implementation of any alternative proposed in this EA. This section also provides a discussion of topics that were dismissed from further analysis. Following the discussion on the topics selected and not selected, the chapter presents the methodologies used in the environmental analysis.

IMPACT TOPICS CONSIDERED IN THIS PLAN

The following impact topics were identified during the public scoping process and by staff of Yosemite National Park. These topics are described and possible impacts to them are addressed in the analysis presented in Chapter 3: Affected Environment and Environmental Consequences.

Natural Resources

- Geology, Geologic Hazards, and Soils
- Hydrology, Floodplains, and Water Quality
- Wetlands
- Vegetation
- Wildlife
- Rare, Threatened, and Endangered Species
- Night Sky
- Scenic Resources
- Air Quality
- Soundscape
- Wilderness

Socio- cultural Resources

- Historic Properties
 - Archeology
 - Historic Structures, Buildings, and Cultural Landscapes
 - American Indian Traditional Cultural Properties
- American Indian Traditional Cultural Practices
- Visitor Experience and Recreation
- Park Operations
- Transportation
- Land Use
- Socioeconomics

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

The following impact topics were considered during scoping, but dismissed from further analysis, because these resources were thought to be unaffected or negligibly affected by the various alternatives given the scale or location of the project.

Environmental Justice: No aspect of the action alternatives would result in disproportionately high and adverse human health or environmental effects on minority or low-income populations. Any restriction on travel or access to any area of the park that might result from the project would be equally applied to all visitors, regardless of race or socioeconomic standing. The action alternatives would not result in destruction or disruption of community cohesion and economic vitality; displacement of public and private facilities and services; increased traffic congestion; and/or exclusion or separation of minority or low-income populations from the broader community.

Museum Collections: Park projects can indirectly affect the museum collections by generating minimal additions to the collections from archeological data recovery performed as mitigation for direct site impacts. Archeological resources would be avoided to the maximum extent feasible. Based on the design of the proposed action, data recovery is unlikely to be necessary.

Prime and Unique Farmlands: There are no agricultural lands or uses in the area, and Action alternatives would not have an indirect effect on farmlands outside of the area.

ENVIRONMENTAL CONSEQUENCES METHODOLOGY

Impact Analysis General

Following a description of the affected environment, the potential environmental consequences, or impacts, that would occur as a result of implementing each alternative are analyzed and presented for each resource topic. Direct and indirect effects, as well as impairment to park resources, are discussed for each resource. The structure of impact analysis is divided into the following:

Construction- related Impacts. Impacts that would occur during construction activities, including site preparation, vegetation removal or trimming, grading, trenching, excavation, foundation preparation, utility installation, structural construction.

Operation- related Impacts. Impacts that would occur during operation and visitor use of the Tenaya Lake area and proposed facilities and improvements. This also includes park operations and management actions. These are impacts that may occur for the life of the project.

Potential impacts are described in terms of context, duration, intensity, and type. General definitions for all resources (except for historic properties subject to requirements of the National Historic Preservation Act (NHPA), which are discussed in the Historic Properties section of this chapter) are as follows; specific impact thresholds (intensity) are described at the beginning of each resource's environmental consequences section.

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

Impact Analysis for Historic Properties

NHPA Methods for Determination of Effect (Impact Analysis)

This impact analysis methodology applies to the five types of historic properties as defined by Section 106 of the NHPA: sites, districts, buildings, structures, and objects. Section 106 of the NHPA requires a federal agency to take into account the effects of its undertakings on properties included in, or eligible for inclusion in the National Register of Historic Places (NRHP), and provide the Advisory Council on Historic Preservation the reasonable opportunity to comment. The *1999 Park Programmatic Agreement Among The National Park Service At Yosemite, The California State Historic Preservation Officer and The Advisory Council On Historic Preservation Regarding Planning, Design, Construction, Operations And Maintenance, Yosemite National Park, California* (1999 PA) was developed among the NPS at Yosemite, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation, in consultation with American Indian tribes and the public. The 1999 PA governs the park's effort to take into account the effects of park planning and operations on historic properties.

In addition, NPS executed a nationwide PA on November 14, 2008 with the Advisory Council on Historic Preservation (AChP) and the National Conference of State Historic Preservation Officers (NCSHPO) to further integrate the stewardship of historic properties into NPS policy, streamline the Section 106 process, and strengthen NPS's partnership with state and tribal preservation programs across the country.

Pursuant to Director's Order 12 Sections 2.14(6) (3), 6.2 F and 6.3 F and Appendix 3, 40 Code of Federal Regulations (CFR) 1508.7, 1508.8 and 1508.27 and 36 CFR 800.8, impact intensity, duration, context and type as they relate to historic properties are determined with the criteria established in 36 CFR 800.5. NHPA defines the following types of effects:

No Effect: Indicates that there are no historic properties in the area of potential effect (APE); or, there are historic properties in the APE, but the undertaking will not alter the characteristics that qualify it for inclusion in or eligibility for the NRHP.

No Adverse Effect: Indicates that there will be an effect on the historic property by the undertaking, but the effect is not adverse, meaning it will not alter characteristics that make it eligible for listing in the NRHP in a manner that would diminish the integrity of the property (see below).

Adverse Effect: Indicates that the undertaking will alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. An adverse effect may be resolved in accordance with Stipulation VIII: Resolution of Adverse Effects, of the 1999 PA.

Impact Measures under NHPA and NEPA

Conventional terms used by the NPS to measure the context (local, regional, national or international), duration (short- or long- term), type (beneficial or adverse), and intensity (negligible, minor, moderate or major) of impact under the National Environmental Policy Act (NEPA) are not valid for assessing effects on historic properties under NHPA. Because the effect on a historic property is measured by the status of the historic property's eligibility for listing in the NRHP, the negligible, minor, moderate, and major degrees do not apply, and therefore satisfy neither the NHPA nor NEPA requirements. Either a historic property maintains the characteristics making it eligible for listing in the NRHP, or it does not. It cannot, for example, be moderately eligible for listing in the NRHP. Assessment of significance of impact under NEPA would occur only when an adverse effect to the characteristics of an historic property making it eligible for listing in the NRHP cannot be resolved.

Context and Duration: The geographical context of a historic property is determined during the identification and evaluation process when it is determined if it is of local, regional, national, or international significance consistent with NRHP significance assessment. Because historic

properties are nonrenewable, irreplaceable resources, duration of effect is “long- term” across the full range of actions from preservation to destruction.

Type and Intensity: Beneficial Effects as measured in NEPA are folded into the “No Adverse Effect” finding for NHPA. For example, a restoration of an historic structure may be considered “beneficial” under NEPA. NHPA, on the other hand, recognizes that the restoration will affect the historic property, but it will not be an adverse effect. Direct or indirect impact consideration is the same for NHPA and NEPA. Direct impacts are those caused by the action that will occur at the same time and place. Indirect impacts are those caused by the action later in time or at a distance from the action that are reasonably foreseeable (1508.8 (a) and (b), 36 CFR 800.5 (a) (1)).

Resolving Adverse Effects to Historic Properties: An adverse effect under Section 106 of NHPA can be resolved with a good faith effort to consider whether and how to avoid, reduce, or mitigate the effect. Resolving adverse effects could be achieved by modifying the undertaking, imposing certain mitigation conditions (i.e., photo documentation, treatment of historic buildings, structures, and landscapes in accordance with the Secretary’s of Interior Standards), or accepting the effect in the public interest. Yosemite’s 1999 PA stipulates Standard Mitigation Measures (SMM) that can be used to resolve an adverse effect. These measures are: Recordation, Salvage, Interpretation, and NRHP Reevaluation.

Significant Impact: For the purposes of NEPA and Director’s Order 12, an impact to a NRHP property would be considered significant when an adverse effect cannot be resolved by agreement among State Historic Preservation Officers (SHPO), ACHP, American Indian tribal governments, other consulting and interested parties and the public. The resolution must be documented in a memorandum or programmatic agreement or the NEPA decision document.

Cumulative Impacts

The Council on Environmental Quality (CEQ) describes a cumulative impact as follows (Regulation 1508.7):

A “Cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non- federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The cumulative projects addressed in this analysis include past and present actions, as well as any planning or development activity currently being implemented or planned for implementation in the reasonably foreseeable future (refer to Appendix B for a list of projects considered in the cumulative analysis). Cumulative actions are evaluated in conjunction with the impacts of an alternative to determine if they have any additive effects on a particular resource. Because most of the cumulative projects are in the early planning stages, the evaluation of cumulative impacts was based on a general description of the project. These projects are included in the cumulative effects analysis presented in Chapter 3 of this document.

Impairment

NPS *Management Policies* (2006a) requires analysis of potential effects to determine whether actions would impair park resources (NPS 2006a). The fundamental purpose of the national park system, established by the Organic Act (16 United States Code [USC] 1) and reaffirmed by the General Authorities Act, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or minimize to the greatest degree practicable, adverse impacts on park resources and values. The laws give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values.

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies* (2006) and Director's Order 12 requires an analysis of potential effects to determine if actions would impair park resources. As such, an impact that would harm the integrity of the park resources or values, including the opportunities that otherwise would be present for those resources or values would constitute impairment. In this EA determinations of impairment are provided in the conclusion section under each cultural and natural applicable resource topic for each alternative. No impairment consideration is given to health and safety, transportation, maintenance operations, and energy resource topics.

1.4.3 The NPS Obligation to Conserve and Provide for Enjoyment of Park Resources and Values

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values. The laws do give the Service the management discretion, however, to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.

The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. The enjoyment that is contemplated by the statute is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. This is how courts have consistently interpreted the Organic Act.

1.4.4 The Prohibition on Impairment of Park Resources and Values

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

The impairment of park resources and values may not be allowed by the Service unless directly and specifically provided for by legislation or by the proclamation establishing the park. The relevant legislation or proclamation must provide explicitly (not by implication or inference) for the activity, in terms that keep the Service from having the authority to manage the activity so as to avoid the impairment.

1.4.5 What Constitutes Impairment of Park Resources and Values

The impairment that is prohibited by the Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.

- An impact to any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; or,
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or,
- Identified in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated. An impact that may, but would not necessarily, lead to impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessionaires, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park.

1.4.6 What Constitutes Park Resources and Values

The “park resources and values” that are subject to the no- impairment standard include: the park’s scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; American Indian traditional cultural resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals; appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them; the park’s role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and any additional attributes encompassed by the specific values and purposes for which the park was established.

1.4.7 Decision- making Requirements to Identify and Avoid Impairments

Before approving a proposed action that could lead to an impairment of park resources and values, an NPS decision- maker must consider the impacts of the proposed action and determine, in writing, that the activity will not lead to an impairment of park resources and values. If there would be impairment, the action must not be approved.

Impairment determinations, however, are not made for health and safety, visitor use, maintenance, operations, socio- economic resources, or other non- natural or cultural resources topics.

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

1. Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
2. Key to the natural or cultural integrity of the park; or
3. Identified as a goal in the park’s general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. A determination on impairment is made for each of the resource topics analyzed in this chapter.

Impact Mitigation

- Avoid conducting management activities in an area of the affected resource.
- Minimize the type, duration, or intensity of the impact to an affected resource.
- Mitigate the impact by repairing localized damage to the affected resource immediately after an adverse impact.
- Rehabilitate an affected resource with a combination of additional management activities.
- Compensate a major long- term adverse direct impact through additional strategies designed to improve an affected resource to the degree practicable.

The list of Best Management Practices (BMPs) and mitigation measures for this project is included in Appendix A.

Summary of Alternatives Assessed

Alternative 1 (No Action). Under the No Action Alternative, the Tenaya Lake area would not be improved, except for continuation of existing restoration projects, emergency repairs, and routine and periodic maintenance activities. The current observed physical parking area (411 spaces) would remain.

Alternative 2 (Tenaya Confluence). Alternative 2 would significantly reduce roadside parking on the southern side of Tioga Road (five spaces are proposed); include a continuous trail along the northern side of the lake; and remove culverts and construct a box culvert at the Tioga Road/Murphy Creek crossing. Parking areas within the Sunrise Trailhead, Old Campground, Murphy Creek, and East Beach areas would be expanded or improved. The Murphy Creek east parking area would be removed and restored. Total parking capacity would be 215 spaces including: 195 designated spaces within parking areas, five spaces south of Tioga Road, and 10 to 15 undesignated spaces on the northern side of Tioga Road.

Alternative 3 (Tenaya Ecotones). Alternative 3 would reduce Tioga Road southern roadside parking to 15 spaces; include an accessible trail between Murphy Creek and East Beach; relocate the Murphy Creek trail and construct a bridge over Murphy Creek north of Tioga Road; and remove culverts and construct a combined vehicular/pedestrian bridge at the Tioga Road Murphy Creek crossing. Parking areas within the Sunrise Trailhead, Murphy Creek, and East Beach areas would be expanded, including a parking area on the northern side of Tioga Road, west of Murphy Creek. The Murphy Creek east parking area would be removed and restored. Total parking capacity would be 208 spaces including: 178 designated spaces within parking areas; 15 designated roadside parking spaces on the southern side of Tioga Road; and 10 to 15 undesignated spaces on the northern side of Tioga Road.

Alternative 4 (Lake Loop). Alternative 4 would eliminate roadside parking on the southern side of Tioga Road; include an accessible trail from the Sunrise Trailhead, along the western side of the lake, to the northern extent of the South Trail; and include a bridge crossing over the Tenaya Lake outlet. Parking areas within the Sunrise Trailhead, Murphy Creek (east and west), and East Beach areas would be expanded, including parking areas on the northern side of Tioga Road in the Sunrise Trailhead area. The Old Campground parking loop would be removed and restored. Total parking capacity would be 214 spaces, including: 199 designated spaces within parking areas, and 10 to 15 undesignated spaces on the northern side of Tioga Road.

Alternative 5 (Immersive Nodes). Alternative 5 would retain 30 roadside parking spaces on the southern side of Tioga Road; include the development of 10 primitive campsites on the northern side of Tioga Road; relocate the Murphy Creek trail and construct a bridge over Murphy Creek north of Tioga Road; and remove culverts and construct a 25- foot vehicular bridge at the Tioga Road/Murphy Creek Crossing. The Sunrise Trailhead parking area would be improved, and a new parking area would be constructed on the northern side of Tioga Road adjacent to the proposed campsites. The Murphy Creek and East Beach parking areas would be expanded, including a parking area west of Murphy Creek on the northern side of Tioga Road. The Murphy Creek east parking area would be removed and restored. Total parking capacity would be 212 to 251 spaces, including: 206 designated spaces within parking areas; 30 designated spaces on the southern side of Tioga Road; and 10 to 15 undesignated spaces on the northern side of Tioga Road.

GEOLOGY, GEOHAZARDS, AND SOILS

Affected Environment

Regional Setting

Yosemite National Park is located within the Sierra Nevada Range of California. The project area and much of the Sierra Nevada Range is underlain by granitic rock that formed through repeated intrusions of magma between about 80 and 210 million years ago, creating the Sierra Nevada batholith. The Sierra Nevadas cover an area approximately 300 miles long and 70 miles wide, encompassing approximately 27,000 square miles. Geologic features in Yosemite National Park were formed by the retreat and expansion of glaciers during several glacial periods, the most recent being the Tioga episode which ended approximately 10,000 years ago. The final retreat of glaciers created the glacially- carved landscape of today's Yosemite National Park.

The Sierra Nevada Range in the vicinity of Yosemite National Park is not considered an area at high risk of fault rupture due to the lack of close proximity to local active faults. However, the area has historically experienced ground shaking associated with large earthquakes on distant faults, including the Owens Valley fault, the Hilton Creek fault, the San Andreas fault, and the Hayward fault. Active fault zones in the vicinity of the project include the Sierra Nevada fault zone (including Mono Lake and Hartley Springs faults, approximately 35 miles northeast of Yosemite Valley), the Bear Mountains fault zone (approximately 60 miles west of Yosemite Valley), and Hilton Creek fault (approximately 50 miles east of Yosemite Valley) (USGS 2010).

Rockfalls are the result of the erosive forces of glaciation, weathering, and bedrock fractures, and are common in Yosemite National Park. Tectonic stresses and erosion cause the granitic rock common in Yosemite National Park to fracture, sometimes parallel to the surface to cause sheet

joints. This creates large slabs of rock that eventually fall in a process called exfoliation. Water can speed this process by flowing through fissures in the rock and causing expansion and contraction as it freezes and thaws. Water, ice, vegetation, earthquakes, and human or other wildlife influence can cause unstable rocks to fall. In areas where rockfalls are common, large piles of rock debris or talus build up at the base of the slope.

The Natural Resource Conservation Service (NRCS) has identified approximately 120 soil types within Yosemite National Park (NRCS 2007). Soil types vary greatly within the park but are primarily of a granitic composition with varying levels of organic content dependent on the surrounding micro- climate and the proximity of water resources.

Project Setting

Tenaya Lake is located in the central portion of Yosemite National Park in a narrow valley that was created by the Tenaya Branch of the Tuolumne Glacier, and is currently surrounded by glacier- polished rock that extends to the edge of the lake (NPS 2004a). The elevation of the project site ranges from 8,150 to 9,200 feet above mean sea level. The project area is located west of Cathedral Peak, south of Polly Dome, east of Mount Hoffmann, and directly adjacent to Tenaya Lake. Potential geologic hazards include rockfall onto Tioga Pass Road near Stately Pleasure Dome and along Tenaya Lake Trail (United States Geological Survey [USGS] 2004). Figure 3- 1 shows the geology of the project area.

The project area is not located on an active or potentially active fault. The nearest active fault is the Hartley Springs Fault, which is located approximately 11 miles east of Tenaya Lake. No earthquakes have been recorded on this fault in recent geologic history. Just beyond Mono Lake to the east lies the Huntoon Valley fault system, which experienced a ‘swarm’ of earthquakes ranging up to 5.5 magnitude between September 18 and October 8, 2004 (California Integrated Seismic Network [CISN] 2010). A series of small micro- earthquakes was recorded by the USGS between March 3 and March 6, 2010 approximately 8 miles southeast of Tenaya Lake, ranging from 0.9 to 2.1 magnitude (USGS 2010). However, these micro- quakes were not located on a known active fault.

Five soil types are located within the project area: Rock outcrop- Crazymile- Vitrandic Cryothents association 0- 45% slopes; Canisrocks- Xeric Dystrocryepts association 5- 30% slopes; Glacierpoint- Typic Cryothents complex 30- 65% slopes; Rock outcrop- Canisrocks complex 30- 70% slopes; and Canisrocks- Glacierpoint- Humic Dystrocryepts complex 15- 55% slopes. Figure 3- 2 shows soil types in the vicinity of the project. Rock outcrop- Crazymile- Vitrandic Cryothents soils are found along the western shore of Tenaya Lake, and typically consist of boulders and loamy sand. Canisrocks- Xeric Dystrocryepts soils are found on the valley floor at the west and east ends of the Lake, and are primarily composed of loamy sand. Glacierpoint- Typic Cryothents soils are found near Murphy Creek and along the eastern shores of Tenaya Lake, and typically consist of bouldery to very stony loamy and fine sand. Rock outcrop- Canisrocks soils occur along the north bank adjacent to Tioga Road and consist predominantly of coarse loamy sand. Canisrocks- Glacierpoint- Humic Dystrocryepts soils consist of sandy, very cobbly, and extremely bouldery loamy sand. All of these soils are fairly impermeable due to the prevalence of granitic bedrock (United States Department of Agriculture [USDA] 2009).

Figure 3-1. Site Geologic Map

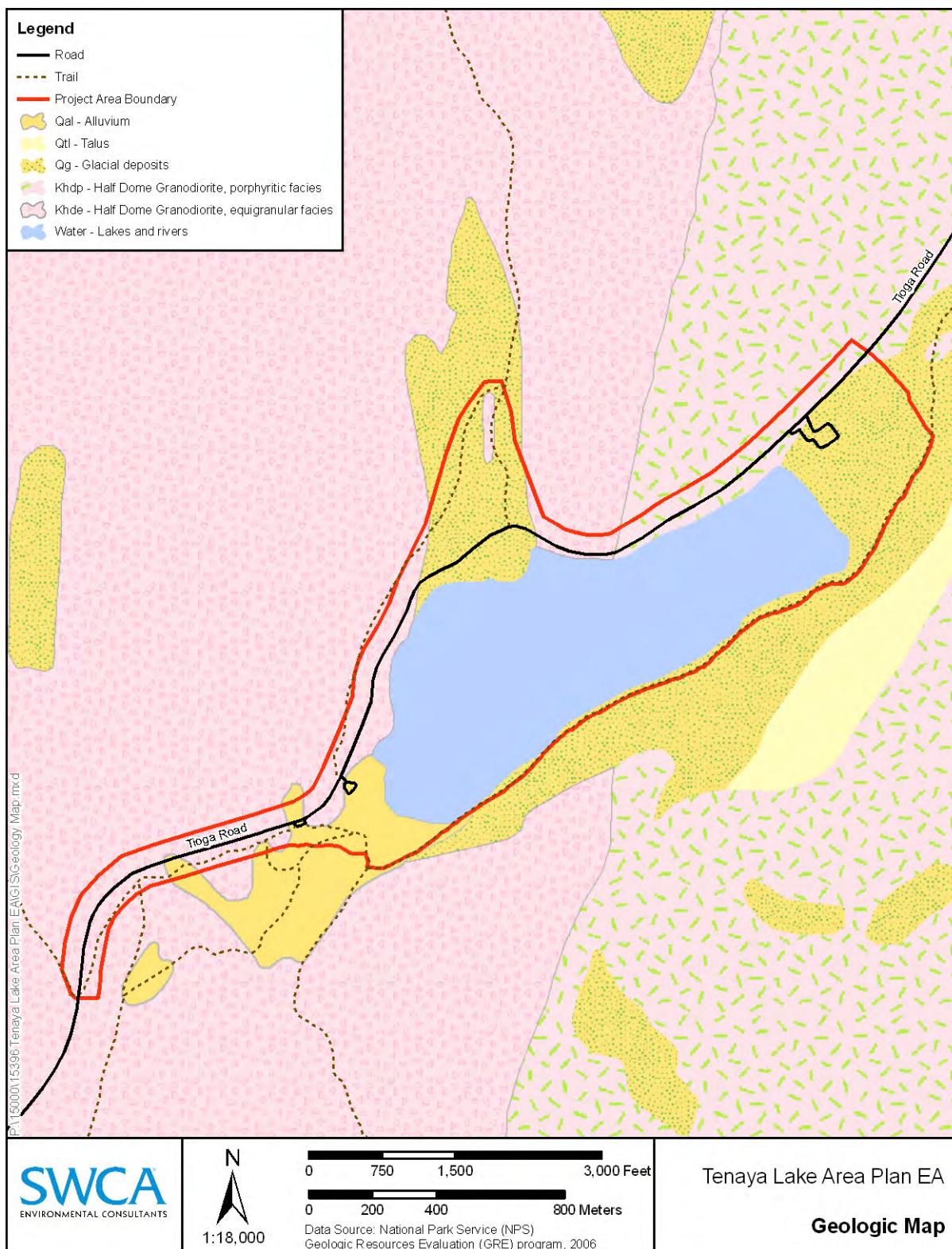
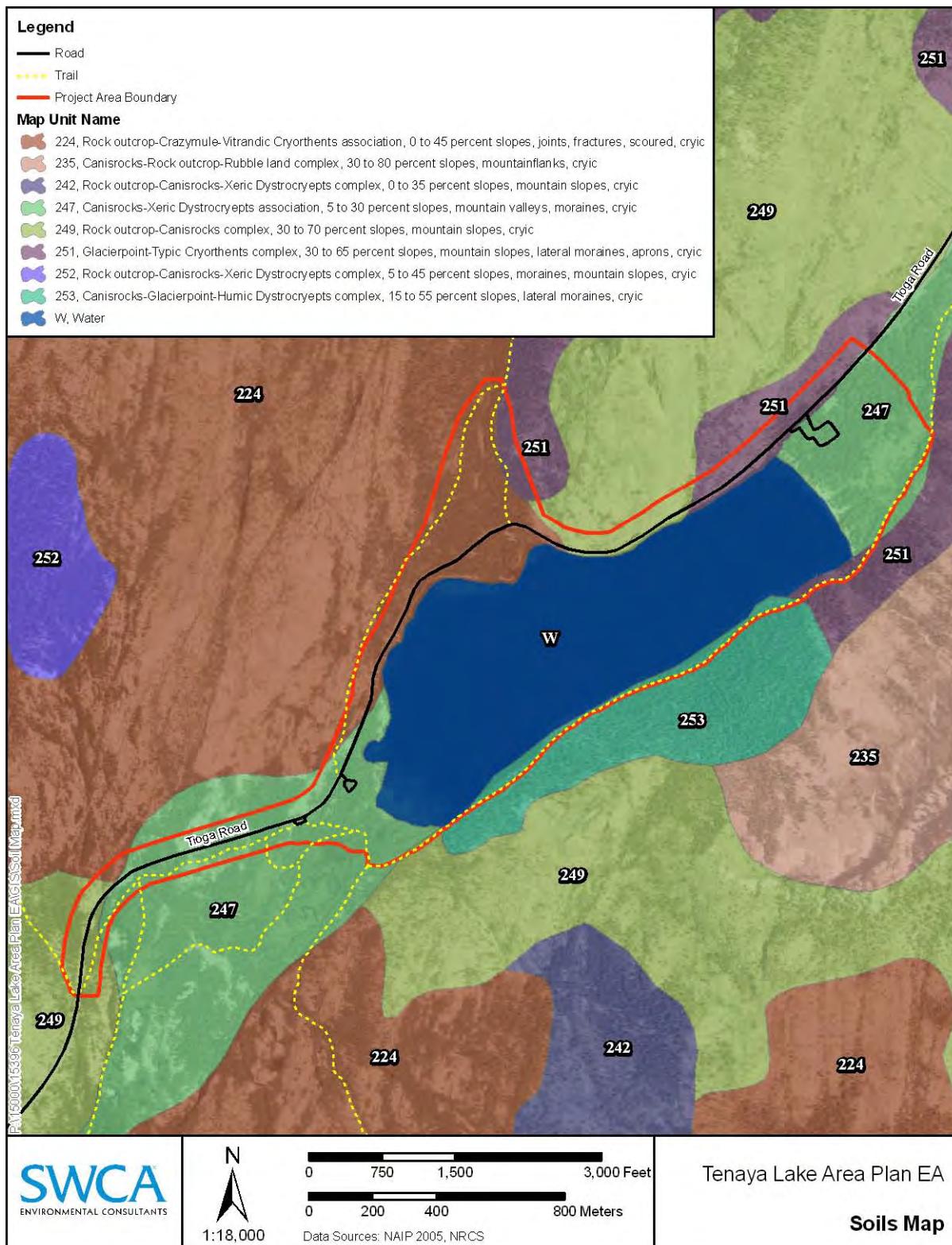


Figure 3-2. Site Soils Map



Environmental Consequences

This impact assessment focuses on the effects that geologic processes could have on people or facilities in the project area, or that construction activities in the project area could have on geological resources or processes. Rockfall or severe soil instability would negatively affect people and facilities if they result in damage to facilities, injury, or death. Project-related actions could cause increased soil erosion, removal, or compaction. Vegetation removal related to project construction activities or visitor use increase the rates of erosion if areas are not properly restored or if erosion control measures are not properly implemented during and following construction. Project activities could also affect the exposure of construction workers or Park visitors to hazardous rockfall.

Methodology. Analysis of the potential project affects on geological processes and soils in the project area was based on a qualitative assessment of historical records of earthquakes and rockfall in Yosemite National Park and of the soil types that surround Tenaya Lake and the project area. This information was then used to determine if the proposed construction activities could cause impact to these resources or would result in increased potential for exposure to geological hazards in the project area.

Types of Impacts. Implementation of the action alternatives is not likely to create increased exposure to earthquakes because there are no active faults in the vicinity of the project and risks associated with earthquakes are rarely predictable or possible to quantify. Therefore, impacts related to earthquakes are not discussed further in this chapter. Impacts to soils could include soil erosion, contamination, removal, profile mixing, or compaction. Activities that would impact soils include construction of parking areas, trails, stormwater drainage structures, and picnic or campground facilities. Beneficial impacts would include removal of impervious surfaces, reduced potential for erosion by improving drainage features, improving soil quality by installing biofiltration areas, and stabilizing soils through revegetation and restoration efforts. Exposure to rockfall would be affected by construction, modification, or removal of existing parking areas and trails.

Intensity Level Definitions

Impacts to geology and soils were evaluated using the process described in the beginning of Chapter 3. Impact threshold definitions for geology and soils are as follows:

- Negligible:** Effects to geology and soils would not occur or would be so slight as to be immeasurable.
- Minor:** Effects to geology and soils would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.
- Moderate:** Effects to geology and soils would be readily apparent. Mitigation would probably be necessary to offset adverse effects.
- Major:** Effects to geology and soils would be readily apparent and would substantially change the soil or geologic characteristics of the area. Extensive mitigation would

probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment: A permanent adverse change would occur to geology and soils in a large area of Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the geology or resources supported by soils would be precluded.

Assumptions

This analysis of impacts to geology and soils is based on the assumption that the action alternatives would include standard grading and erosion control BMPs and mitigation measures to minimize or avoid impact (refer to Appendix A). BMPs would include the following:

- The construction contractor would be responsible for the implementation of soil control measures to minimize erosion of soils exposed during construction activities
- The construction contractor would be responsible for implementation of appropriate hazardous material management practices to reduce the possibility of fuel or chemical spills or releases of contaminants into the environment during construction
- The construction contractor would be responsible for the proper restoration of disturbed areas to minimize long- term effects from construction activities and any contaminated runoff. Methods would include:
 - Salvage of topsoil and vegetation using heavy equipment
 - De- compaction of soil using hand tools or heavy equipment.
 - Re- contour of natural topography using heavy equipment.
 - Replacing salvaged topsoil using hand tools or heavy equipment.
 - Controlling soil erosion using natural materials.
- The construction contractor would be responsible for educating all crew members about the potential for rockfall in the project area and for requiring the use of proper safety gear (i.e., hard hats) at all times while on the construction site

Alternative 1 (No Action)

Construction and Operation- related Impacts. Under the No Action Alternative, impacts to soils would remain the same, and exposure to geological hazards would not be affected. Current conditions in the project area are causing erosion and vegetation trampling within wetland features, along creek banks, and along trails and parking areas surrounding the lake. Parking areas along Tioga Road and trail access along the south shore of Tenaya Lake would potentially expose people to rockfall. Under this alternative, existing restoration projects, emergency repairs, and routine and periodic maintenance activities including removal of vault toilet waste, trash, and recyclables; hazard tree abatement; and snow removal would continue at current levels. Erosion

and vegetation trampling within wetlands and creek banks and exposure of visitors to rockfall would potentially continue to occur.

Impact Significance. Local, long- term, moderate, adverse impact.

Cumulative Impacts. Effects to geology and soils are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

Past actions that cumulatively impact geology and soils within the project area include the development and use of picnic and parking areas that expose soils to erosion, create surface runoff and erosive flows from impermeable surfaces, or lead to establishment of social trails. These projects increased the rates of erosion resulting from human use or exposure of visitors to hazardous rockfall areas. Continued implementation of the Yosemite National Park Fire, Vegetation, and Invasive Plant Management Plans would affect soils in the project area, but such effects would be mitigated by implementation of standard BMPs to minimize erosion and sedimentation.

Present actions that contribute to cumulative impacts to geology and soils within the project area include existing establishment and use of unmarked trails, trampling of vegetation, and parking in unpaved areas, which could result in increased soil erosion, soil contamination, or exposure to rockfall. Human activities that expose soils to accelerated rates of erosion by natural water flows would increase as a result of unplanned or unregulated use. Implementation of the Parkwide Communication Data Network and Tioga Road Rehabilitation projects would require grading, trenching, and repaving within the Tioga Road road prism adjacent to Tenaya Lake, potentially resulting in erosion, sedimentation, and discharge into the lake; these effects would be mitigated by implementation of standard BMPs.

There are no Reasonably Foreseeable Future actions that could contribute to cumulative impacts to geology and soils within the project area.

Past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would result in local, long- term, negligible adverse cumulative impacts to geology and soils, because local moderate impacts would not add appreciably to impacts from related actions within the project area.

Impairment. Alternative 1 (No Action) would result in no change from current conditions. No modifications in the project area would occur, including comprehensive restoration of areas experiencing erosion. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 1 would not impair park geological or soil resources.

Action Alternatives (2 through 5)

The following actions would be incorporated into each of the four action alternatives, and would be expected to result in similar impacts.

Trail work would create new established trails and could minimize unregulated social trails and vegetation trampling/denuding, but disturbance resulting from this work could temporarily

impact soils where footings for bridges, boardwalks, or other features are proposed. It is likely that these trails would reduce the potential for exposure to rockfall, since they could be located away from rock faces and could include cautionary signage in appropriate areas.

The relocation, improvement, and consolidation of parking and facilities at the East Beach picnic area would mostly involve disturbances of previously disturbed surfaces, but would require additional soil disturbance where the parking area would be expanded. With the proper implementation of BMPs during construction and the establishment of biofiltration areas around the parking lots, it is likely that the area would experience less erosive flow from stormwater runoff, and that vehicle- related pollutants could be captured and filtered without contaminating surrounding soils.

Removal of a water pipe extending from a well near the East Beach parking area along the southern edge of Tioga Road would require excavation, removal, and backfill of the pipe. Additionally, fire and grill pits would be removed wherever they currently exist. Although these activities would cause temporary soil disturbances, it is likely that the areas could be completely restored following construction and that erosion of soil or sedimentation resulting from stormwater runoff could be mitigated by implementation of BMPs. Removal of the fire and grill pits would also minimize risks associated with fire hazards, which in turn would reduce the risk of soil erosion associated with a wildfire.

Installation of new culverts proposed along Tioga Road as a part of parking area, trail, and roadside improvements could result in temporary disturbance of soils and exposure of soil to stormwater runoff or sedimentation if flowing water is present at the time of construction. Temporary soil impacts could be mitigated with the implementation of soil management BMPs. Additionally, it is likely that the improved drainage systems would reduce overall erosion of surrounding soils and would support drainage of stormwater to proposed biofiltration areas which could minimize pollution or contamination of soils while increasing vegetated areas, thus further stabilizing soils.

The biofiltration areas proposed along Tioga Road between Sunrise Trailhead and Murphy Creek and between Murphy Creek and East Beach would occur mainly in areas already subjected to disturbance. These areas would require temporary soil disturbance during construction, but would likely reduce erosion and potential soil contamination after vegetation is established.

Restoration would occur under each action alternative in various degrees. Restoration efforts would occur along the South Trail, along Tioga Road, at Sunrise Trailhead and Old Campground, near Murphy Creek, and at the East Beach area. The pedestrian impact on natural areas would be reduced by reorganizing pathways, and restoration would include revegetation of denuded areas and abandonment of some of the unplanned social trails that have exposed soil to erosion. Restoration would also include new bridge crossings, culverts or other drainage systems, and signage along trail segments, which could further reduce exposure and erosion of soils and educate users about staying on established trails. Exposure to rockfall could be minimized by relocation of trails and visitor use areas away from rock faces or by including cautionary signage in hazard areas.

The proposed strategic removal of existing rip- rap along the northeastern edge of the lake and replacement with vegetated patches within the existing structure would expose construction workers or the public to rockfall from the adjacent rock slope, and would likely cause temporary

soil disturbances. These impacts would be mitigated through implementation of safety and BMP measures.

Alternative 2 (Tenaya Confluence, Preferred Alternative)

Construction - related Impacts. Disturbances associated with worker foot- traffic and use of tools required for construction of expanded parking areas, biofiltration and drainage systems, reorganized trails, and restoration activities in the vicinity of Tenaya Lake would result in short-term impacts to soils and increased exposure of construction workers to rockfall in the area.

Construction of a continuous trail between Sunrise Trailhead, Murphy Creek, and East Beach along the Tioga Road corridor would likely require equipment and worker foot- traffic and result in soil disturbances, contaminated runoff, new impervious surfaces, and potential temporary increased exposure of construction crews to rockfall along Tioga Road. Safety precautions and BMPs would minimize risks associated with rockfall and discharge of pollutants into surface waters.

Expanding the parking area at Sunrise Trailhead area and reconfiguration of the Old Campground area would disturb areas that are currently vegetated, thus exposing new soils to erosion during construction. Installation of boardwalks or the boulder stepping stones along trail segments would likely require heavy equipment, worker foot- traffic, and earthwork, which would likely cause increased temporary soil disturbances. These impacts would be adverse, but would be mitigated by containing and filtering sediment- laden water and implementing other relevant BMPs.

The relocation of a portion of the Murphy Creek trail would subject formerly undisturbed areas to soil disturbance associated with trail construction. The reconfiguration and expansion of Murphy Creek West parking facilities, and restoration of Murphy Creek East would result in temporary soil impacts. Construction of the proposed pedestrian bridge, and replacement of the culvert under Tioga Road with a box culvert, would all lead to increased temporary sedimentation or erosion if water is present during these activities. These impacts would be adverse, but would be mitigated by conducting this work during the dry season or containing flows that contain construction- associated sediment.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Implementation of this alternative would produce long- term beneficial impacts as a result of reduced visitor impacts (i.e., bank and vegetation trampling, spur trails), restored and revegetated areas, bank stabilization between Tioga Road and Tenaya Lake, and improved drainage systems, which would minimize exposure and erosion of soils and would potentially reduce exposure to hazardous rockfall areas.

Increased impermeable surface footprints resulting from pavement of existing soil areas would increase runoff to adjacent soils; however, the installation of improved drainage and adjacent biofiltration systems would minimize erosion. The removal of all roadside parking along the southern side of Tioga Road between Sunrise Trailhead and Murphy Creek would result in beneficial impacts including reduced soil impacts since restoration of the areas would include revegetation, and soils would not be regularly disturbed by cars or human foot traffic. Construction of new bridges, boardwalks, and drainage features would result in a long- term

benefit to soil stability by reducing visitor trampling of riparian vegetation and by improving drainage in areas where current features have deteriorated.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area (including the Parkwide Communication Data Network Project and Tioga Road Rehabilitation Project, which would be located adjacent to Tenaya Lake) would result in local, long- term, minor to moderate adverse impacts to soils and geology, including erosion and down-gradient sedimentation. Implementation of Alternative 2 would have local, long- term, minor, beneficial impacts. The cumulative actions in combination with Alternative 2 in context of proposed restoration activities would result in net local, long- term, beneficial impacts to soils and geology within the project area.

Impairment. Alternative 2 would result in localized, short- term, moderate impacts to soils. These effects would be mitigated by the implementation of standard BMPs. The long- term effect would be beneficial, because existing conditions would be improved. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 2 would not impair park geological or soil resources.

Alternative 3 (Tenaya Ecotones)

Construction- related Impacts. Disturbances associated with worker foot- traffic and construction equipment required for restoration of impacted areas near Tenaya Lake would potentially result in short- term impacts to soils or temporary increases in the risk of exposure to rockfall.

The expansion/improvements proposed for parking at Sunrise Trailhead, Old Campground, Murphy Creek, East Beach, and along Tioga Road, and installation of improved drainage features and adjacent biofiltration areas would cause temporary soil disturbances. Restructuring and installation of parking spaces along the south side of Tioga Road between Sunrise Trailhead and Murphy Creek would result in a net decrease of approximately 18,250 square feet of impervious surface, which could lead to temporary soil instability.

The reorganization of trails, construction of foot bridges and boardwalks, and improvement of the boulder crossing at the Tenaya Creek lake outlet would potentially require heavy equipment, worker foot- traffic, and movement of rock within aquatic areas, which could result in increased soil disturbance or sedimentation if water is present at the time of construction. These impacts would be mitigated by proper implementation of BMPs related to soil stability and restoration/revegetation of disturbed areas following construction.

Construction of a continuous accessible trail between Murphy Creek and East Beach along the Tioga Road corridor would likely require equipment and worker foot- traffic and would result in temporary soil disturbances and increased exposure of construction crews to rockfall. However, these temporary impacts could be minimized by implementing relevant safety precautions and soil BMPs. The relocation of the Murphy Creek trailhead and installation of a bridge at Murphy Creek would subject formerly undisturbed areas to soil disturbance associated with trail construction. The relocation and expansion of parking facilities at Murphy Creek West and

restoration of Murphy Creek East would result in temporary soil impacts. The proposed pedestrian bridge over Murphy Creek, replacement of the culvert under Tioga Road with a vehicular bridge, and construction of a pedestrian bridge crossing at the Tenaya Lake inlet at the East Beach area would all lead to increased temporary sedimentation or erosion if water is present during these activities. These impacts would be adverse, but would be mitigated by conducting this work during the dry season, implementing appropriate BMPs, or containing flows that contain construction- associated sediment.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. The expansion/improvements proposed for parking at Sunrise Trailhead, Old Campground, Murphy Creek, East Beach, and along Tioga Road would increase impervious surfaces in the immediate areas, potentially generating increased stormwater runoff. Installation of improved drainage features and adjacent biofiltration areas would manage runoff, and reduce erosion and soil contamination in the long term. Revegetation of the southern shoulder of Tioga Road between Sunrise Trailhead and Murphy Creek, and installation of naturalistic barriers would reduce stormwater runoff, improve soil stability, and minimize soil disturbance by visitors.

Restoration activities and installation of adjacent drainage and vegetated biofiltration areas would minimize long- term soil disturbance and erosion. Restoration activities would lead to long- term benefits including soil stability and reduced erosion. Construction of new bridges and drainage features would lead to a long- term benefit to soils by reducing erosion caused by failed drainage structures or visitor trampling of streambanks and riparian vegetation.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, long- term, minor to moderate adverse impacts to soils and geology. Actions under the Parkwide Communication Data Network and Tioga Road Rehabilitation projects would result in grading, and potentially erosion and sedimentation adjacent to Tenaya Lake. Implementation of Alternative 3 would have local, long- term, minor, beneficial impacts. The cumulative actions in combination with Alternative 3 in context of proposed restoration activities would result in net local, long- term, beneficial impacts to soils and geology within the project area.

Impairment. Alternative 3 would result in localized, short- term, moderate impacts to soils. These effects would be mitigated by the implementation of standard BMPs. The long- term effect would be beneficial, because existing conditions would be improved. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 3 would not impair park geological or soil resources.

Alternative 4 (Lake Loop)

Construction- related Impacts. Improvements and expansion of the parking areas at Sunrise Trailhead, Murphy Creek, and East Beach, and construction of the new parking area and shuttle stop along Tioga Road would require temporary soil disturbance, which would result in short- term impacts to soils in the area. These impacts could be adverse if soils were not properly

restored or if increased flows from the impermeable surfaces caused contamination or additional erosion of surrounding soils. The proposed reorganization and consolidation of existing trails, the construction of boardwalks and bridges across wetlands and major inlets and outlets, and the proposed bridge across Tenaya Creek to connect to the South Trail and Sunrise High Sierra Camp/Clouds Rest Trail could result in temporary soil disturbances such as soil mixing, erosion, or contamination. These impacts could be adverse, but would be mitigated by implementing soil BMPs or mitigation measures such as spill management, soil stabilization, and restoration during and after construction. Conducting this activity during the dry season could minimize the potential for sedimentation of adjacent water sources.

The removal and restoration of the Old Campground parking loop, picnic tables, and parking-related culverts would require temporary soil disturbance. Construction and/or improvements to the accessible trail parallel Tioga Road and the South Trail would require equipment and worker foot- traffic and result in soil disturbances and potential increased exposure to rockfall. Safety precautions and BMPs could minimize the risk of exposure to rockfall, and restoration and trail improvements would likely have a long- term benefit to soils by allowing disturbed areas to re-establish vegetation, minimizing visitor trampling and foot traffic, and removing impervious surfaces.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Improvements and expansion of the parking areas at Sunrise Trailhead, Murphy Creek, and East Beach, and construction of the new parking area and shuttle stop along Tioga Road would permanently increase impermeable surfaces, which could result in long- term impacts to soils in the area. Proposed drainage and biofiltration systems would reduce the potential for soil erosion caused by stormwater runoff. The removal of all roadside parking along the southern side of Tioga Road would result in reduced exposure of visitors to hazardous rockfall and would minimize soil impacts related to vehicular and foot traffic. Restoration and trail improvements would likely have a long- term benefit to soils by allowing disturbed areas to re- establish vegetation, minimizing visitor trampling and foot traffic, and removing impervious surfaces.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, long- term, minor to moderate adverse impacts to soils and geology. Actions under the Parkwide Communication Data Network and Tioga Road Rehabilitation projects would result in grading, and potentially erosion and sedimentation adjacent to Tenaya Lake. Implementation of Alternative 4 would have local, long- term, minor, beneficial impacts. The cumulative actions in combination with Alternative 4 in context of proposed restoration activities would result in net local, long- term, beneficial impacts to soils and geology within the project area.

Impairment. Alternative 4 would result in localized, short- term, moderate impacts to soils. These effects would be mitigated by the implementation of standard BMPs. The long- term effect would be beneficial, because existing conditions would be improved. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 4 would not impair park geological or soil resources.

Alternative 5 (Immersive Nodes)

Construction- related Impacts. The reorganization, expansion, and/or restoration of parking areas at Sunrise Trailhead and Old Campground, Murphy Creek, and East Beach would require temporary soil disturbance, which could result in short- term impacts to soils in the area. These impacts could be adverse if soils were not properly restored or if increased flows from the impermeable surfaces caused contamination or additional erosion of surrounding soils.

Construction of 10 campsites north of Tioga Road at Sunrise Trailhead would cause temporary increases in soil disturbance from construction equipment and crews. Construction of designated parking areas and access points and trail improvements adjacent to Tioga Road would result in temporary soil impacts.

The proposed reorganization and consolidation of existing trails, the construction of boardwalks and bridges across wetlands and major inlets and outlets, and construction of proposed viewing areas/nodes could result in temporary soil impacts or exposure to hazardous rockfall. These impacts could be adverse, but could be mitigated through implementation of BMPs and safety measures. The relocation of the Murphy Creek trailhead and installation of a bridge at Murphy Creek would subject formerly undisturbed areas to soil disturbance associated with trail construction. Impacts associated with the continued use and management of the South Trail would be negligible, because this trail would not be significantly modified.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. The expansion of parking areas at Sunrise Trailhead and Old Campground, Murphy Creek, and East Beach would increase impervious surfaces in these areas; however, proposed drainage and biofiltration systems would reduce the potential for soil impacts resulting from stormwater runoff.

Construction of 10 campsites north of Tioga Road at Sunrise Trailhead would cause a long- term increase in visitor trampling of the area and adjacent vegetation and establishment of new social trails, which could lead to increased exposure of soils and erosion. Proposed improvements along Tioga Road could result in increased erosion from surface flows, and increased exposure to hazardous rockfall in the eastern section of Tioga Road, and further erosion or soil disturbance from increased visitor use along the rustic trail.

Overall, limited non- accessible lakewide pedestrian connectivity would likely concentrate human- related disturbances in particular areas. Construction of new bridges and drainage features would lead to a long- term benefit to soils by reducing erosion caused by failed drainage structures or visitor trampling of streambanks and riparian vegetation. The relocation of the Murphy Creek trailhead and installation of a bridge at Murphy Creek would subject formerly undisturbed areas to soil disturbance associated with increased levels of future use; however, soil impacts associated with this new trail would likely be offset by abandonment of the old trail, and updated drainage features would assist to minimize additional erosion. Impacts associated with the continued use and management of the South Trail would be negligible, because this trail would not be significantly modified.

Impact Significance. Local, long- term, moderate, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, long- term, minor to moderate adverse impacts to soils and geology. Actions under the Parkwide Communication Data Network and Tioga Road Rehabilitation projects would result in grading, and potentially erosion and sedimentation adjacent to Tenaya Lake. Implementation of Alternative 5 would have local, long- term, minor, beneficial impacts. The cumulative actions in combination with Alternative 5 in context of proposed restoration activities would result in net local, long- term, beneficial impacts to soils and geology within the project area.

Impairment. Alternative 5 would result in localized, short- term, moderate impacts to soils. These effects would be mitigated by the implementation of standard BMPs. The long- term effect would be beneficial, because existing conditions would be improved. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 5 would not impair park geological or soil resources.

HYDROLOGY, FLOODPLAINS, AND WATER QUALITY

Affected Environment

Regional Setting

Hydrology

Tenaya Lake is located within the Merced River Basin, which is part of the San Joaquin River Hydrologic Area. The basin's headwaters begin in the high elevations of the Sierra Nevadan Range and join several tributaries as they drain westward through the Yosemite and Central Valleys before joining the San Joaquin River. The main tributary is the Merced River, and several smaller streams, lakes, and ponds are present throughout the basin. In regions above 5,000 feet, precipitation generally falls as snow between the months of November and April. Peak stream flows, as a result of snowmelt, occur in May and June. Minimum river flow is observed in September and October. The basin is divided into three hydrologic segments, the upper Merced River, Yosemite Valley, and the Merced River gorge. The project area is located in the Upper Merced Watershed, within the 30,827- acre Tenaya Creek watershed (NPS 2004b).

Floodplains

Since 1916, Yosemite National Park has experienced eleven winter floods substantial enough to cause damage to property. The floodplain of the Merced River is well developed in some sections, such as in meadow areas in Yosemite Valley. In other areas the floodplain is lacking due to narrowing of canyon / valley walls, such as the gorge, or incision of the channel into moraine deposits (NPS 2004b).

Water Quality

Water quality is measured by constituents such as dissolved oxygen, suspended sediment, nutrients, and chemical pollutants. Lakes within the central Sierra Nevada contain very dilute surface waters. Specifically, within the Merced River Basin, surface waters are considered to have near- neutral pH, low alkalinity, and low nutrient concentrations, these factors make river

systems within the basin particularly sensitive to fluctuations in water components and anthropogenic disturbances (Clow et al 1996).

Water quality throughout Yosemite National Park is considered to be good and is generally above state and federal standards. The surface water quality of most park waters is considered by the State of California to be beneficial for wildlife habitat, freshwater habitat, and for canoeing, rafting, and other recreation, as indicated in the 1998 Central Valley Regional Water Quality Control Board's (RWQCB) Water Quality Control Plan (NPS 2004b). The Merced River and the Tuolumne River are not listed as impaired on the United States Environmental Protection Agency (EPA) 303(d) list of water quality limited segments in the vicinity of the facility sites (RWQCB 2006).

The NPS Freshwater Resource Management Guidelines (found in NPS- 77) require the NPS to "maintain, rehabilitate, and perpetuate the inherent integrity of water resources and aquatic ecosystems." The Clean Water Act requires the NPS to "comply with all federal, state, interstate, and local requirements" (NPS 2004c).

Project Setting

Hydrology

The project area has relatively low topographic variability because it is almost entirely located within the Tenaya Lake Basin. Topographically the project area drains west. Several hydrologic features exist within the project area. Tenaya Lake, which has a surface area of approximately 150 acres, is the most predominant feature within the project area. Cathedral Creek, a tributary of Cathedral Lake, enters the project area at its eastern- most extent and meanders through the lakeside vegetation before discharging into Tenaya Lake at East Beach. Murphy Creek, a tributary of Polly Dome Lake, enters Tenaya Lake on its northern shore via a series of large culverts under Tioga Road. The Murphy Creek alluvial fan between Tioga Road and Tenaya Lake is dynamic, and water courses may shift each year. Tenaya Creek is located on the western end of Tenaya Lake and serves as the only outlet of the lake. The creek flows westward and joins the Merced River after it passes through Tenaya Canyon.

Flow rates of the hydrologic features within the basin are highly dependent on snowpack volume and snowmelt rates. Due to the impermeability of soils within the project area, snowmelt and water transports rapidly to stream channels and other low- lying areas (Herrera Environmental Consultants 2009). Following snowmelt, the southwestern and northeastern areas surrounding the lake experience high water and flooding conditions. These waters recede later in the spring and early summer, depending on precipitation and weather conditions.

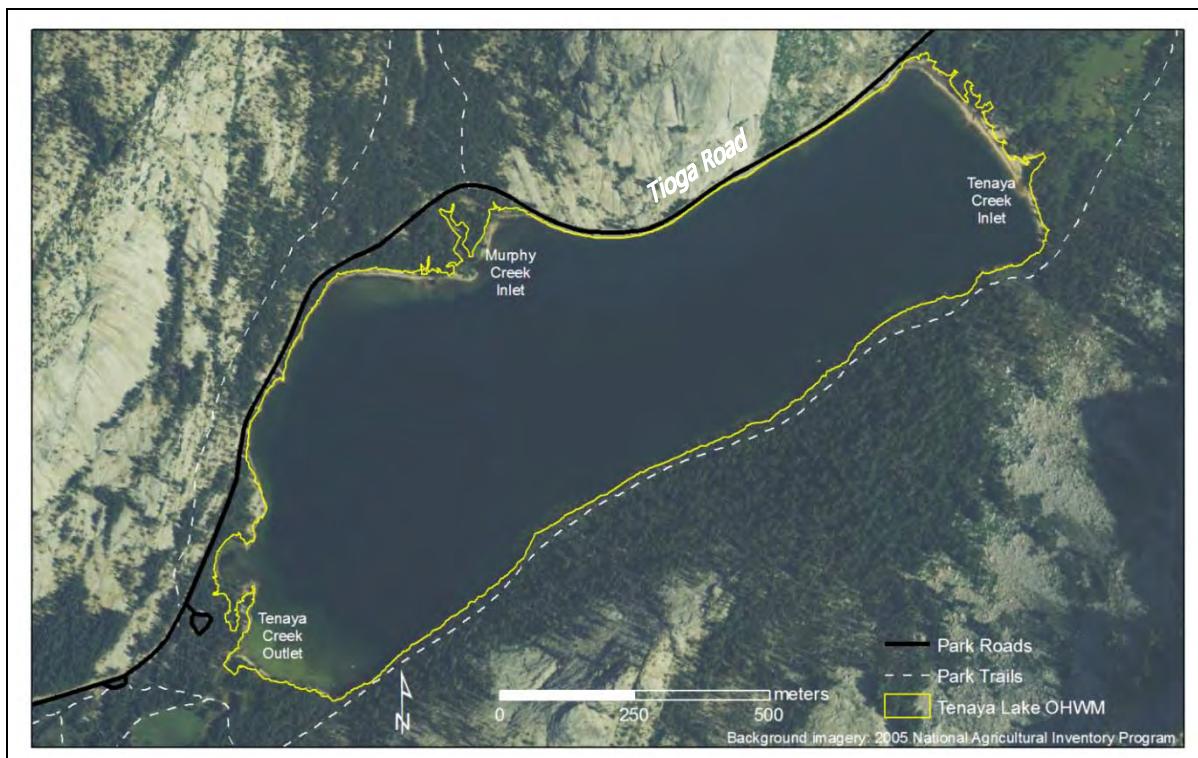
Floodplains

Tenaya Lake and the surrounding project area are part of a 100- year floodplain (Federal Emergency Management Agency [FEMA] 1990). Executive Order 11988 requires federal agencies to take action to minimize flood hazard potential and to establish flood prevention measures. The ordinary high water mark was mapped by NPS resource staff in May 2009, just following the peak lake level for the year (NPS 2009a) (refer to Figure 3- 3). Based on the results of the study, the peak water level for the year occurred on May 18, 2009. Peak water levels correspond with region- wide snowpack melting, and based on the study, corresponded closely to a two- year flood.

Water Quality

In general, water in the Merced River Watershed is noted for low conductivity (limited dissolved solids), near- neutral pH (a measure of acid or base conditions) – low alkalinity, and low nutrient concentrations. Due to low alkalinity of the stream water, the Merced River also has low buffering capability (ability to withstand changes in water chemistry due to impacts) (NPS 1994). Based on water quality data collected in Tenaya Lake, EPA water quality criteria was not exceeded, with the exception of pH (potentiometric hydrogen ion concentration). The EPA standard is between 6.5 and 8.0; the documented pH of Tenaya Lake was 6.7 (NPS 1994). Values less or greater than this range are harmful to aquatic life.

Figure 3-3. Ordinary High Water Mark at Tenaya Lake



Environmental Consequences

Methodology. The hydrology analysis was based on a qualitative assessment of surface and groundwater resources, and the effects likely caused by construction and operation of proposed plan elements and infrastructure improvements.

Types of Impacts. Types of impacts include the discharge of pollutants to surface and ground waters, including sediment, hydrocarbons, and other materials, and changes in the direction and runoff rate of water. Beneficial impacts would include protection of water resources, maintaining natural flows and conditions, improvements to water quality. Adverse impacts would include degradation of the chemical or physical properties of water resources, including natural or human-constructed structures.

Intensity Level Definitions

Impacts to hydrology were evaluated using the process described at the beginning of Chapter 3. Impact threshold definitions for hydrology are as follows:

Negligible: Hydrology and water quality would not be affected, or effects would not be measurable, and would not affect beneficial uses of receiving waters. Any effects to the hydrologic regime would be slight and short- term.

Minor: Effects to hydrology, such as an increase or decrease in surface or groundwater flow, would be detectable. Effects to water quality would be detectable and may affect beneficial uses of receiving waters. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to hydrology would be readily apparent. Effects to water quality would be readily apparent and would affect beneficial uses of receiving waters. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to hydrology would be readily apparent and would substantially change the hydrologic regime over the area. Effects to water quality would be readily apparent and would substantially change beneficial uses of surface or groundwater. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment: A permanent adverse change would occur to the hydrologic regime and water quality over a large area of Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the hydrologic resources of the park would be precluded.

Assumptions

The analysis of impacts to hydrology and water quality is based on the assumption that the proposed action would include standard procedures related to grading and erosion control and stormwater runoff. Standard best management practices would be implemented by the park, which would minimize the potential for sediment and pollutant discharge. Prior to construction, if determined necessary, NPS would file a Notice of Intent to discharge stormwater to the RWQCB and prepare and implement provisions of a Storm Water Pollution Prevention Plan (SWPPP) to control runoff from construction activities, which would be short- term in nature. The BMPs specified in the SWPPP would specify means of waste disposal, post- construction sediment and erosion control, and maintenance responsibilities. The construction contractor(s) would also be required to implement appropriate hazardous materials management practices to reduce the possibility of chemical spills or releases of contaminants, including any non- stormwater discharge to drainage channels. Post- construction permanent BMPs would also be implemented where deemed necessary, to minimize long- term effects from land disturbances and contaminated runoff.

Alternative 1 (No Action)

Construction and Operation- related Impacts. Under the No Action Alternative, impacts to hydrology (water resources and water quality) would remain the same, and no new impacts would occur. Existing impacts would continue, including erosion and subsequent sediment discharge, and untreated stormwater runoff from parking areas and Tioga Road.

Across the entire site, no evidence was found to indicate that increased stormwater flows resulting from unnatural impervious surfaces such as roadways and parking lots are creating a significant hydrologic burden on Murphy Creek, Tenaya Creek, or Tenaya Lake (Sherwood 2010). The tributary watershed on the north side of the lake is comprised largely of steep, barren rock face, which overwhelms any stormwater runoff contribution from paved surfaces. There are significant water quality impacts from development, however, including: erosive flows from concentrated stormwater runoff at culvert outlets; denuded soil in areas of uncontrolled pedestrian access; pollutant loading from roadway and parking lot stormwater runoff; and pollutant loading from an overflowing vault toilet.

In addition, natural hydrologic flow patterns are interrupted in certain places by elevated roadway, parking, and pathway surfaces. A network of culverts exists to convey flows across those physical flow barriers; there is some visual evidence that certain culverts do not have adequate hydraulic capacity to convey design flows, and concentrated discharges from culvert outlets create erosive forces during storm events. Stormwater runoff from the roadways and parking lots, which does not receive any formal water quality treatment, contains some amount of heavy metals, hydrocarbons, and other automobile- associated pollutants such as antifreeze. Denuded soil created by uncontrolled pedestrian traffic represents another significant threat to the health of Tenaya Lake by reducing the biofiltrative capacity of the landscape and exposing the soil to erosion from wind, rain, and surface water flows. Under the No Action Alternative, these impacts would continue to occur.

Impact Significance. Local, long- term, moderate, adverse impact.

Cumulative Impacts. Cumulative effects to hydrology are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

Past actions that cumulatively impact hydrology within the project area include restoration projects (Happy Isles Dam Removal, Happy Isles Fen Habitat Restoration, Happy Isles Gauging Station Bridge Removal, and Merced River Ecological Restoration at Eagle Creek). These projects have a beneficial effect on hydrology in the Merced River watershed. Construction projects including the Tunnel View Overlook Rehabilitation Project may have resulted in short- term adverse effects to hydrology, but long- term beneficial impacts. Continued implementation of the Fire and Vegetation Management Plans may include removal or trimming of trees and vegetation, which may result in localized effects to water quality, including displacement of soil.

Present actions that contribute to cumulative impacts to hydrology include operation of existing Tenaya Lake facilities and visitor use areas, as discussed above. Other projects in the area, including the Parkwide Communication Data Network Project, Yosemite Institute Environmental Education Center, and Tioga Road Rehabilitation Project would result in ground disturbance, potentially adversely affecting water quality in the watershed. Short- term effects would be mitigated by implementation of standard BMPs to protect water quality. Implementation of the Scenic Vista Management Plan would include removal of trees and roadside vegetation, resulting in erosion and sedimentation. The New Merced Wild and Scenic River Comprehensive Management Plan is expected to have a long- term beneficial effect on hydrology along the Merced River corridor.

Reasonably Foreseeable Future actions that could contribute to cumulative impacts to hydrology include the Wawona Road Maintenance Facility and Wawona Road Rehabilitation Project. These projects may have a short- term adverse effect to water quality during construction, which can be mitigated by implementation of standard BMPs.

Past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would result in local, long- term, minor adverse cumulative impacts to hydrology.

Impairment. Alternative 1 (No Action) would result in no change from current conditions. No modifications in the project area would occur, including comprehensive restoration of areas experiencing erosion, removal of hydrological barriers, and construction of biofiltration areas. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 1 would not impair park hydrological resources.

Alternative 2 (Tenaya Confluence, Preferred Alternative)

Construction - related Impacts. Ground disturbance during construction would displace soils, potentially resulting in erosion and discharge of sediment into creeks, drainages, and lake waters. Use of heavy equipment to construct parking areas, bridges, facility structures, and infrastructure may result in the discharge of hydrocarbons into surface waters. These adverse effects can be mitigated by applying standard BMPs, including delineation of project boundaries, establishment of appropriate staging areas, application of intensive erosion control measures, stabilization of loose soils and stockpiles, consistent maintenance of equipment, and adherence to spill prevention and contingency plans.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Under this alternative actions within the floodplain would include trail development (accessible and rustic), boardwalks, picnic areas, and ecological restoration. An existing restroom within the Murphy Creek area is located within the floodplain; this restroom would be removed, and a new restroom facility would be constructed outside of seasonally flooded areas. Existing trails within the Sunrise Trailhead and East Beach areas have created hydrological barriers within the floodplain; these trails would be removed and restored to facilitate natural flow of runoff and floodwaters.

Implementation of this alternative would produce long- term beneficial impacts to water quality as a result of reduced visitor impacts (i.e., bank and vegetation trampling, spur trails), restored and revegetated areas, bank stabilization between Tioga Road and Tenaya Lake, and improved drainage systems. Construction of biofiltration areas within and adjacent to parking areas and Tioga Road would filter polluted stormwater prior to discharge into waterbodies and Tenaya Lake. Trail improvements would include bridges and boardwalks to provide visitor access over creeks, waterways, and wetlands.

The existing causeway on the Sunrise High Sierra Camp/Clouds Rest Trail would be removed to restore hydrological conditions in the immediate area. A culvert would be installed under the expanded parking area to facilitate the flow of an unnamed drainage.

Proposed infrastructure improvements within the Murphy Creek area include the removal of existing culverts at the Tioga Road/Murphy Creek crossing and construction of a box culvert. Murphy Creek would flow unimpeded directly under the roadway. Pedestrian bridges would include a 15- foot bridge over small creek channel. No bridges or paths would be constructed within the alluvial fan, which would allow the braided channels to naturally shift. The bridge would be constructed to span the creek channel, and avoid obstruction of surface waters. Drainage improvements in parking areas would include culverts to facilitate stormwater flow.

Within the East Beach area, drainage improvements in the expanded parking area would include a culvert to facilitate stormwater flow towards the lake. Removal of the existing trail would allow for restoration of the wetland and hydrological conditions in this location.

Along the South Trail, existing culverts would be maintained, repaired, and replaced as needed. Hydrological conditions would remain similar to existing conditions.

The intent of proposed improvements is to maintain or restore the hydrological flow of creeks and drainages associated with Tenaya Lake. Proposed structures would require site specific engineering to ensure that the capacity, size, and location of footings do not interfere with runoff or cause additional flooding. Proposed bridge structures and boardwalks would be designed to minimize the potential for damage to these facilities from flood events. Proposed drainage facilities and infrastructure would include installation of new culverts as a part of parking area, trail, and roadside improvements. Strategies such as using vegetation and strategic boulder cluster placement to dissipate hydrologic energy will be employed to improve existing culvert performance where erosion patterns and other related issues occur. Culvert outlets would be retrofitted with energy dissipation strategies that will disperse concentrated flows and mitigate erosion at those points. The long- term effects of these improvements would be beneficial. A Floodplain Statement of Findings is included in Appendix G, per Executive Order 11988 (Floodplain Management) and the NPS Floodplain Management Guidelines 1993.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, short- term, minor adverse impacts to hydrology. Implementation of Alternative 2 would have local, long- term, minor, beneficial impacts. The cumulative actions in combination with Alternative 2 in context of proposed restoration activities would result in net local, long- term, beneficial impacts to hydrology within the project area.

Impairment. Alternative 2 would result in localized, short- term, moderate, adverse impacts to hydrology. These effects can be mitigated by the implementation of standard BMPs. The long- term effect would be beneficial, because existing conditions would be improved. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 2 would not impair park hydrological resources.

Alternative 3 (Tenaya Ecotones)

Construction - related Impacts. Ground disturbance during construction would displace soils, potentially resulting in erosion and discharge of sediment into creeks, drainages, and lake waters.

Use of heavy equipment to construct parking areas, bridges, facility structures, and infrastructure may result in the discharge of hydrocarbons into surface waters. These adverse effects can be mitigated by applying standard BMPs, including delineation of project boundaries, establishment of appropriate staging areas, application of intensive erosion control measures, stabilization of loose soils and stockpiles, consistent maintenance of equipment, and adherence to spill prevention and contingency plans.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Implementation of this alternative would produce long- term beneficial impacts as a result of reduced visitor impacts (i.e., bank and vegetation trampling, spur trails), restored and revegetated areas, bank stabilization between Tioga Road and Tenaya Lake, and improved drainage systems. Construction of biofiltration areas within and adjacent to parking areas and Tioga Road would filter polluted stormwater prior to discharge into waterbodies and Tenaya Lake. Trail improvements would include bridges and boardwalks to provide visitor access over creeks, waterways, and wetlands.

Within the Sunrise Trailhead area, the crossing through the Tenaya Creek outlet would be improved with larger boulders. The intent of the boulders would be to facilitate pedestrian access through high waters, which would require the boulders to be located in close proximity. During seasonal flooding vegetation, logs, and other natural materials may collect in between the boulders, resulting in a natural dam. This may cause floodwaters to widen in this area. The existing causeway on the Sunrise High Sierra Camp/Clouds Rest Trail would be removed to restore hydrological conditions in the immediate area.

Where Tioga Road crosses Murphy Creek, the culverted roadway would be removed, and replaced with a 25- foot combined vehicular and pedestrian bridge. Murphy Creek would flow freely under the span bridge. No bridges or paths would be constructed within the alluvial fan, which would allow the braided channels to naturally shift. North of Tioga Road, a 50- foot span bridge would be constructed over Murphy Creek.

Under this alternative, the existing, informal log crossing over the Tenaya Lake inlet would remain. Within the East Beach area, an additional culvert would be constructed to facilitate stormwater flow under the parking area towards the lake. Removal of the existing trail would allow for restoration of the wetland and hydrological conditions in this location.

Along the South Trail, existing culverts would be maintained, repaired, and replaced as needed. Hydrological conditions would remain similar to existing conditions.

The intent of proposed improvements is to maintain or restore the hydrological flow of creeks and drainages associated with Tenaya Lake. Proposed structures, including the bridge over Murphy Creek would require site specific engineering to ensure that the capacity, size, and location of footings does not interfere with runoff or cause additional flooding.

Overall, the long- term effects of these improvements would be beneficial; however, effects to hydrology at the Tenaya Creek outlet would be adverse.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, short- term, minor adverse impacts to hydrology. Implementation of Alternative 3 would have local, long- term, minor, adverse impacts as a result of structural improvements; however, proposed restoration actions would have an overall beneficial effect. The cumulative actions in combination with Alternative 3 in context of proposed restoration activities would result in net local, long- term, beneficial impacts to hydrology within the project area.

Impairment. Alternative 3 would result in localized, short- term, moderate, adverse impacts to hydrology. These effects can be mitigated by the implementation of standard BMPs. Overall, the long- term effect would be beneficial, because existing conditions would be improved. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 3 would not impair park hydrological resources.

Alternative 4 (Lake Loop)

Construction - related Impacts. Ground disturbance during construction would displace soils, potentially resulting in erosion and discharge of sediment into creeks, drainages, and lake waters. Use of heavy equipment to construct parking areas, bridges, facility structures, and infrastructure may result in the discharge of hydrocarbons into surface waters. These adverse effects can be mitigated by applying standard BMPs, including delineation of project boundaries, establishment of appropriate staging areas, application of intensive erosion control measures, stabilization of loose soils and stockpiles, consistent maintenance of equipment, and adherence to spill prevention and contingency plans.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Implementation of this alternative would produce long- term beneficial impacts as a result of reduced visitor impacts (i.e., bank and vegetation trampling, spur trails), restored and revegetated areas, bank stabilization between Tioga Road and Tenaya Lake, and improved drainage systems. Construction of biofiltration areas within and adjacent to parking areas and Tioga Road would filter polluted stormwater prior to discharge into waterbodies and Tenaya Lake. Trail improvements would include bridges and boardwalks to provide visitor access over creeks, waterways, and wetlands.

Within the Sunrise Trailhead area, an approximately 80 to 100- foot long steel and wood pedestrian bridge, with stone abutments, is proposed across the Tenaya Creek outlet. Based on the conceptual plan, the abutments would be constructed outside of the ordinary high water mark, which represents a two- year flood condition. During years of higher flooding conditions, the abutments may be within the flooded area, and may create a barrier to floodwaters. In addition, vegetation, logs, and other natural materials may collect at the abutments, resulting in a dam condition, and causing widening of the floodplain. Additional culverts would be installed at the proposed northern parking area, and expanded southern parking area to facilitate the flow of an unnamed drainage.

Where Tioga Road crosses Murphy Creek, the culverted roadway would remain. Preliminary analysis indicates that the hydraulic capacity of the four culverts is only adequate to convey flows

equal to the two- year storm without creating backwater conditions. It appears that backwater could overlap Tioga Road, threatening to wash out that section of the causeway and result in substantial erosion and sedimentation (Sherwood 2010). While current plans are conceptual, additional engineering analysis of the existing culverts is warranted. Under this alternative, these adverse effects would not be remedied. South of Tioga Road, three pedestrian bridges (15, 15, and 40 feet each) would traverse segments of Murphy Creek and an unnamed drainage. Two bridges and an accessible path would traverse the Murphy Creek fan, potentially interfering with the natural shift of waterways, or resulting in erosion surrounding bridge abutments.

In the East Beach area, a 50- foot bridge would be constructed over the Tenaya Creek inlet. An additional culvert would be constructed as part of the expanded parking area to facilitate surface water flow towards the lake. Removal of the existing trail would allow for restoration of the wetland and hydrological conditions in this location.

Along the South Trail, existing culverts would be maintained, repaired, and replaced as needed. Hydrological conditions would remain similar to existing conditions.

The intent of proposed improvements is to maintain or restore the hydrological flow of creeks and drainages associated with Tenaya Lake. While effects to water quality would be beneficial, minor adverse impacts may occur within the Murphy Creek area due to the continued use of existing culverts, potential backwater conditions during larger flood events, and the potential obstruction of hydrological flows within the Murphy fan. Proposed bridge structures would require site specific engineering to ensure that the capacity, size, and location of footings does not interfere with runoff or cause additional flooding. Adverse effects would be mitigated by engineered design and ongoing maintenance within the Murphy Creek area.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, short- term, minor adverse impacts to hydrology. Implementation of Alternative 4 would have local, long- term, minor, adverse impacts specific to the Murphy Creek area. The cumulative actions in combination with Alternative 4 in context of proposed restoration activities would result in net local, long- term, beneficial impacts to hydrology within the project area.

Impairment. Alternative 4 would result in localized, short- term, moderate, adverse impacts to hydrology. These effects can be mitigated by the implementation of standard BMPs. Long- term effects would be minor and adverse, specific to the Murphy Creek area. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 4 would not impair park hydrological resources.

Alternative 5 (Immersive Nodes)

Construction- related Impacts. Ground disturbance during construction would displace soils, potentially resulting in erosion and discharge of sediment into creeks, drainages, and lake waters. Use of heavy equipment to construct parking areas, bridges, facility structures, and infrastructure may result in the discharge of hydrocarbons into surface waters. These adverse effects can be mitigated by applying standard BMPs, including delineation of project boundaries, establishment

of appropriate staging areas, application of intensive erosion control measures, stabilization of loose soils and stockpiles, consistent maintenance of equipment, and adherence to spill prevention and contingency plans.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Implementation of this alternative would produce long- term beneficial impacts as a result of reduced visitor impacts (i.e., bank and vegetation trampling, spur trails), restored and revegetated areas, bank stabilization between Tioga Road and Tenaya Lake, and improved drainage systems. Construction of biofiltration areas within and adjacent to parking areas and Tioga Road would filter polluted stormwater prior to discharge into waterbodies and Tenaya Lake. Trail improvements would include bridges and boardwalks to provide visitor access over creeks, waterways, and wetlands.

In the Sunrise Trailhead area, 10 primitive campsites are proposed. Restrooms would be provided, which would reduce the potential for adverse water quality impacts related to operation of the facility. A common potable water source would be located near the camping area; water supply would be provided by a water truck. Visitor presence in this area may result in increased foot traffic, vegetation and soil disturbance, and subsequent erosion and sedimentation adversely affecting the unnamed creek southeast of the proposed campsites.

A 15- foot bridge would traverse a waterway east of the camping area. A 20- foot span pedestrian bridge would provide access across the creek west of the southern parking area. The existing stepping stone path across the Tenaya Creek outlet would remain. An additional culvert would be constructed as part of the expanded parking areas to facilitate water flow.

The existing culverts at the Tioga Road/Murphy Creek crossing would be removed and replaced with a 25- foot vehicular bridge. A detached pedestrian bridge would traverse Murphy Creek to the southeast of Tioga Road. Murphy Creek would flow freely beneath the bridges. Three bridges would provide access over creek channels in the Murphy Creek area south of Tioga Road. Two of these bridges, and an accessible path, would be located near the Murphy Creek inlets to Tenaya Lake. The location of these bridges may potentially interfere with the natural shift of waterways, or result in erosion surrounding bridge abutments. North of Tioga Road, a 50- foot bridge would be constructed over Murphy Creek.

In the East Beach area, no additional culverts are proposed, and the existing rustic crossing at the Tenaya Creek outlet would remain. Removal of the existing trail would allow for restoration of the wetland and hydrological conditions in this location.

Along the South Trail, existing culverts would be maintained, repaired, and replaced as needed. Hydrological conditions would remain similar to existing conditions.

The intent of proposed improvements is to maintain or restore the hydrological flow of creeks and drainages associated with Tenaya Lake. While effects to water quality would be beneficial, minor adverse impacts may occur within the Sunrise Trailhead and Murphy Creek areas, including potential obstruction of hydrological flows within the Murphy fan, and erosion around the abutments of two pedestrian bridges, and soil and vegetation disturbance resulting in sediment discharge. Proposed bridge structures would require site specific engineering to ensure that the capacity, size, and location of footings do not interfere with runoff or cause additional

flooding. Adverse effects would be mitigated by engineered design and ongoing maintenance within the Murphy Creek area.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, short- term, minor adverse impacts to hydrology. Implementation of Alternative 5 would have local, long- term, minor, adverse impacts specific to the Sunrise Trailhead and Murphy Creek areas. The cumulative actions in combination with Alternative 5 in context of proposed restoration activities would result in net local, long- term, beneficial impacts to hydrology within the project area.

Impairment. Alternative 5 would result in localized, short- term, moderate, adverse impacts to hydrology. These effects can be mitigated by the implementation of standard BMPs. Long term effects would be minor and adverse. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 5 would not impair park hydrological resources.

WETLANDS

Affected Environment

Regional Setting

Wetlands in Yosemite National Park occur in valley bottoms throughout the park, and are often hydrologically linked to nearby lakes and rivers through seasonal flooding and groundwater movement. Meadow habitats, distributed at elevations from 3,000 feet to 11,000 feet in the park, are generally wetlands, as are the riparian habitats found on the banks of Yosemite's numerous streams and rivers (NPS 2004b).

Three major types of wetland are present in the park: riverine, lacustrine, and palustrine. The wetlands vary in geographic distribution, duration of saturation, vegetation community, and overall ecosystem function. All three types of wetlands provide rich habitat for plant and animal species, delay and store seasonal floodwaters, minimize downstream erosion, and improve water quality. The following comprises a summary description (specific to habitats within the project area of the various wetland types observed (NPS 2008a, Cowardin et al. 1979):

Palustrine wetlands. These systems include all wetlands dominated by trees, shrubs, and persistent emergents. These wetlands are bounded by upland or by any of the other Cowardin system habitats. The transitions between palustrine wetlands and uplands are usually vegetated.

Riverine wetlands. These systems include all aquatic and deepwater habitats contained within a channel. This habitat class is bounded on the landward side by upland, by the channel bank, or by palustrine wetlands. In braided systems, the system is bounded by the banks forming the outer limits of the depression within which the braiding occurs.

Lacustrine wetlands. These systems include all aquatic and deepwater habitats situated in a topographic depression, lacking palustrine vegetation greater than 30% area coverage, and having

a total area exceeding 20 acres. Similar aquatic and deepwater habitats totaling less than 20 acres are also included in this system if an active wave- formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 2 m at low water. The lacustrine system is bounded by upland or palustrine habitat (persistent emergent, shrubs, or trees). Where a stream or river enters a lake, the extension of the lacustrine shoreline forms the riverine- lacustrine boundary.

The NPS Freshwater Resource Management Guidelines (found in NPS- 77) requires the NPS to “maintain, rehabilitate, and perpetuate the inherent integrity of water resources and aquatic ecosystems.” The Clean Water Act requires the NPS to comply with all federal, state, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution.

Project Setting

A total of 37 wetlands (40.44 acres) and 18 streams (8.56 acres) occur within the project area, totaling 49 acres (Herrera Environmental Consultants 2009) (refer to Figure 3- 4). The following is a description of the wetland habitats within each key area.

East Beach. The eastern portion of the project area is composed of 10 wetlands and 10 streams, including Cathedral Creek. Six wetland habitat types are located within this area: palustrine emergent; palustrine forested; palustrine shrub/scrub; riverine/intermittent; riverine/upper perennial/unconsolidated bottom; and riverine/upper perennial/unconsolidated shore (Cowardin et al 1979).

Sunrise Trailhead Old Campground. The western portion of the project area is composed of 16 wetlands and five streams, including Tenaya Creek. Six wetland habitat types are located within this area: palustrine emergent; palustrine shrub/scrub; riverine/intermittent; riverine/upper perennial/unconsolidated bottom; riverine/upper perennial/unconsolidated shore; and riverine/lower perennial/unconsolidated bottom.

Murphy Creek. The Murphy Creek portion of the project area is composed of nine wetlands, two streams, and Murphy Creek. Five wetland habitats are located within this area: palustrine emergent, palustrine shrub/scrub, riverine/lower perennial/rock bottom; riverine/lower perennial/unconsolidated bottom; and riverine/intermittent/streambed.

Environmental Consequences

Methodology. To identify potential wetlands, wetland biologists evaluated field conditions by walking through the entire project area, consisting of approximately 180 acres surrounding Tenaya Lake, excluding the south shore (Herrera Environmental Consultants 2009). For each area that appeared to have wetland characteristics, data on dominant plant species, soil conditions in test plots, and evidence of hydrologic conditions were recorded on routine wetland data forms. Adjacent upland areas were also analyzed. On the basis of the collected data, a determination of wetland or upland was made for each area examined. Wetland boundaries were delineated and test plots were marked with a Global Positioning System (GPS) unit. Potential wetland areas within the project area were identified as distinct vegetation units or closely related complexes that met either the three criteria for U.S. Army Corps of Engineers (USACE)

jurisdictional wetlands (hydrophytic vegetation, hydric soils, and wetland hydrology) or that were classified as wetlands or aquatic habitats under the Cowardin system (Cowardin et al. 1979).

The Cowardin system (1979) is used as the basis for wetland classification and protection by the NPS. The Cowardin system classifies wetlands based on the type of vegetative cover and life form, flooding regime, and substrate material. Jurisdictional wetlands are delineated and classified in accordance with Section 404 of the Clean Water Act. Cowardin wetlands include jurisdictional wetlands, but may also include certain non- vegetated sites lacking soil, if they meet specific criteria. In the Cowardin classification, wetlands have at least one of the following attributes:

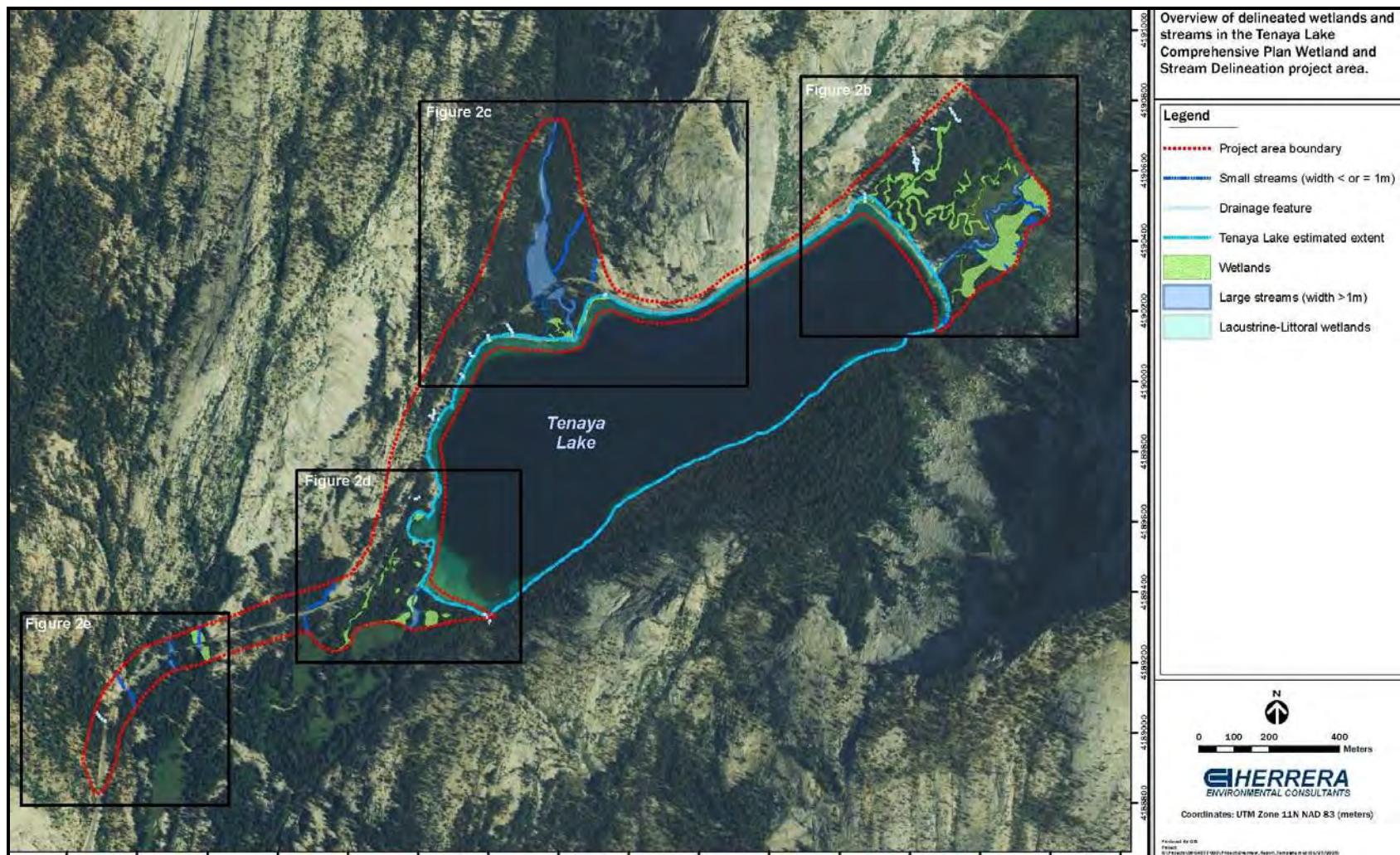
1. The land supports predominantly hydrophytes, at least periodically. Hydrophytes are plants that grow in water or on a substrate that is at least periodically deficient in oxygen because of high water content.
2. The substrate is mainly undrained hydric soils. Hydric soils are wet long enough to periodically produce anaerobic conditions.
3. The substrate is saturated with water or covered by shallow water at some time during the growing season of each year.

The Cowardin classification system is more stringent than the definition used by the USACE under the Clean Water Act. The Clean Water Act defines wetlands as "Those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3).

The Cowardin system and the USACE both use the three wetland parameters to define wetlands: hydrophytic vegetation, hydric soil, and wetland hydrology. However, Cowardin and the NPS require only one of the parameters be present to be wetland, whereas the USACE requires all three parameters be present. Therefore, the Cowardin definition identifies more habitat types as wetlands than the definition used by the Corps. The Cowardin wetland definition also recognizes that many unvegetated sites (e.g., mudflats, stream shallows, saline lakeshores, playas) or sites lacking soil (e.g., rocky shores, gravel beaches) are wetland habitats. The reason these wetlands lack hydrophytic vegetation or hydric soil is due to natural chemical or physical factors. These additional aquatic environments are still regulated by the USACE under the Section 404 permit program as other "waters of the United States."

Most wetlands on NPS lands meet all three parameters required by the USACE for a jurisdictional determination. However, naturally unvegetated areas or non- soil sites (such as beaches, stream channels, dry washes, etc.) with wetland hydrology, which may not satisfy the conventional USACE requirements for wetlands, are decisively considered wetlands by Cowardin et al. (1979) standards and are consequently subject to NPS Director's Order 77- 1. They may, however, be considered "other waters of the United States" or potentially considered "naturally problematic," and they would still be subject to USACE jurisdiction under that rationale.

Figure 3-4. Wetland and Stream Delineation Map



The wetland protection statutes that guide the NPS include Executive Order 11990, Protection of Wetlands; Director's Order 77-1, Wetland Protection, and its accompanying Procedural Manual 77-1; the Clean Water Act Sections 10 and 404; and the "no net loss" goal outlined by the White House Office on Environmental Policy in 1993. Executive Order 11990 requires agencies to minimize the destruction, loss, or degradation of wetlands. NPS's Director's Order 77-1 and Procedural Manual 77-1 provide specific procedures for carrying out Executive Order 11990. Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act authorize the USACE to grant permits for construction and disposal of dredged material in waters of the United States. This analysis considers whether proposed actions could breach applicable federal laws, regulations, or executive orders.

According to Executive Order 11990, federal agencies are required to avoid, mitigate, and follow preservation procedures with public input before proposing new construction in wetlands. Impacts to wetlands were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action.

Types of Impacts. Three primary measures were used to evaluate the intensity of impacts on wetlands: the size and type of the wetland, the integrity of the wetland, and the connectivity of the wetland to adjacent habitats. The intensity of impacts has been described as negligible, minor, moderate, or major. Negligible impacts would be imperceptible or not detectable. Minor impacts would be slightly detectable, localized within a small area and would not affect the overall viability of wetlands in the park. Moderate impacts would be apparent and have the potential to become major impacts. Major impacts would be substantial, highly noticeable and could become permanent.

Adverse impacts would degrade the size, integrity, or connectivity of wetlands. Conversely, beneficial impacts would enlarge the size or enhance the integrity and connectivity of wetlands.

Intensity Level Definitions

Impacts to wetlands were evaluated using the process described in the introduction to this chapter. NPS impact threshold definitions for wetlands are as follows:

- Negligible:** Wetlands would not be affected, or effects would not result in a loss of wetland function or value.
- Minor:** Effects to wetlands would be detectable and could result in a loss of wetland function or value. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.
- Moderate:** Effects to wetlands would be readily apparent and would result in a loss of wetland function or value. Mitigation would probably be necessary to offset adverse effects.
- Major:** Effects to wetlands would be readily apparent and would substantially change the physical characteristics or result in a significant net loss of wetland function or value. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment: A permanent adverse change would occur to wetlands in a large area of Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the wetlands or biological resources associated with this habitat would be precluded.

Alternative 1 (No Action)

Construction and Operation- related Impacts. There would be no new impacts to wetlands under Alternative 1 beyond the current existing use. Existing impacts on wetlands would continue. Visitors would continue to divert from designated trails while finding paths around areas saturated by surface water, resulting in soil compaction and tramping of wetland vegetation. The existing trail from the East Beach parking lot to the beach bisects a wetland and diverts water from the wetland, interrupting the natural hydrology.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Effects to wetlands are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

Past actions which cumulatively impact wetlands within the project area include the development of trails in the Tenaya Lake area. These activities have introduced direct and/or indirect, permanent and/or temporary impacts to wetlands. Precipitation events mobilize contaminants resulting in impacts to water quality and indirectly to wetland vegetation. Past actions in the park, which had a beneficial effect on wetlands include Cook's Meadow Ecological Restoration, Happy Isles Dam Removal and Fen Habitat Restoration, and Invasive Plant Management Plan.

Present actions which cumulatively impact wetlands within the project area include routine trampling of wetland vegetation from ongoing establishment and use of informal trails. Locations within the project area currently exhibiting the most marked impacts include the East Beach (particularly the northern portion), the trail to East Beach from the east parking area, portions of the lake shoreline adjacent to pullouts and picnic areas along Tioga Road, the beach near the Sunrise Trailhead area, and the banks of the three major waterways (Cathedral Creek, Murphy Creek, and Tenaya Creek) near these high use zones (Herrera Environmental Consultants 2009). In many of these areas, wetland vegetation has been significantly denuded through trampling, often resulting in atypical situations with respect to vegetation. Also, wetland hydrology and soils were observed to be altered in some areas through soil compaction due to trampling or filling/grading. Combined these impacts have a localized, adverse effect on wetlands at Tenaya Lake.

Present actions that could contribute to cumulative impacts to wetlands within and adjacent to the project area include the Tioga Road Rehabilitation Project and Parkwide Communication Data Network project. These projects would include grading and trenching in the roadway, which may have direct and indirect short- term adverse effects to adjacent wetlands. Mitigation would be incorporated into these actions to ensure restoration of habitat. Implementing specific aspects of the Vegetation Management Plan and Parkwide Invasive Plant Management Plan would have beneficial impacts on wetland species through invasive species management, habitat restoration, and other management strategies and techniques for improving habitat and protecting wetland vegetation. Additional actions beneficial to wetlands would include the High Elevation Aquatic

Ecological Recovery Plan, El Capitan Meadow Restoration Project, and Visitor Use and Floodplain Restoration in East Yosemite Valley. Overall, these projects would have a beneficial effect on park- wide wetlands.

Past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would result in local, long- term, minor adverse cumulative impacts to wetlands.

Impairment. Alternative 1 (No Action) would result in no change from current conditions. No modifications in the project area would occur, but no restoration of disturbed vegetation would occur either. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural and cultural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 1 would continue to result in adverse impacts, but would not impair park wetlands.

Action Alternatives (2, 3, 4 and 5)

Generally, trail work and facility and parking area construction would result in ground disturbance to existing disturbed areas, but incidental impacts to wetlands in the immediate vicinity may occur, including soil compaction, soil and vegetation disturbance, and discharge of pollutants (i.e., sediment, hydrocarbons, construction materials). These impacts can likely be avoided or minimized with monitoring and careful work in and near wetlands, consistent with standard BMPs (refer to Appendix A). Direct impacts to wetlands would include placement of boardwalk footings, installation of new culverts, removal of culverts, and restoration activities. Overall, proposed improvements and ecological restoration would result in a net benefit of improving existing wetland functions and values. Estimated impacts to wetlands and streams for each action alternative are shown in Table 3- 1.

Table 3-1. Estimated Permanent and Temporary Impacts (in acres) to Wetlands for Each Action Alternative

Alternative	Wetland Type							
	Palustrine		Riverine		Lacustrine		TOTAL	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Alternative 2 Tenaya Confluence	0.0800	0.1360	0.0424	0.0059	0.0461	0.0432	0.1685	0.1851
Alternative 3 Tenaya Ecotones	0.0936	0.1371	0.0110	0.0161	0.0104	0.0119	0.1150	0.1651
Alternative 4 Lake Loop	0.1052	0.1481	0.0005	0.0023	0.0184	0.0192	0.1241	0.1696
Alternative 5 Immersive Nodes	0.1291	0.2167	0.0163	0.0180	0.0307	0.0309	0.1761	0.2656

Installation of culverts, boardwalks, or other trail components in jurisdictional wetlands or other waters will likely require permits from USACE, the appropriate RWQCB, State Water Resources Control Board (SWRCB), and the California Department of Fish and Game (CDFG).

Constructing bridges across jurisdictional drainages will likely require a CDFG Streambed Alteration Agreement, but may not trigger USACE or RWQCB jurisdiction if all bridge components fall outside of the ordinary high water mark (OHWM) of the drainage and adjacent wetlands, which represents the jurisdictional limits for these two agencies. These requirements are applicable to all action alternatives.

Alternative 2 (Tenaya Confluence, Preferred Alternative)

Construction- related Impacts. Disturbance associated with worker foot- traffic and use of tools required for restoration of wetland and riparian habitat areas in the vicinity of Tenaya Lake may result in short- term impacts to riparian vegetation. Proposed parking area improvements at Sunrise Trailhead and East Beach would include installation of culverts within jurisdictional drainages. Construction of a continuous trail between Sunrise Trailhead, Murphy Creek, and East Beach along the Tioga Road corridor and eventually connecting to the South Trail would involve boardwalks through wetlands at either end of the lake, and would likely require equipment and worker foot- traffic. Restoration of Murphy Creek East would mainly occur in existing areas of disturbance, but could produce incidental impacts to jurisdictional wetlands and streams (other waters). Removal of the existing culverts and construction of a box culvert under Tioga Road would require direct impacts within the bed of Murphy Creek.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Upon completion of construction activities, the project will include a system of trail and use areas, which would primarily avoid sensitive wetland areas by design (i.e., location of trail, use of boardwalks over wetland areas). Visitors would be able to access the East Beach, South Trail, and backcountry trails without diverting from the designated trail, which would prevent soil compaction and vegetation trampling in sensitive areas. The hydrologic function of Murphy Creek would be improved by allowing unimpeded flow under Tioga Road. Approximately nine acres of restoration is proposed under this alternative, including wetland habitat restoration. Removal and restoration of the existing East Beach trail, and restoration of other large areas surrounding the lake would improve the quality and function of the riparian and wetland zones associated with the lake and its waterways.

Executive Order 11990 (Protection of Wetlands) and NPS Procedural Manual 77- 1: Wetland Protection provide guidelines and requirements for analysis of effects to wetlands, and preparation of Wetland Statement of Findings. Procedural Manual 77- 1 includes a list of actions that may be excepted from the Statement of Findings. Specific exceptions applicable to the Alternative 2, the Preferred Alternative include the following:

- Scenic overlooks and foot/bike trails or boardwalks, including signs, where primary purposes include public education, interpretation, or enjoyment of wetland resources and where total wetland impacts from fill placement are 0.1 acre or less (exception a)
- *Minor* stream crossing using bridges or other structures that completely span the channel and associated wetland habitat (exception d)

- Maintenance, repair, or renovation of currently serviceable facilities or structures (total of 0.1 acre or less) (exception g)
- Actions designed specifically for the purpose of *restoring* degraded natural wetland, stream, riparian, or other aquatic habitats or ecological processes – actions causing a cumulative total of up to 0.25 acres of new long- term adverse impacts on natural wetland may be allowed if they are directly associated with and necessary for the restoration (e.g., small structures or berms) (exception h).

Under Alternative 2, direct impacts to wetlands would include placement of boardwalk footings, installation of new culverts, removal of culverts, construction of biofiltration areas, and restoration activities. A pedestrian bridge at Murphy Creek, south of Tioga Road, would be constructed to span the channel. Estimated long- term, permanent impacts to wetlands and streams for each action type under Alternative 2 are shown in Table 3- 2 below.

**Table 3-2. Alternative 2 (Tenaya Confluence, Preferred Alternative)
Estimated Permanent Effects to Wetlands Based on Action Type**

Action Type	Exception Threshold (acres)	Estimated (acres)
Scenic overlooks, trails, and boardwalks	0.1	0.06
Culvert maintenance/repair	0.1	0.02
Restoration (biofiltration areas)	0.25	0.10

As shown in Table 3- 2, the proposed actions would not exceed exception thresholds identified in Procedural Manual 77- 1. In addition, approximately 9.7 acres of ecological restoration would be implemented under this alternative. The proposed action would have a long- term beneficial impact on the extent, function, and value of wetlands by relocating trails outside of wetland habitat, restoring areas compacted by existing trails, improving interpretive materials to reduce spur trails and promote stewardship, and ecological restoration.

The trail relocation and ecological restoration actions are expected to result in a net decrease in soil compaction and disturbance within wetland areas. Application of biofiltration areas would improve the water quality of stormwater and snowmelt runoff. Mitigation and best management practices (refer to Appendix A) and compliance with regulations and policies to prevent impacts to water quality, wetland function and values, and loss of property or human life would be strictly adhered to during and after construction.

Individual permits with other federal and cooperating state and local agencies will be obtained or updated as appropriate prior to construction and removal activities. No long- term adverse impacts to wetlands would occur from implementation of the proposed action. Therefore, the proposed action meets the intent of Executive Order 11990 (Protection of Wetlands) and NPS Procedural Manual 77- 1: Wetland Protection, and a Wetland Statement of Findings is not required.

Impact Significance. Local, long- term, moderate, beneficial impact.

Cumulative Impacts. Overall, past, present and reasonably foreseeable future actions would result in local, long- term, minor, beneficial impacts to wetlands while implementation of Alternative 2 would have local, short- term, moderate adverse impacts. The cumulative actions in combination with Alternative 2 in context of proposed restoration activities would result in net local, long- term, beneficial cumulative impacts to wetlands within the project area.

Impairment. Alternative 2 would result in localized, short- term, adverse changes from current conditions; however, the long- term effects would be beneficial. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 2 would not impair park wetland resources.

Alternative 3 (Tenaya Ecotones)

Construction - related Impacts. Disturbance associated with worker foot- traffic and use of tools required for restoration of wetland and riparian habitat areas in the vicinity of Tenaya Lake may result in short- term impacts to riparian vegetation. Proposed parking area improvements at Sunrise Trailhead and East Beach would include installation of culverts within jurisdictional drainages. Construction of boardwalks within the Sunrise Trailhead and East Beach areas would likely require equipment and worker foot- traffic within wetland areas. The relocation of the Murphy Creek trailhead would involve installation of a bridge at Murphy Creek. Restoration of Murphy Creek East would mainly occur in existing areas of disturbance, but could produce incidental impacts to jurisdictional wetlands and streams (other waters). Removal of the existing culverts under Tioga Road would require direct impacts within the bed of Murphy Creek. Improvements involving boulder crossing at the Tenaya Creek lake outlet would likely require heavy equipment, worker foot- traffic, and movement of rock within aquatic areas, which could result in incidental impacts to wetlands interspersed in meadow vegetation.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Upon completion of construction activities, the project will include a system of trail and use areas, which would primarily avoid sensitive wetland areas by design (i.e., location of trail, bridge over Murphy Creek, use of boardwalks over wetland areas). Visitors would be able to access the East Beach, South Trail, and backcountry trails without diverting from the designated trail, which would prevent soil compaction and vegetation trampling in sensitive areas. The hydrologic function of Murphy Creek would be improved by allowing unimpeded flow under Tioga Road. Approximately nine acres of restoration is proposed under this alternative, including wetland habitat restoration. Removal and restoration of the existing East Beach trail, and restoration of other large areas surrounding the lake would improve the quality and function of the riparian and wetland zones associated with the lake and its waterways.

Impact Significance. Local, long- term, moderate, beneficial impact.

Cumulative Impacts. Overall, past, present and reasonably foreseeable future actions would result in local, long- term, minor, beneficial impacts to wetlands while implementation of Alternative 3 would have local, short- term, moderate adverse impacts. The cumulative actions in combination with Alternative 3 in context of proposed restoration activities would result in net local, long- term, beneficial cumulative impacts to wetlands within the project area.

Impairment. Alternative 3 would result in localized, short- term, adverse changes from current conditions; however, the long- term effects would be beneficial. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 3 would not impair park wetland resources.

Alternative 4 (Lake Loop)

Construction- related Impacts. The proposed reorganization and consolidation of existing trails, the construction of boardwalks and bridges across wetlands and major inlets and outlets, and the proposed bridge across the Tenaya Lake inlet and outlet to connect to the South Trail and Sunrise High Sierra Camp/Clouds Rest Trail would result in impacts to meadow vegetation, and potentially wetland habitat. Construction of a continuous accessible trail between Sunrise Trailhead, Murphy Creek, and East Beach along the Tioga Road corridor and eventually connecting to the South Trail would involve boardwalks through wetlands at either end of the lake, and would likely require equipment and worker foot- traffic. Installation of culverts at the proposed Sunrise Trailhead and East Beach parking areas are also proposed, which could impact jurisdictional drainages.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Upon completion of construction activities, the project will include a system of trail and use areas, which would primarily avoid sensitive wetland areas by design (i.e., location of trail, bridges over Murphy Creek waterways and Tenaya Lake inlet and outlet, use of boardwalks over wetland areas). Visitors would be able to access the East Beach, South Trail, and backcountry trails without diverting from the designated trail, which would prevent soil compaction and vegetation trampling in sensitive areas. The hydrologic function of Murphy Creek would not change from current conditions. Approximately 6 acres of restoration is proposed under this alternative, including wetland habitat restoration. Removal and restoration of the existing East Beach trail, and restoration of other large areas surrounding the lake would improve the quality and function of the riparian and wetland zones associated with the lake and its waterways.

Impact Significance. Local, long- term, moderate, beneficial impact.

Cumulative Impacts. Overall, past, present and reasonably foreseeable future actions would result in local, long- term, minor, beneficial impacts to wetlands while implementation of Alternative 4 would have local, short- term, moderate adverse impacts. The cumulative actions in combination with Alternative 4 in context of proposed restoration activities would result in net local, long- term, beneficial cumulative impacts to wetlands within the project area.

Impairment. Alternative 4 would result in localized, short- term, adverse changes from current conditions; however, the long- term effects would be beneficial. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 4 would not impair park wetland resources.

Alternative 5 (Immersive Nodes)

Construction- related Impacts. The proposed reorganization and consolidation of existing trails, the construction of boardwalks and bridges across wetlands and creeks could result in incidental impacts to wetlands interspersed in meadow vegetation. The relocation of the Murphy Creek trailhead would involve installation of a bridge at Murphy Creek, north of Tioga Road. Restoration of Murphy Creek East would mainly occur in existing areas of disturbance, but could also produce incidental impacts to jurisdictional wetlands and streams (other waters). Removal of the culverts at the Tioga Road/Murphy Creek crossing would require direct disturbance within the bed of Murphy Creek.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Upon completion of construction activities, the project will include a system of trail and use areas, which would primarily avoid sensitive wetland areas by design (i.e., location of trail, bridges over Murphy Creek waterways and Tenaya Lake inlet, use of boardwalks over wetland areas). Visitors would be able to access the East Beach, South Trail, and backcountry trails without diverting from the designated trail, which would prevent soil compaction and vegetation trampling in sensitive areas. The hydrologic function of Murphy Creek would be improved by the removal of existing culverts and replacement with a bridge. Approximately nine acres of restoration is proposed under this alternative, including wetland habitat restoration. Removal and restoration of the existing East Beach trail, and restoration of other large areas surrounding the lake would improve the quality and function of the riparian and wetland zones associated with the lake and its waterways.

Impact Significance. Local, long- term, moderate, beneficial impact.

Cumulative Impacts. Overall, past, present and reasonably foreseeable future actions within the project area would result in local, long- term, moderate, adverse impacts to wetlands while implementation of Alternative 5 would have local, short- term, moderate adverse impacts. The cumulative actions in combination with Alternative 5 in context of proposed restoration activities would result in net local, long- term, beneficial cumulative impacts to wetlands within the project area.

Impairment. Alternative 5 would result in localized, short- term, adverse changes from current conditions; however, the long- term effects would be beneficial. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 5 would not impair park wetland resources.

VEGETATION

Affected Environment

Regional Setting

The Sierra Nevada, due to its many variations in elevation, latitude, topography, climate, and soils, fosters a very diverse biotic landscape. The major vegetation zones of the Sierra Nevada form readily apparent, north- south elevation bands along the axis of the Sierra Nevada. Major east-

west watersheds that dissect the Sierra Nevada into steep canyons form a secondary pattern of vegetation. Yosemite National Park supports five major vegetation zones: chaparral/oak woodland, lower montane, upper montane, sub-alpine, and alpine. Straddling the crest of the Sierra Nevada is a zone of alpine vegetation that generally occurs above 11,000 feet. Sub-alpine vegetation occurs at 8,000 to 11,000 feet above mean sea level (msl) in elevation. Below the sub-alpine zone, upper montane coniferous forests range from about 6,000 up to 10,000 feet in elevation. Lower montane mixed coniferous forests range from about 3,000 to 6,700 feet.

Project Setting

Tenaya Lake is located within the sub-alpine vegetation zone. Five distinct vegetation/habitat types are dominant within the project area: Sierra lodgepole pine forest, urban/developed, wetlands, montane shrub, and seasonally flooded meadow. A map of all habitats surrounding Tenaya Lake is included in Figure 3-5.

Sierra lodgepole pine forest is located adjacent to and within the project area. It is most extensive along the Tenaya Lake Basin and northern facing slopes. Lodgepole pine forests are common throughout California with their greatest range existing in the central and northern Sierra Nevada. Lodgepole pine is generally the dominant species within lodgepole pine communities and often occurs in pure stands. Within the project area the habitat is characterized by a dense growth of trees, including, lodgepole pine, red fir, and Sierra Juniper.

Montane shrub occurs along the northern portion of the project area, on a south-facing granitic outcropping, directly adjacent to Tioga Pass Road. Shrub is not a common species within lodgepole pine due to the often dense canopy blocking sunlight penetration. Within biotic regions of higher elevations, montane chaparral typically forms small, low-growing tufts at the base of rocks where sediment and water collect. Common species found within this habitat include bush chinquapin (*Chrysolepis sempervirens*) and pinemat manzanita (*Arctostaphylos nevadensis*).

Montane meadows occur in valleys and topographic bowls with relatively slow drainage and generally form transitional zones between aquatic environments and drier coniferous forests. Organic content is considered high in meadows due to saturated soils and organic decomposition. Meadow habitat is dominated by a mixture of grasses, sedges, and rushes and is largely determined by the saturation level of the soil.

Intermittently to seasonally flooded wetlands occur within and adjacent to the project area. Wetland habitats (see above section) occur within and adjacent to the project area near creeks, intermittent streams and the shoreline of Tenaya Lake. Wetland habitats are dominated by herbaceous species, such as dwarf lupine (*Lupinus lepidus*) and tundra aster (*Aster alpigenus*).

Urban/developed habitat occurs along Tioga Pass Road directly adjacent to Tenaya Lake. This habitat includes dirt and paved roads as well as road shoulders, empty lots, and other sparsely vegetated, disturbed areas. Sierra lodgepole pine and California red fir have established along most portions of Tioga Pass Road within the project area.

Special-status (rare, threatened, and endangered) plant species in the Tenaya Lake area are discussed in detail under the Rare, Threatened, and Endangered Species section of this EA.

Undesignated trails around campsites and cross-country routes within Yosemite National Park have increased. Trails and campsites can adversely affect soils and natural vegetation, and

inadequate trail maintenance can result in trail deterioration and accelerated damage to resources. Considering these challenges, the primary goal of vegetation management in Yosemite is to preserve, restore, and perpetuate the natural processes which act upon the native plant life as part of natural ecosystem functioning (NPS 1997a).

Environmental Consequences

Methodology. Vegetation analysis was based on a primarily qualitative assessment of the project area's vegetation and technical reports prepared in support of the project (Nelson and Colwell 2008; Herrera Environmental Consultants 2009). Project disturbance footprints were overlain with mapped vegetation data to assist with quantitative and qualitative impacts to vegetation. Impacts to vegetation were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action.

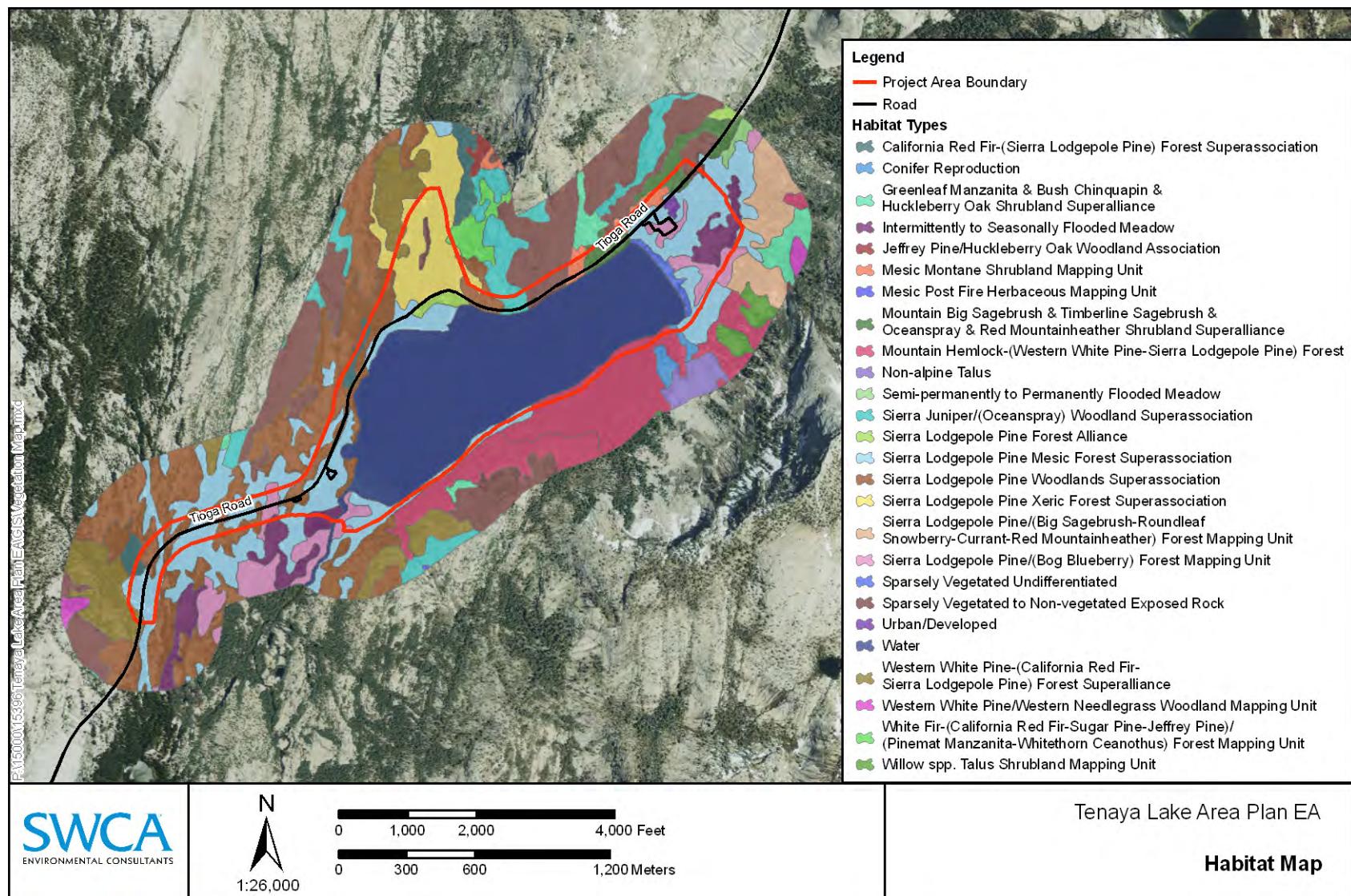
Types of Impacts. Actions that reduce the size or disrupt the continuity, and/or integrity of native plant communities are considered adverse impacts. Ground disturbance and importation of contaminated materials can adversely impact native plant communities because they provide means for non-native species to gain a foothold in the park. Standard mitigation measures, such as inspecting construction vehicles for invasive species, minimize such adverse impacts. Restoration of disturbed areas using native seeds, plants, mulch, or other stabilizing materials accelerates site recovery and reduces opportunities for exotic plants to become established. Actions that preserve and/or restore any or all of these essential qualities of native plant communities constitute beneficial impacts.

Intensity Level Definitions

Impacts to native vegetation were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for common vegetation are as follows:

- Negligible:** Native vegetation would not be affected, or effects would not be measurable.
- Minor:** Effects to native vegetation would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.
- Moderate:** Effects to native vegetation would be readily apparent. Mitigation would probably be necessary to offset adverse effects.
- Major:** Effects to native vegetation would be readily apparent and would substantially change the biological value of the native plant community. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.
- Impairment:** A permanent adverse change would occur to native vegetation communities in Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the park's vegetation would be precluded.

Figure 3-5. Tenaya Lake Vegetation Habitat Map



Alternative 1 (No Action)

Construction and Operation- related Impacts. There would be no new impacts to vegetation under Alternative 1 beyond the current existing use. Existing impacts on vegetation would continue. Trampling of vegetation would continue to occur from ongoing establishment and use of undesignated trails. Routine repair and maintenance actions, including hazard tree abatement, would continue. Areas proposed for restoration would be left unrestored. These impacts reduce the amount and quality of undisturbed vegetation.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Cumulative effects to vegetation are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

Past actions which cumulatively impact vegetation within the project area include the Invasive Plant, Fire, and Vegetation Management Plans. Implementation of these plans benefit vegetation by removal of invasive species, restoration of native vegetation, and management of fire regimes and fuel loads. Construction and operation of parking and visitor use areas, the generation of spur trails, and bank and lake edge trampling in the project area have resulted in vegetation disturbance, removal, and loss. Vehicle traffic within the project area causes deposition of petroleum products and other contaminates along paved surfaces. Precipitation events mobilize these contaminates resulting in impacts to water quality and indirectly to vegetation.

Present actions which cumulatively impact vegetation within the project area include routine maintenance of the roadway and parking areas. Implementation of the Scenic Vista Management Plan would include management, trimming, and removal of vegetation within key scenic areas on Tioga Road. Activities associated with the Tioga Road Rehabilitation and Parkwide Communication Data Network projects would include grading, trenching, and disturbance along the Tioga Road corridor, potentially resulting in trimming and disturbance of roadside vegetation. Near Tenaya Lake, maintenance work along the road shoulder may result in the removal, damage, or disturbance of vegetation. Trampling of vegetation occurs from ongoing establishment and use of informal trails. Vegetation maintenance activities, hazard tree abatement, and snow removal has negligible, long- term adverse effect. Combined these impacts have a localized, adverse effect on vegetation in the area. These projects would include implementation of BMPs to minimize impacts to vegetation.

There are no reasonably foreseeable future actions that could contribute to cumulative impacts to vegetation within and adjacent to the project area. Continued implementation of the park's Invasive Plant, Fire, and Vegetation Management Plans would have a beneficial impact on vegetation through programs such as invasive species management, and habitat restoration.

Past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would result in local, long- term, minor adverse cumulative impacts to vegetation.

Impairment. Alternative 1 (No Action) would result in no change from current conditions. No modifications in the project area would occur, including restoration of disturbed vegetation. Because no additional resources specific to the park's purpose would be affected beyond the

current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 1 would continue with adverse impacts, but would not impair park vegetation.

Action Alternatives (2 through 5)

Under each action alternative, construction and improvement of trails and the removal of the East Beach pipeline would result in ground disturbance in primarily disturbed areas, but incidental disturbance, trampling, and uprooting of vegetation may occur. These impacts can likely be avoided or minimized with monitoring and careful work in areas with sensitive vegetation. Trails would be routed through trees to avoid need for removal. Improvements, expansion, and the creation of parking and facility areas may require the removal of lodgepole pine trees. Construction fencing (or other barriers) and/or monitoring restoration activities would avoid or minimize impacts to vegetation. Estimated permanent and temporary impacts to vegetative habitats for each action alternative are shown in Table 3-3 below.

Ecological restoration would include revegetation and restoration of hydrological function and biological diversity in denuded areas. The pedestrian impact on natural areas would be reduced by reorganizing pathways and improving wayfinding in the area.

Table 3-3. Estimated Permanent and Temporary Impacts (in acres) to Vegetation for Each Action Alternative

Alternative	Vegetation											
	Lodgepole Pine ¹		Montane Shrub		Meadow		Wetlands ²		Urban / Developed		TOTAL	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Alternative 2 Tenaya Confluence	3.19	3.18	0.04	0.04	0.01	0.014	0.19	0.18	0.66	0.26	4.11	3.68
Alternative 3 Tenaya Ecotones	3.03	3.17	0.06	0.05	0	0	0.11	0.16	0.70	0.31	3.92	3.70
Alternative 4 Lake Loop	3.61	3.63	0.06	0.06	0	0	0.12	0.17	0.62	0.39	4.43	4.26
Alternative 5 Immersive Nodes	3.01	3.46	0.05	0.08	0.01	0.011	0.17	0.26	0.62	0.24	3.87	4.06

Notes:

¹ Not all impacts in lodgepole pine habitat would necessarily result in the removal of trees, as the trail would be routed through trees to avoid removal. Some trees may need to be removed for parking expansion.

² Wetland impacts are discussed in detail in the wetlands section.

Alternative 2 (Tenaya Confluence, Preferred Alternative)

Construction- related Impacts. Grading and construction activities, including the use of equipment and tools would result in the direct loss of vegetation and lodgepole pine trees within permanently affected areas, including new trails, improvements to existing trails, and expanded/improved parking areas and facility nodes at Sunrise Trailhead, Murphy Creek, and

East Beach. These actions would result in a minor reduction in available forest vegetation. Temporary impacts including compaction and disturbance of vegetation may occur as a result of equipment and worker foot traffic. Trail improvements, natural barriers, and vegetative/biofiltration buffers would require additional disturbances of understory vegetation.

The relocation of a portion of the Murphy Creek Trail north of Tioga Road would subject formerly undisturbed areas within lodgepole pine vegetation to disturbance associated with trail construction. The existing Murphy Creek trail, which is currently subjected to hiking use, would be abandoned and restored.

Disturbance associated with worker foot- traffic and use of tools required for restoration of riparian and wetland habitat areas at East Beach and Sunrise Trailhead may result in short- term impacts, including minor compaction and disturbance of wetland and riparian vegetation.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. The project design includes trail routing and incorporation of boardwalks and bridges to avoid or minimize permanent impacts to vegetation in the project area. Improved wayfinding, discouragement of spur trails, and restoration of denuded areas would remedy current adverse impacts and result in an overall benefit to vegetation.

The removal of roadside parking under Alternative 2 and establishment of a designated trail along the southern side of Tioga Road would result in beneficial impacts to vegetation along the entire linear extent of the roadway, by allowing for re- establishment of vegetation and reducing the potential for spur trails.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, long- term, minor, adverse impacts to vegetation while implementation of Alternative 2 would have local, short- term, minor adverse impacts. The cumulative actions in combination with Alternative 2 in context of proposed restoration activities would result in net local, long- term, beneficial cumulative impacts to vegetation within the project area.

Impairment. Alternative 2 would result in localized, short- term, adverse changes from current conditions. The long- term effects of re- structured trail systems and facility areas, and restoration activities would be beneficial for vegetation. There would be no adverse change to the natural integrity of the park, or discernable effects to resource values highlighted in the 1980 GMP. Therefore, Alternative 2 would not impair park vegetation.

Alternative 3 (Tenaya Ecotones)

Construction- related Impacts. Under Alternative 3, construction activities, including the use of equipment and tools would result in the direct loss of vegetation and lodgepole pine trees within permanently affected areas, including new trails, improvements to existing trails, and expanded/improved parking areas and facility nodes at Sunrise Trailhead, Murphy Creek, and East Beach. These actions would result in a minor reduction in available forest vegetation. Temporary impacts including compaction and disturbance of vegetation may occur as a result of equipment and worker foot traffic. Trail improvements, natural barriers, and vegetative/biofiltration buffers would require additional disturbances of understory vegetation.

Improvements to the boulder crossing at the Tenaya Creek lake outlet would likely require heavy equipment, worker foot- traffic, and movement of rock within aquatic areas, which could result in impacts to meadow vegetation, including compaction and disruption. The relocation of the Murphy Creek trailhead and installation of a bridge at Murphy Creek north of Tioga Road would subject formerly undisturbed areas within lodgepole pine vegetation to disturbance associated with trail construction. The existing Murphy Creek trail, which is currently subjected to hiking use, would be abandoned and restored.

Disturbance associated with worker foot- traffic and use of tools required for restoration of riparian and wetland habitat areas at East Beach and Sunrise Trailhead may result in short- term impacts, including minor compaction and disturbance of wetland and riparian vegetation.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. The project design includes trail routing and incorporation of boardwalks and bridges to avoid or minimize permanent impacts to vegetation in the project area. Improved wayfinding, discouragement of spur trails, and restoration of denuded areas would remedy current adverse impacts and result in an overall benefit to vegetation. Use of the proposed trail adjacent to designated parking along the southern side of Tioga Road would minimize the potential for vegetation trampling.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, long- term, minor, adverse impacts to vegetation while implementation of Alternative 3 would have local, short- term, minor adverse impacts. The cumulative actions in combination with Alternative 3 in context of proposed restoration activities would result in net local, long- term, beneficial cumulative impacts to vegetation within the project area.

Impairment. Alternative 3 would result in localized, short- term, adverse changes from current conditions. The long- term effects of re- structured trail systems and facility areas, and restoration activities would be beneficial for vegetation. There would be no adverse change to the natural integrity of the park, or discernable effects to resource values highlighted in the 1980 GMP. Therefore, Alternative 3 would not impair park vegetation.

Alternative 4 (Lake Loop)

Construction- related Impacts. Grading and construction activities associated with trail, parking area, and facility node development and improvements would result in direct impacts to vegetation, including removal of lodgepole pine trees, and loss, compaction and disturbance of understory vegetation. Construction of bridges within the Murphy Creek fan and the Tenaya Creek lake outlet would likely require heavy equipment, and worker foot- traffic, which could result in impacts to meadow and understory vegetation, including compaction and disruption, and loss of vegetation within the bridge abutment footprints.

Restoration activities, including removal of the Old Campground parking loop, picnic tables, and parking- related culverts would result in short- term disturbance to lodgepole pine habitat. Wetland, riparian, and understory habitat restoration would result in short- term impacts to vegetation, including minor compaction and disturbance of wetland and riparian vegetation.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. The project design includes trail routing and incorporation of boardwalks and bridges to avoid or minimize permanent impacts to vegetation in the project area. Improved wayfinding, discouragement of spur trails, and restoration of denuded areas would remedy current adverse impacts and result in an overall benefit to vegetation.

The removal of roadside parking under Alternative 4 and establishment of a designated trail along the southern side of Tioga Road would result in beneficial impacts to vegetation along the entire linear extent of the roadway, by allowing for re- establishment of vegetation and reducing the potential for spur trails.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, long- term, minor, adverse impacts to vegetation while implementation of Alternative 4 would have local, short- term, minor adverse impacts. The cumulative actions in combination with Alternative 4 in context of proposed restoration activities would result in net local, long- term, beneficial cumulative impacts to vegetation within the project area.

Impairment. Alternative 4 would result in localized, short- term, adverse changes from current conditions. The long- term effects of re- structured trail systems and facility areas, and restoration activities would be beneficial for vegetation. There would be no adverse change to the natural integrity of the park, or discernable effects to resource values highlighted in the 1980 GMP. Therefore, Alternative 4 would not impair park vegetation.

Alternative 5 (Immersive Nodes)

Construction- related Impacts. Grading and construction activities associated with trail, parking area, and facility node development would result in direct impacts to vegetation, including removal of lodgepole pine trees, and loss, compaction and disturbance of understory vegetation. Under this alternative, the improved East Beach parking area would be located roughly within the footprint of the existing parking area, resulting in minimal disturbance to the adjacent lodgepole pine habitat. Establishment of designated parking along the southern edge of Tioga Road between Sunrise Trailhead and Murphy Creek would result in the temporary disturbance of adjacent roadside vegetation, including lodgepole pine understory habitat.

Improvements to the boulder crossing at the Tenaya Creek lake outlet, and re- routing and construction of a bridge on the Murphy Creek Trail north of Tioga Road, and restoration activities would result in minor compaction and disturbance of wetland and riparian vegetation.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. The project design includes trail routing and incorporation of boardwalks and bridges to avoid or minimize permanent impacts to vegetation in the project area. Improved wayfinding, discouragement of spur trails, and restoration of denuded areas would remedy current adverse impacts and result in an overall benefit to vegetation. Use of the proposed trail adjacent to designated parking along the southern side of Tioga Road would minimize the potential for vegetation trampling.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, long- term, minor, adverse impacts to vegetation while implementation of Alternative 5 would have local, short- term, minor adverse impacts. The cumulative actions in combination with Alternative 5 in context of proposed restoration activities would result in net local, long- term, beneficial cumulative impacts to vegetation within the project area.

Impairment. Alternative 5 would result in localized, short- term, adverse changes from current conditions. The long- term effects of re- structured trail systems and facility areas, and restoration activities would be beneficial for vegetation. There would be no adverse change to the natural integrity of the park, or discernable effects to resource values highlighted in the 1980 GMP. Therefore, Alternative 5 would not impair park vegetation.

WILDLIFE

Affected Environment

Regional Setting

Wildlife in Yosemite National Park is diverse and abundant, reflecting the wide range of Sierra Nevada habitats. Yosemite National Park supports over 250 species of vertebrates, which include fish, amphibians, reptiles, birds, and mammals (NPS 2004d). This high diversity of species is also the result of habitats in Yosemite that are largely intact, compared to areas outside the park where various human activities have resulted in habitat degradation or destruction. Concentrated areas of human use in the park have affected wildlife and their habitats, especially in eastern Yosemite Valley, reducing use of these areas by wildlife. Montane meadow and riparian areas within Yosemite National Park are highly productive, structurally diverse habitats that support a high level of species diversity and provide important linkages between terrestrial and aquatic communities.

Many of Yosemite's habitats are dominated by mixed coniferous forests of ponderosa pine, sugar pine, incense cedar, white fir, and Douglas fir, and a few stands of giant sequoia, interspersed by areas of black oak and canyon live oak. A relatively high diversity of wildlife species are supported by these habitats, due to relatively mild, lower- elevation climate, and the mixture of habitat types and plant species. Wildlife species typically found in these habitats include black bear, mule deer, bobcat, gray fox, mountain kingsnake, Gilbert's skink, white- headed woodpecker, brown creeper, spotted owl, various other birds, and a wide variety of bat species. Various birds and raptors (birds of prey) forage in forest habitat and nest in trees. Loose bark on trees and large snags can provide roost sites for bats.

Upon gaining in elevation, coniferous forests become purer stands of red fir, western white pine, Jeffrey pine, and lodgepole pine. Fewer wildlife species tend to be found in these habitats, due to their higher elevation, and reduced vegetative complexity (i.e., diversity of habitat types and vegetative species). Species likely to be found include golden- mantled ground squirrel, chickaree, marten, Steller's jay, hermit thrush, and northern goshawk. Reptiles are not common, but may include rubber boa, western fence lizard, and alligator lizard.

As the landscape rises, trees become smaller and sparser, with stands broken by areas of exposed granite. These include lodgepole pine, whitebark pine, and mountain hemlock that, at highest elevations, give way to vast expanses of granite as treeline is reached. The climate in these habitats is harsh and the growing season is short, but species such as pika, yellow-bellied marmot, white-tailed hare, Clark's nutcracker, and rosy finch are adapted to these conditions. Also, the treeless alpine habitats are the areas favored by Sierra Nevada bighorn sheep. This species, however, is now found in the Yosemite area only around Tioga Pass, where a small, reintroduced population exists.

At a variety of elevations, meadows provide important, productive habitat for wildlife. Animals feed on the green grasses and use the flowing and standing water found in many meadows. Predators, in turn, are attracted to these areas. The interface between meadow and forest is also favored by many animal species because of the proximity of open areas for foraging, and cover for protection. Species that are highly dependent upon meadow habitat include Yosemite toad, raptors, and mule deer. Wet meadows, lake margins, streams, and other aquatic areas support populations of aquatic invertebrates, amphibians, foraging bird species, and mammals commonly found near water such as skunks.

Project Setting

The elevation of Tenaya Lake is approximately 8,150 feet. The project area lies within a narrow valley surrounded by Sierra lodgepole pine forest; several creeks, wetlands, and intermittent streams; a seasonally flooded meadow and exposed bedrock. Nuts produced by shrubs, such as the bush chinquapin, are often harvested by squirrels and bears as soon as they ripen. Several avian and mammalian species feed on the various seeds and berries dispensed by the dense canopy of a lodge pole pine forest, such species include Cassin's finch, pine grosbeak, red crossbills, and chickaree. The blue grouse primarily feeds on needles of pines and firs but will also forage on berries and nuts. Predatory birds such as hawks and owls may rest or take refuge in the stands of lodge pole pine. Common predatory avian species found within the lodge pole pine forest include great horned owl, and the northern goshawk. Wetlands and other seasonally flooded habitats such within the project area provide breeding habitat for amphibians, such as western toads and Pacific tree frogs. Greenery surrounding streams and wetlands provides important sources of vegetation in summer for herbivores such as mule deer.

Special- status (rare, threatened, and endangered) wildlife species in the Tenaya Lake area are discussed in detail in the following Rare, Threatened, and Endangered Species section of this EA.

Environmental Consequences

Methodology. Wildlife analysis was based on a qualitative assessment of wildlife that could occur in the project area and the effects anticipated as a result of project implementation. Impacts to wildlife were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action.

Types of Impacts. Adverse impacts include those that directly remove, relocate, or affect wildlife or wildlife habitat or that affect wildlife or wildlife habitat through increased disturbance.

Beneficial impacts result from restoration of wildlife habitat (size, continuity, or integrity). Noise

impacts can adversely affect wildlife foraging, mating, and nesting behavior. Construction activity can also directly interfere with normal animal movement patterns.

Intensity Level Definitions

Impacts to general wildlife were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for wildlife are as follows:

- Negligible:** Wildlife would not be affected, or effects would not be measurable.
- Minor:** Effects to wildlife, such as displacement of nests or dens or obstruction of corridors, would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.
- Moderate:** Effects to wildlife would be readily apparent. Mitigation would probably be necessary to offset adverse effects.
- Major:** Effects to wildlife would be readily apparent and would substantially change the wildlife populations in the area. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.
- Impairment:** A permanent adverse change would occur to wildlife in Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the park's wildlife would be precluded.

Alternative 1 (No Action)

Construction and Operation- related Impacts. There would be no new impacts to wildlife under Alternative 1. Existing impacts to wildlife would continue under the No Action Alternative. Routine repair and maintenance actions, including removal of vault toilet waste, trash, and recyclables; hazard tree abatement; and snow removal, would continue. Impacts to wildlife would continue to include impacts to vegetation resulting from human use of trails in the vicinity of the lake, removal of hazard trees, availability of human food and trash, and noise and visual disturbance associated with human activities and vehicles. These impacts reduce the amount and quality of areas available to species that require undisturbed habitat for essential activities such as nesting, roosting/resting, and foraging. The majority of wildlife that occur in close proximity to Tenaya Lake are likely at least somewhat habituated to human disturbance, and some species may be attracted to the area to forage on food waste and trash. Some wildlife mortality also results from vehicle travel and parking along Tioga Road.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Effects to wildlife are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

Past actions that cumulatively impact wildlife within the project area include implementation of the Invasive Plan, Fire, and Vegetation Management Plans. Implementing specific aspects of these plans would have beneficial impacts on wildlife through invasive species management, habitat restoration, and other management strategies and techniques for improving habitat. Short- term

adverse effects would include loss of bat and bird roosting and nesting habitat due to hazardous tree removal and fuel load reductions. Habitat was fragmented during construction of Tioga Road, and parking areas for Tenaya Lake. Visitor use and associated noise and disturbance at Tenaya Lake have likely historically impacted formerly undisturbed plant and wildlife species that are sensitive to disturbances.

Present actions that contribute to cumulative impacts to wildlife within the project area include existing trail use and hazard tree abatement, which could result in the loss of some nesting and roosting trees. However, these impacts are slight due to the marginal habitat of the relatively few trees that would require removal due to hazard concerns. Implementation of the Scenic Vista Management Plan would result in modifications to habitat adjacent to roadways, including tree trimming or removal. Assessment of these trees for nesting birds and roosting bats by park biologists would minimize these negative impacts. Projects that would have a short- term adverse effect on wildlife in the area include the Tioga Road Rehabilitation and Parkwide Communication Data Network projects. Construction activities would generate noise and increased human presence along the Tioga Road corridor, potentially displacing wildlife in the immediate area. Implementation of the High Elevation Aquatic Ecological Recovery Plan would have a beneficial effect on aquatic species in the area.

Reasonably Foreseeable Future actions that could contribute to cumulative impacts to wildlife within the project area include continued implementation of the Invasive Plant, Fire, and Vegetation Management Plans.

Past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would result in local, short- term, minor to moderate adverse cumulative impacts to wildlife.

Impairment. Alternative 1 (No Action) would result in no change from current conditions. No modifications in the project area would occur, including restoration of disturbed habitats. No additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural and cultural integrity of the park, nor effect to resource value highlighted in the 1980 GMP; therefore, Alternative 1 would not impair park wildlife resources.

Alternatives 2, 3, and 4

Proposed improvements would be located within similar areas and habitat types; therefore, implementation of Alternatives 2, 3, and 4 would result in similar construction and operation-related effects to wildlife. Alternative 5 may result in additional impacts to wildlife, due to operation of campsites; therefore, a specific analysis of Alternative 5 is provided.

Construction- related Impacts. Trail alignments would be routed through lodgepole pine trees to avoid the need for tree removal; however, ground disturbance, use of equipment, and increased human activity may have an adverse effect on nesting bird and/or roosting bat behaviors in the immediate vicinity, as well as potential direct disturbances to ground- dwelling species. Tree removal to accommodate parking area expansions and improvements would result in adverse effects if conducted during the nesting bird season (typically March 15 through August 31) and/or bat maternity roosting season (typically April 15 through August 31). Work adjacent to Tioga Road, including removal of roadside parking, improvement of designated roadside parking

(Alternatives 2 and 3), trail development and improvements, and construction of biofiltration areas would primarily affect disturbed areas; however, this activity could impact nesting bird and/or bat maternity roosting behaviors in overhead canopy or adjacent trees. These impacts can be mitigated by implementing standard BMPs, including: conducting these activities outside of the nesting bird and/or bat maternity roosting seasons, conducting pre- construction surveys during those seasons to confirm presence or absence of species, or monitoring these activities during those seasons to determine if these work activities are adversely affecting nesting birds or roosting bats.

Removal of a water pipe extending from a well near the East Beach parking area along the southern edge of Tioga Road would require excavation, removal, and backfill of the pipe. Although this activity would occur along the disturbed road edge, wildlife (especially small mammals) could become trapped in the trenches during the excavation of the pipe. This threat could be mitigated by building escape ramps into the side of the trenches.

Removal of Tioga Road/Murphy Creek culverts (Alternatives 2 and 3), installation of new culverts within parking areas, and construction of boardwalks and bridges in the Sunrise Trailhead, Murphy Creek, and East Beach areas could result in injury or mortality to sensitive aquatic life (particularly amphibians), if water is present in drainages or swales during these activities.

Improvement of the boulder crossing (Alternative 3) or construction of a bridge (Alternative 4) within the Tenaya Creek outlet would require work within wetland and meadow habitat, including use of heavy equipment. The proposed strategic removal of existing rock- slope along the northeastern edge of the lake and replacement with vegetated patches within the existing structure would likely require heavy equipment heavy equipment, worker foot- traffic, and movement of rock within and adjacent to aquatic areas. These actions could result in injury or mortality to aquatic life such as amphibians, and other wildlife that inhabit the lake and adjacent aquatic habitat. These impacts could be adverse, but can be mitigated by implementing standard BMPs, including conducting pre- construction surveys for sensitive aquatic life to confirm the presence or absence of species (refer to Appendix A). Scheduling culvert removal during the summer, when water levels are low, and outside of the amphibian breeding season would further reduce the potential for encountering aquatic species.

Disturbances associated with worker foot- traffic and use of tools required for restoration of understory, riparian, and wetland habitat areas and repair of the South Trail may result in short- term impacts to wildlife utilizing these habitats. While there may be a minor potential for impacts to amphibian and terrestrial species dispersing from aquatic areas, this can be mitigated with periodic monitoring and relocation of these species if necessary to avoid injury or mortality.

Impact Significance. Local, short- term, minor to moderate, adverse impact.

Operation- related Impacts. Wildlife species in the Tenaya Lake area are generally accustomed to vehicular traffic and the presence of visitors. Implementation of habitat restoration, construction of biofiltration areas, and the use of bridges and boardwalks within sensitive areas would improve habitat characteristics for terrestrial and aquatic species. The continued use of bear- proof storage bins, trash, and recycling containers would reduce the potential risk of interaction, and modifications to behavior. Overall, proposed improvements to habitat characteristics under Alternatives 2, 3, and 4 would result in a beneficial long- term effect to wildlife.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, long- term, minor to moderate, adverse impacts to wildlife.

Implementation of Alternatives 2, 3, and 4 would have local, short- term, minor to moderate adverse impacts to wildlife; long- term effects would be beneficial. The cumulative actions in combination with Alternatives 2, 3, and 4 in context of proposed restoration activities would result in net local, long- term, beneficial cumulative impacts to wildlife within the project area.

Impairment. Alternatives 2, 3, and 4 would result in localized, short- term, adverse changes from current conditions. The long- term effects would be beneficial. Because no resources specific to the park's purpose would be discernibly affected, and there would be no change to the natural and cultural integrity of the park, nor effects to resource values highlighted in the 1980 GMP, Alternatives 2, 3, and 4 would not impair park wildlife.

Alternative 5 (Immersive Nodes)

Construction- related Impacts. Trail alignments would be routed through lodgepole pine trees to avoid the need for tree removal; however, ground disturbance, use of equipment, and increased human activity may have an adverse effect on nesting bird and/or roosting bat behaviors in the immediate vicinity, as well as potential direct disturbances to ground- dwelling species. Tree removal to accommodate parking area expansions and improvements would result in adverse effects if conducted during the nesting bird season (typically March 15 through August 31) and/or bat maternity roosting season (typically April 15 through August 31). Work adjacent to Tioga Road, trail development and improvements, and construction of biofiltration areas would primarily affect disturbed areas; however, this activity could impact nesting bird and/or bat maternity roosting behaviors in overhead canopy or adjacent trees. These impacts can be mitigated by implementing standard BMPs, including: conducting these activities outside of the nesting bird and/or bat maternity roosting seasons, conducting pre- construction surveys during those seasons to confirm presence or absence of species, or monitoring these activities during those seasons to determine if these work activities are adversely affecting nesting birds or roosting bats.

Removal of a water pipe extending from a well near the East Beach parking area along the southern edge of Tioga Road would require excavation, removal, and backfill of the pipe. Although this activity would occur along the disturbed road edge, wildlife (especially small mammals) could become trapped in the trenches during the excavation of the pipe. This threat could be mitigated by building escape ramps into the side of the trenches.

Removal of Tioga Road/Murphy Creek culverts, installation of new culverts within parking areas, and construction of boardwalks and bridges in the Sunrise Trailhead, Murphy Creek, and East Beach areas could result in injury or mortality to sensitive aquatic life (particularly amphibians), if water is present in drainages or swales during these activities. The proposed strategic removal of existing rock- slope along the northeastern edge of the lake and replacement with vegetated patches within the existing structure would likely require heavy equipment heavy equipment, worker foot- traffic, and movement of rock within and adjacent to aquatic areas. These actions could result in injury or mortality to aquatic life such as amphibians, and other wildlife that inhabit the lake and adjacent aquatic habitat. These impacts could be adverse, but can be mitigated by implementing standard BMPs, including conducting pre- construction surveys for

sensitive aquatic life to confirm presence or absence of species (refer to Appendix A). Scheduling culvert removal during the summer, when water levels are low, and outside of the amphibian breeding season would further reduce the potential for encountering aquatic species.

Disturbances associated with worker foot- traffic and use of tools required for restoration of understory, riparian, and wetland habitat areas may result in short- term impacts to wildlife utilizing these habitats. While there may be a minor potential for impacts to amphibian and terrestrial species dispersing from aquatic areas, this can be mitigated with periodic monitoring and relocation of these species if necessary to avoid injury or mortality.

Impact Significance. Local, short- term, minor to moderate, adverse impact.

Operation- related Impacts. Implementation of habitat restoration, construction of biofiltration areas, and the use of bridges and boardwalks within sensitive areas would improve habitat characteristics for terrestrial and aquatic species, resulting in a beneficial long- term effect.

Operation of the proposed camping area on the northern side of Tioga Road would introduce a new night- time use in the immediate area. Human presence, including noise, use of vehicles, and the effects of food preparation (i.e., storage, scents, trash production) may affect wildlife behavior in the area. Some night- time species may avoid the campsite, and relocate to other similar habitats in the area. Scavenger and bear species may be attracted by the scent of food and trash. The proposed project includes trash and recycling containers, and bear- proof storage bins; in addition, existing park interpretive and informational materials emphasize safe practices to reduce the potential for adverse or harmful interactions between visitors and wildlife. While existing methods are effective, consistent control of visitor practices is not feasible; therefore, potential effects would be minor and adverse.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would result in local, long- term, minor to moderate, adverse impacts to wildlife.

Implementation of Alternative 5 would have local, short and long- term, minor to adverse impacts to wildlife. The cumulative actions in combination with Alternatives 5 would result in local, long- term, minor adverse cumulative impacts to wildlife within the project area.

Impairment. Alternative 5 would result in localized, minor changes from current conditions. Because no resources specific to the park's purpose would be discernibly affected, and there would be no change to the natural and cultural integrity of the park, nor effects to resource values highlighted in the 1980 GMP, Alternative 5 would not impair park wildlife.

RARE, THREATENED, AND ENDANGERED SPECIES

Affected Environment

Section 7(a)(2) of the Federal Endangered Species Act of 1973 (ESA), as amended, requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure their actions will not jeopardize the continued existence of any federally listed or proposed threatened or endangered species, or adversely modify designated or proposed critical habitat (ESA Section 7 (a) (2)). If listed species or their critical habitat are present, the federal agency must determine if

the action will have “no effect,” “may effect, not likely to adversely affect,” or “may effect, likely to adversely affect” those species or their habitat. In addition, the CEQ regulations for implementing NEPA require agencies to consider whether the action would violate federal, state, or local laws or requirements imposed for the protection of the environment. For this reason, species listed under California Endangered Species Act or afforded “special status” (i.e., considered rare or sensitive) by the California Department of Fish and Game (CDFG) are included in this analysis. Also included are impacts to “park rare” species. Park rare species are those that have no federal or state status, but have extremely limited distributions in the park and may represent relict population from past climatic or topographic conditions, may be at the extreme extent for their range in the park, or represent changes in species genetics. These species are all considered “special- status species.”

Regional Setting

The Sierra Nevada is rich in plant diversity. Of California’s 7,000 plant species, about 50% occur in the Sierra Nevada. Of these, more than 400 are found only in the Sierra Nevada, and 200 are rare. As a group, Sierra Nevada plants are most at risk where habitat has been reduced or altered, or where restricted to rare local geologic formations and their derived unique soils.

The Sierra Nevada contains 33 bird species, 19 mammals, 13 amphibians, and four reptiles considered at risk and afforded special- status (i.e., through listing as candidate to list of endangered, threatened, endangered, or of special concern by the state or federal government), which is roughly 17% of the Sierra Nevada terrestrial fauna (University of California [UC], Davis 1996). At least three species have been extirpated from the mountain range since the time of Euro- American settlement: Bell’s vireo (*Vireo bellii*), California condor (*Gymnogyps californianus*), and grizzly bear (*Ursus arctos*). Population declines can be attributed to several factors in varying proportions, including habitat loss, disturbance or hunting by humans, environmental toxins, climatic change, and competition from non- native species. However, one of the most charismatic species associated with the park, the bald eagle (*Haliaeetus leucocephalus*) is showing signs of recovery. The bald eagle was formally delisted on August 8, 2007, but remains a State of California Endangered species.

Yosemite National Park supports 109 special- status plant species, which are designated as either a federal species of concern, listed as rare by the State of California, or listed by the park as rare. Many of these species are considered rare due to extremely limited distribution, representation of relic populations from past climatic or topographic conditions, presence at the extreme extent of their range in the park, or representation of changes in species genetics.

Project Setting

A search of the California Natural Diversity Database (CNDDB) was centered on the Tenaya Lake USGS quadrangle and surrounding nine quadrangles to develop a list of potential special- status plant and wildlife species to be evaluated for potential for occurrence. An official species list of the Tenaya Lake USGS quadrangle was also obtained from USFWS. Appendix B includes the CNDDB and USFWS lists of species evaluated for potential occurrence. The lists of plant and wildlife species considered included species that are listed as threatened or endangered under the Federal and/or California ESA, candidates or proposed for listing, those afforded special protection by the state of California (i.e., species of special concern or fully protected) or by the

California Native Plant Society (CNPS) (i.e., rare plants), or that are otherwise considered a special- status species based on input from NPS Yosemite Wildlife Management Branch.

A total of 11 special- status plant species and 19 special- status wildlife species were evaluated to determine their potential for occurrence within the study area. The evaluation considered the distribution and abundance of each species, habitat requirements of each species, habitat characteristics of each facility site, and existing human disturbance at each site. Species were eliminated from consideration based on the existing conditions within the study area and the lack of suitable habitat for the particular species. Species that warranted further investigation are included in Tables 3- 4 and 3- 5. Discussions of special- status species with documented occurrences in or near the study area or are otherwise anticipated to have a likelihood of occurrence follow Tables 3- 4 and 3- 5.

Special- status Plant Species

A botanical study conducted at Tenaya Lake and other areas in 2008 considered the following special- status plant species: American awlwort (*Subularia aquatica* ssp. *americana*), Center Basin rush (*Juncus hemiendytes* var. *abjectus*), mountain bent grass (*Agrostis humilis*), ribbonleaf pondweed (*Potamogeton epihydrus* ssp. *nuttallii*), slender lupine (*Lupinus gracilentus*), and Yosemite bulrush (*Trichophorum clementis*). Based on a review of the CNDB, an additional five special- status plant species have been documented in the vicinity of the project area (CNDB 2009) (refer to Table 3- 4). None of the species are listed as endangered or threatened under Federal and/or California ESA.

A survey of the Tenaya Lake area occurred on August 11, 2008 by a group of eleven staff and volunteer botanists led by Dr. Alison Colwell (Nelson and Colwell 2008). The group then visited known occurrences of special- status plants to build familiarity. Teams starting at opposite ends of the Lake (west and east) spread out, with members walking in parallel 20 meters apart to cover the lake edges and forest. When rare plants were encountered, their locations were mapped with GPS units. All plot data were stored in the Yosemite California Native Species Field Survey database.

Table 3-4. Special-status Plant Species Potentially Present

Species Name	Status	Habitat Preference	Flowering Period	Documented within the Study Area
American awlwort (<i>Subularia aquatica</i> ssp. <i>americana</i>)	CNPS 4.3	Shallowly inundated to dry mud flats in montane meadows in full sun to part shade of nearby conifers; otherwise sparsely vegetated areas; 2,000 to 3,100 m.	July - September	No
Bolander's bruchia (<i>Bruchia bolanderi</i>)	CNPS 2.2	Lower montane coniferous forest, meadows and seeps, upper montane coniferous forest/damp soil; 1,700 to 2,800 m.	Not specified	No
Bolander's woodreed (<i>Cinna bolanderi</i>)	CNPS 1B.2	Meadows and seeps, upper montane coniferous forest; 1,850 to 2,400 m.	July - September	No
Center Basin rush (<i>Juncus hemiendytus</i> var. <i>abjectus</i>)	CNPS 4.3	Shallowly inundated to dry mud flats in montane meadows in full sun where vegetation is sparse; 1,400 to 3,400 m.	July - August	No
Fell-fields claytonia (<i>Claytonia megarhiza</i>)	CNPS 2.3	Alpine boulder and rock field, sub-alpine coniferous forest (rocky or gravelly); 2,600 to 3,300 m.	July - September	No
Mountain bent grass (<i>Agrostis humilis</i>)	CNPS 2.3	Alpine boulder and rock field, meadows and seeps, sub-alpine coniferous forest; 2,700 to 3,200 m.	July - September	No
Ribbonleaf pondweed (<i>Potamogeton epihydrus</i> ssp. <i>nuttallii</i>)	CNPS 2.2	Still or flowing waters of lakes, ponds, rivers and streams; 10 to 1,900 m.	August – November	No
Short-leaved hulsea (<i>Hulsea brevifolia</i>)	CNPS 1B.2	Montane coniferous forest; granitic or volcanic, gravelly or sandy; 1,500 to 2,700 m.	May – August	No
Slender lupine (<i>Lupinus gracilentus</i>)	CNPS 1B.3	Mesic to saturated, partially shaded sites in sub-alpine forest; 2,430 – 3,050 m.	July - August	Yes <i>L. gracilentus</i> was observed and mapped along the southern boundary of Tenaya Lake and along Murphy Creek.

Table 3-4. Special-status Plant Species Potentially Present

Species Name	Status	Habitat Preference	Flowering Period	Documented within the Study Area
Yosemite bulrush (<i>Trichophorum clementis</i>)	PS	Dry to wet sub-alpine and alpine meadows and stream banks; central & southern high Sierra Nevada; from 2,400 to 3,600 m.	July	No
Yosemite lewisia (<i>Lewisia disepala</i>)	CNPS 1B.2	Montane coniferous forest, pinyon juniper woodland, granitic sand; 1,900 to 3,500 m.	March - June	No

Key to Status

FE – Federal Endangered

FT – Federal Threatened

FC – Federal Candidate

CE – California Endangered

CT – California Threatened

PS – Yosemite National Park Sensitive Plant

USFS:S – U.S. Forest Service Sensitive

BLM:S – Bureau of Land Management Sensitive

CNPS = California Native Plant Society Listed Species

List 1B = rare, threatened, or endangered in California and elsewhere.

List 2 = rare, threatened, or endangered in California, but more common elsewhere.

List 4 = limited distribution (Watch List).

Threat Code

.1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)

.2 = Fairly endangered in California (20-80% occurrences threatened)

.3 = Not very endangered in California (<20% of occurrences threatened or no current threats known)

Slender lupine (*Lupinus gracilentus*). Slender lupine was the only special- status plant species observed within the project study area. This species has the following status:

Federal: Forest Service Watch, Forest Service Sensitive

State: None

CNDB: G2, S2.3

CNPS: 1B3 (considered rare, but not very endangered in California)

Park: Sensitive

Slender lupine is a perennial within the legume family (Fabaceae) with erect leafy stems 20- 80 centimeters (cm) high. Basal leaves largely absent; stem leaves on petioles 3- 14 cm long. Leaflets 5- 8, sparsely hairy or with a few stiff, appressed hairs, linear, acute, green 4- 8 cm long. Racemes 6- 20 cm long, the bracts thread- like, 4- 10 millimeters (mm) long, deciduous. Flowers 8- 18 mm long, in 4- 6 whorls. Petals blue, the bracts thread- like, 4- 10 mm long, deciduous. Flowers straight, ciliate on the upper edges toward the tip. Wings broad, covering the keel. Pods 2- 3 cm long, densely long- soft hairy (Botti 2001).

Slender lupine only occurs in the state of California in the central High Sierra Nevada (Hickman 1993). In Yosemite National Park, it occurs in the Cathedral and Clark ranges, at 2,430- 3,050 m elevation (Botti 2001). It inhabits mesic to saturated, partially shaded sites in sub- alpine forest (e.g., *Pinus contorta* ssp. *murrayana*). During surveys, it was observed to occur in canopy gaps at some sites, along streams, and within *Pinus contorta* stands at others (Nelson and Colwell 2008). Soil texture was sandy loam at each site surveyed where soil texture was identified (three out of four sites). Project alternatives have been designed to avoid areas where this species occurs around Tenaya Lake.

Special- status Wildlife Species

Based on the review of the CNDDDB and other information, a total of 19 special- status wildlife species were considered for potential to occur in the study area (CNDDDB 2009) (refer to Table 3-5). Of these species considered, six special- status wildlife species were determined to have a marginal or greater potential for occurrence within the study area (or have potential to nest for bird species or maternity roost for bat species) and therefore could be potentially subjected to impacts resulting from the proposed project. No focused wildlife surveys were conducted in the study area specifically for this EA. The list of species considered is derived from the CNDDDB records search, the USFWS species list for the Tenaya Lake USGS quad, and communications with NPS biologists familiar with the fauna of the Tenaya Lake area.

Sierra Nevada Yellow- legged Frog (*Rana sierrae*). While this species no longer occurs at Tenaya Lake, further discussion is warranted based on the presence of aquatic habitat. The Sierra Nevada yellow- legged frog is a rare, high- elevation species that occurs primarily at elevations above 5,940 feet. It is highly aquatic; larvae may require two to four years to complete their aquatic development. Frogs usually crouch on rocks or clumps of grass within a few feet of water, or may burrow in bottom sediments. Eggs are usually laid in shallow water attached to gravel or rocks, after lakes and streams are free of ice. Breeding and egg- laying usually occur from June to August depending on local conditions. NPS biologists are aware of two UC Berkeley Museum of Vertebrate Zoology (MVZ) records for Sierra Nevada yellow- legged frog (one record from 1915 and one record from 1937). No frogs were detected in Tenaya Lake or the surrounding water bodies during comprehensive surveys conducted in 2000- 2002 (Knapp 2003.). While there are several historical CNDDDB records from the Tenaya Lake area, the CNDDDB indicates the population has disappeared in the last 20 to 30 years from the date of a 1992 study (CNDDDB, 2010). Given the lack of fishless habitat, it is highly unlikely that any populations of frogs were able to persist in Tenaya Lake (Heather McKenny 2010, pers. comm.). Therefore, this species is not expected to occur at Tenaya Lake or otherwise be impacted by the proposed project.

Yosemite Toad (*Bufo canorus*). Yosemite toads inhabit high elevation wet meadows in the central high Sierra Nevada. Research suggests that populations have declined in and around Yosemite National Park. During inactive periods, toads use rodent burrows or move to adjacent forest habitat. Breeding and egg laying occur from mid- April to mid- July depending on local conditions. Eggs are deposited in shallow, quiet pools in wet meadows, or in shallow, small mountain lakes or pools.

There is suitable habitat in meadow and aquatic habitats at both ends of the lake; however, NPS does not have any records of occurrences at Tenaya Lake from MVZ (1915 to 2007) (Heather McKenny 2010, pers. comm.). No amphibian surveys of the meadows directly adjacent to Tenaya Lake were conducted from 1993 to 2009. Several of the meadows just west of the lake were surveyed between 2000 and 2002 with no observations of toads. Because the meadows at Tenaya

Lake are far from known populations (>1.5 km dispersal distance), and given the lack of observations, it is unlikely that there are any toad populations within the meadows adjacent to the lake; however, this species is very difficult to detect outside of the breeding season, and presence/absence has not been confirmed. If present, this species could be impacted by project-related activities in or near meadows or aquatic areas, which could be particularly sensitive during the breeding season (mid- April to mid- July).

Table 3-5. Special-status Wildlife Species Potentially Present

Species Name	Status	Habitat Preference	Present/Potentially Present within the Study Area
Amphibians			
Mount Lyell salamander (<i>Hydromantes platycephalus</i>)	CSC	Largely restricted to alpine or sub-alpine vegetation associations in outcrops of rocks and boulders with free surface water, such as a stream, waterfall, or melting snow, nearby.	While this species may inhabit rocky, high elevation areas around the lake, there is no suitable habitat within study area. Not expected to occur.
Sierra Nevada yellow-legged frog (<i>Rana sierrae</i>)	FC, CSC	Upper elevation lakes, ponds, and slow-moving alpine streams, montane riparian habitats in lodgepole pine, ponderosa pine, Jeffrey pine, sugar pine, white fir, whitebark pine, and wet meadow vegetation types.	While there are several historical CNDDDB records from the Tenaya Lake area, the species has apparently been extirpated from the site. Not expected to occur.
Yosemite toad (<i>Anaxyrus canorus</i>)	FC, CSC	Wet mountain meadows and the borders of forests. Restricted to areas of wet meadows in central Sierra Nevada between elevations of 1,950 and 3,450 m.	Suitable meadow habitat occurs at both ends of Lake Tenaya, but the species has not been recently detected there. While unlikely to occur, project activities in meadows or aquatic areas could have the potential to impact the species if present.
Reptiles			
Western pond turtle (<i>Actinemys marmorata</i>)	CSC	Quiet waters of ponds, lakes, streams, and marshes to 2,040 m. Typically in the deepest parts with an abundance of basking sites.	No CNDDDB records or other known occurrences in or near Lake Tenaya. Elevation likely too high for species. Not expected to occur.
Birds			
Northern goshawk (<i>Accipiter gentilis</i>)	CSC	Favors moderately dense coniferous forests broken by meadows, and other openings, between 1,525 and 2,750 m in elevation. The species typically nests in mature conifer stands near streams.	Potential nesting and foraging habitat occurs in lodgepole pine forest, but marginal potential for nesting near Tenaya Lake due to existing levels of disturbance in the study area.

Table 3-5. Special-status Wildlife Species Potentially Present

Species Name	Status	Habitat Preference	Present/Potentially Present within the Study Area
Golden eagle (<i>Aquila chrysaetos</i>)	CFP, WL	Found in a wide range of elevations in the park. Needs open terrain for hunting. Feeds primarily on small mammals. Nests on cliffs and in large trees in open areas.	Potential foraging habitat around Tenaya Lake, but unlikely to nest near the lake due to lack of cliffs and open areas, along with existing levels of disturbance in the study area. Not expected to be impacted by the proposed project.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	SE	Not typically found in high Sierra Nevada, but may winter locally. Forages over river, streams, and lakes. Primarily eats fish, also carrion, water birds, and small mammals. Nesting is known to occur in the park.	Study area is at high elevation and likely outside of summer (breeding) range for the species. Marginal potential for wintering near Tenaya Lake, but not expected due to existing levels of disturbance in the study area. Not expected to be impacted by the proposed project.
Prairie falcon (<i>Falco mexicanus</i>)	SA, WL	Primarily associated with open areas such as grasslands and meadows, where it feeds on small mammals and birds. Nests on cliffs in Yosemite's sub-alpine and alpine areas.	Potential foraging habitat around Tenaya Lake, but unlikely to nest near the lake due to lack of cliffs and open areas, along with existing levels of disturbance in the study area. Not expected to be impacted by the proposed project.
Great gray owl (<i>Strix nebulosa</i>)	CE	Coniferous forest near meadows.	Study area is at high elevation and likely outside of the range for this species.
Mammals			
Mount Lyell shrew (<i>Sorex lyelli</i>)	CSC	Observed only in the vicinity of Mt. Lyell, within or near Yosemite. Favors moist areas near streams, in grass, or under willows.	Project area is northwest of Mt. Lyell. Not expected to occur at Tenaya Lake.
Townsend's big-eared bat (<i>Corynorhinus townsendii townsendii</i>)	CSC	Majority of records are from low to moderate elevations, though the species has been found to almost 2,750 m. Uses caves, mines, or buildings for roosting. Prefers mesic habitats where it gleans from brush or trees along habitat edges.	May forage along trees or over water in study area, but not expected to roost in study area.
Spotted Bat (<i>Euderma maculatum</i>)	CSC	Occurs in variety of habitats. Prefers to roost in rock crevices. Occasionally found in caves and buildings. Cliffs provide optimal roosting habitat.	May forage along trees or over water in study area, but not expected to roost in study area.

Table 3-5. Special-status Wildlife Species Potentially Present

Species Name	Status	Habitat Preference	Present/Potentially Present within the Study Area
Western Red Bat (<i>Lasiusurus blossevillii</i>)	CSC	Roosts in foliage. Breeding females appear to be highly associated with low elevation riparian habitats and are most often observed in the Central Valley and southern coastal areas. Individuals (most likely males or non-reproductive females) have been documented up to 2,500 m in the Sierra Nevada.	Elevation of project area is likely too high for this species. Not expected to roost in study area.
Western Mastiff Bat (<i>Eumops perotis californicus</i>)	CSC	Desert scrub and chaparral to montane coniferous forest. Roosts primarily in crevices in cliff faces, and occasionally trees. Detected most often over meadows and other open areas, but will also feed above forest canopy.	Moderate potential for occurrence under the loose bark of trees, in hollow trees, on snags, and in tree canopy. Particularly sensitive during the maternity roosting season from April 15 to August 31.
Yosemite pika (<i>Ochotona princeps muiiri</i>)	SA	Mountainous areas on talus slopes.	There is a very old CNDDDB record from 1915 along the east border of Tenaya Lake, but no recent records. No known nearby extant populations, no recent records of occurrence, and not expected to occur due to existing levels of disturbance in the study area.
Sierra Nevada red fox (<i>Vulpes vulpes necator</i>)	CT	Occurs from the Cascades down to the Sierra Nevada in a variety of habitats from wet meadows to forested areas.	No known nearby extant populations, no recent records of occurrence, and not expected to occur due to existing levels of disturbance in the study area.
California wolverine (<i>Gulo gulo</i>)	CT, CFP	Occurs in the north coast mountains and the Sierra Nevada in a wide variety of high elevation habitats.	No known nearby extant populations, no recent records of occurrence, and not expected to occur due to existing levels of disturbance in the study area.
Sierra marten (<i>Martes americana sierrae</i>)	SA	Occurs in old-growth mixed conifer forests. Optimal habitats are various mixed evergreen forests with more than 40% crown closure, with large trees and snags.	Potential habitat occurs in lodgepole pine forest, but no recent nearby records. Marginal potential to occur due to existing levels of disturbance in the study area.

Table 3-5. Special-status Wildlife Species Potentially Present

Pacific fisher (<i>Martes pennanti</i> (<i>pacifica</i>) DPS)	CCT or CCE	Associated with closed-canopy late-successional forest between 1,525 to 2,440 m. Solitary and apparently needs large areas of mature forests with a high percentage of canopy closure, free of human disturbance. Yosemite represents the northern distribution of the southern Sierra population.	Potential habitat occurs in lodgepole pine forest, but no recent nearby records. Marginal potential to occur due to existing levels of disturbance in the study area.

Key to Status

FE – Federal Endangered

FT – Federal Threatened

FC – Federal Candidate

BCC – Federal Bird of Conservation Concern

CE – California Endangered

CT – California Threatened

CSC – California Species of Concern

CFP – California Fully Protected

CC – California Candidate

CWL – California Watch List

SA = Not formally listed but included in CDFG "Special Animal" List.

Northern Goshawk (*Accipiter gentilis*). Northern goshawks inhabit middle and higher elevations and mature, dense conifer forests. They use mature and old- growth stands of conifer and deciduous habitats. Northern goshawks have been observed on 155 different occasions in Yosemite National Park. Key breeding requirements, including suitable nesting and foraging habitat, and adequate prey, exist in the conifer woodlands surrounding Lake Tenaya, but are likely marginal within the study area due to existing disturbance.

Western Mastiff Bat (*Eumops perotis californicus*). The western mastiff bat is an uncommon resident in the southeastern San Joaquin Valley and Coast Ranges from Monterey County southward through southern California, and from the coast eastward to the Colorado Desert (Zeiner et al., 1990). This species occurs in many open, semi- arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and urban. Crevices in cliff faces, high buildings, trees, and tunnels are required for roosting. Nursery roosts are in tight rock crevices or crevices in buildings. This species has the potential to forage and roost in trees within the study area, and could be impacted by the proposed project.

Sierra marten (*Martes americana sierrae*). The Sierra marten occurs in old- growth mixed conifer forests. Optimal habitats are various mixed evergreen forests with more than 40% crown closure, with large trees and snags. Key habitat requirements exist in the conifer woodlands surrounding Lake Tenaya, but are likely marginal within the study area due to existing disturbance.

Pacific fisher (*Ochotona princeps muiiri*). The Pacific fisher is a specialized forest carnivore associated with closed- canopy late- successional forest between 5,000 to 8,000 feet in elevation. This species is solitary and apparently needs large areas of mature forests with a high percentage

of canopy closure, free of human disturbance. Yosemite represents the northern distribution of the southern Sierra population. Key habitat requirements exist in the conifer woodlands surrounding Lake Tenaya. Existing disturbance could affect adjacent fisher habitat, but the degree of this effect is unknown.

Critical Habitat

Federal ESA requires federal agencies to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat. Critical habitat is defined as specific geographic areas, whether occupied by listed species or not, that are determined to be essential for the conservation and management of listed species and that have been formally described in the Federal Register. The Tenaya Lake Area Plan study area is not located in any designated critical habitat areas.

Environmental Consequences

Methodology. Analysis was based on the known or likely occurrence of the species in the vicinity of the project area, the potential loss of habitat for the species, and the alteration of habitat. Floristic surveys specific to this project to identify individuals or populations of special- status plant species have been performed. Habitat assessments and examination of database and other records have been used to assess the potential for impacts to special- status wildlife species. Data presented herein are based on past field reconnaissance, the professional knowledge and judgment of park staff, records of observations, published references, and studies of selected species.

Plants: The impact evaluation for special- status plant species was based on the following: (1) the known or likely occurrence of a species or its preferred habitat in the vicinity of the project area; (2) the direct physical loss of habitat; (3) the effective loss of habitat through loss of habitat features such as surface water flows.

Wildlife: The impact evaluation for special- status wildlife species was based on the following: (1) the known or likely occurrence of a species or its preferred habitat in the vicinity of the project area; (2) the direct physical loss or adverse modification of habitat; (3) the effective loss of habitat (through avoidance or abandonment) due to construction activity or noise, or the species' sensitivity to human disturbance.

Types of Impacts. Adverse impacts are those that alter the range, location, number, or population of a special status species or its habitat. Beneficial impacts would improve one or more of these characteristics.

Intensity Level Definitions

Impacts to rare, threatened, and endangered species were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for rare, threatened, and endangered species are as follows:

Negligible: Rare, threatened, and endangered species would not be affected, or effects would not be measurable. Any effects to abundance, distribution, and reproductive potential of species would be slight. No mitigation would be required.

Minor: Effects to rare, threatened, and endangered species would be detectable. Construction and operational disturbances could potentially affect breeding success and reduce habitat availability. Mitigation measures would be sufficient to offset minor adverse effects.

Moderate: Effects to rare, threatened, and endangered species would be readily apparent and would result in the reduction of potential habitat required to meet life requisite needs of one or more species. Mitigation would be required to offset moderate adverse effects.

Major: Effects to rare, threatened, and endangered species would be readily apparent and would result in the direct or indirect loss of occupied breeding sites, take of individuals, or habitat degradation resulting in reduced potential for occupancy or reproductive potential. Extensive mitigation would be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment: A permanent adverse change would occur to one or more rare, threatened, or endangered species affecting the resource to the point that it becomes extirpated from a significant portion of the park or results in the loss of a significant proportion of the park's population such that the park's purposes could not be fulfilled and enjoyment by future generations of the resources would be precluded.

Alternative 1 (No Action)

Construction and Operation- related Impacts. There would be no new impacts to special-status species under Alternative 1. Existing impacts to special- status plants and wildlife would continue under this No Action Alternative. Routine repair and maintenance actions, including removal of vault toilet waste, trash, and recyclables; hazard tree abatement; and snow removal, would continue. Impacts to special- status plants and wildlife would continue to include impacts to vegetation resulting from human use of trails in the vicinity of the lake, removal of hazard trees, availability of human food and trash, and noise and visual disturbance associated with human activities and vehicles. These impacts reduce the amount and quality of areas available to special-status plant species that require undisturbed substrate and special- status wildlife species that require undisturbed habitat for essential activities such as nesting, roosting/resting, and foraging. Some special- status wildlife mortality also likely results from vehicle travel and parking along Tioga Road.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Effects to rare, threatened, and endangered species are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

Past actions that cumulatively impact special- status species within the project area implementation of the Invasive Plant Plan, Fire, and Vegetation Management Plans. Implementing specific aspects of these plans would have beneficial impacts on species through invasive species management, habitat restoration, and other management strategies and techniques for improving habitat. Short- term adverse effects would include loss of special- status

bat and bird roosting and nesting habitat due to hazardous tree removal and fuel load reductions. Habitat was fragmented during construction of Tioga Road, and parking areas for Tenaya Lake. Visitor use and associated noise and disturbance at Tenaya Lake have likely historically impacted formerly undisturbed plant and wildlife species that are sensitive to disturbances.

Present actions that contribute to cumulative impacts to special- status species within the project area include existing trail use and hazard tree abatement, which could result in the loss of some nesting and roosting trees. However, these impacts are slight due to the marginal habitat of the relatively few trees that would require removal due to hazard concerns. Implementation of the Scenic Vista Management Plan would result in modifications to habitat adjacent to roadways, including tree trimming or removal. Assessment of these trees for nesting birds and roosting bats by park biologists would minimize these negative impacts. Projects that would have a short- term effect on plants and wildlife in the area include the Tioga Road Rehabilitation and Parkwide Communication Data Network projects. Construction activities would disturb roadside vegetation and generate noise and increased human presence along the Tioga Road corridor, potentially displacing wildlife in the immediate area. Implementation of species protection measures, including avoidance of habitat, implementation of pre- construction surveys, and monitoring by park specialists, would avoid or minimize adverse effects. Implementation of the High Elevation Aquatic Ecological Recovery Plan would have a beneficial effect on aquatic species in the area.

Reasonably Foreseeable Future actions that could contribute to cumulative impacts to special- status species within the project area include continued implementation of the Invasive Plant, Fire, and Vegetation Management Plans.

Past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would not likely result in adverse effects to rare, threatened, or endangered species.

Impairment. Alternative 1 (No Action) would result in no change from current conditions. No modifications in the project area would occur. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, Alternative 1 would not impair park special- status species.

Alternative 2 (Tenaya Confluence, Preferred Alternative)

Construction- related Impacts. Trail work would result in ground disturbance within primarily previously disturbed areas, but incidental impacts to vegetation may occur, including disturbance, trampling, and uprooting. These impacts can likely be avoided or minimized with monitoring and careful work in areas with sensitive vegetation. Trail work would be routed through trees to avoid need for removal, but disturbance resulting from this work could impact nesting bird and/or roosting bat in the vicinity, as well potential direct disturbances to ground- dwelling species. Based on conceptual plans, direct impacts to slender lupine would be avoided. Implementation of protection measures, including temporary flagging or fencing of sensitive habitats, training of construction crews to avoid the species, and inspection by NPS resource specialists would ensure avoidance of this species.

The expansion and improvement of parking areas and facilities at the Sunrise Trailhead, Murphy Creek, and East Beach areas would require the removal of some lodgepole pine trees. These impacts could be adverse if conducted during the nesting bird season (typically March 15 through August 31) and bat maternity roosting season (typically April 15 through August 31) or if Sierra marten or Pacific fisher are present. Work adjacent to Tioga Road, including removal of roadside parking, trail development and improvements, and construction of biofiltration areas would primarily affect disturbed areas; however, this activity could impact nesting bird and/or bat maternity roosting behaviors in overhead canopy or adjacent trees. Impacts to Sierra marten and Pacific fisher are less likely due to habitat preferences and lack of documented occurrences. These impacts can be mitigated by implementation of standard BMPs, including scheduling tree removal outside of the nesting bird and/or bat maternity roosting season seasons or conducting pre- construction surveys for nesting birds, bat maternity roosts, and America marten and Pacific fisher to confirm presence or absence of species.

Removal of the East Beach water pipe would require excavation, removal, and backfill. Although this activity would occur along the disturbed road edge, there remains the possibility of small special- status species becoming trapped during excavation of the pipe. This could be mitigated by monitoring of the activity by a qualified biologist, installing small ramps at linear intervals to allow trapped wildlife to escape, and conducting final surveys for wildlife during backfilling to prevent incidental injury or mortality to wildlife.

Removal of Tioga Road/Murphy Creek culverts, installation of new culverts within parking areas, roadside, restoration, and drainage improvements adjacent to Tenaya Lake, and construction of boardwalks and bridges in the Sunrise Trailhead, Murphy Creek, and East Beach areas could result in injury or mortality to Yosemite toad, if present in creeks, drainages, swales, lakeshore banks, or saturated meadows. Improvement of trails within and near the Tenaya Creek outlet would require work and possibly use of heavy equipment within wetland and meadow habitat suitable for Yosemite toad. Impacts to habitat and potential harm to the species could occur, if present. These impacts could be adverse, but can be mitigated by conducting pre- construction surveys for Yosemite toad to confirm presence or absence of species. Conducting these activities during the summer, when water levels are low, and outside of the Yosemite toad breeding season would reduce the potential for encountering this species. The breeding season is typically mid-April though mid- July, which coincides with the higher water levels in and around Tenaya Lake.

Ecological restoration would occur within sensitive habitats. Restoration would be conducted or supervised by NPS resource specialists to ensure avoidance of special- status species, and long- term enhancement of habitat. Due to the proposed methodology, the short- term effects to special- status plant and wildlife species would be negligible.

Revegetation and restoration activities along the South Trail would mainly occur along social trails and denuded lake edges. Trail repair would be limited to the existing trail limits. Fencing off areas inhabited by slender lupine and/or monitoring restoration activities along South Trail would avoid or minimize impacts to this species. While there may be a minor potential for impacts to Yosemite toad dispersing from aquatic areas, this can be mitigated with periodic monitoring and relocation of these species if necessary to avoid injury or mortality.

Impact Significance. Based on implementation of mitigation measures, implementation of Alternative 2 would not likely adversely affect rare, threatened, or endangered species.

Operation- related Impacts. The design Alternative 2 incorporates avoidance of special- status plants. Improved wayfinding, interpretive materials and signage, and restoration of spur trails would reduce the potential for visitor disturbance of slender lupine. Special- status wildlife species in the Tenaya Lake area are generally accustomed to vehicular traffic and the presence of visitors. Implementation of habitat restoration, construction of biofiltration areas, and the use of bridges and boardwalks within sensitive areas would improve habitat characteristics for terrestrial and aquatic species, resulting in a beneficial long- term effect.

Impact Significance. Based on the design of the proposed action alternatives, implementation of Alternative 2 would not affect rare, threatened, or endangered species.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area, including Alternative 2 would not likely result in adverse effects to rare, threatened, or endangered species.

Impairment. Alternative 2 would result in localized, short- term, adverse changes from current conditions. The long- term effects would be beneficial, due to habitat enhancement. Because no resources specific to the park's purpose would be discernibly affected, and there would be no change to the natural integrity of the park, nor effects to resource values highlighted in the 1980 GMP, Alternative 2 would not impair rare, threatened, or endangered species.

Alternative 3 (Tenaya Ecotones)

Construction- related Impacts. Trail work would result in ground disturbance within primarily previously disturbed areas, but incidental impacts to vegetation may occur, including disturbance, trampling, and uprooting. These impacts can likely be avoided or minimized with monitoring and careful work in areas with sensitive vegetation. Trail work would be routed through trees to avoid need for removal, but disturbance resulting from this work could impact nesting bird and/or roosting bat in the vicinity, as well potential direct disturbances to ground- dwelling species. Based on conceptual plans, direct impacts to slender lupine would be avoided. Implementation of protection measures, including temporary flagging or fencing of sensitive habitats, training of construction crews to avoid the species, and inspection by NPS resource specialists would ensure avoidance of this species.

The expansion and improvement of parking areas and facilities at the Sunrise Trailhead, Murphy Creek, and East Beach areas would require the removal of some lodgepole pine trees. These impacts could be adverse if conducted during the nesting bird season (typically March 15 through August 31) and bat maternity roosting season (typically April 15 through August 31) or if Sierra marten or Pacific fisher are present. Work adjacent to Tioga Road, including improvement of designated roadside parking, trail development and improvements, and construction of biofiltration areas would primarily affect disturbed areas; however, this activity could impact nesting bird and/or bat maternity roosting behaviors in overhead canopy or adjacent trees. Impacts to Sierra marten and Pacific fisher are less likely due to habitat preferences and lack of documented occurrences. These impacts can be mitigated by implementation of standard BMPs, including scheduling tree removal outside of the nesting bird and/or bat maternity roosting season seasons or conducting pre- construction surveys for nesting birds, bat maternity roosts, and America marten and Pacific fisher to confirm presence or absence of species (refer to Appendix A).

Removal of the East Beach water pipe would require excavation, removal, and backfill. Although this activity would occur along the disturbed road edge, there remains the possibility of small special- status species becoming trapped during excavation of the pipe. This could be mitigated by monitoring of the activity by a qualified biologist, installing small ramps at linear intervals to allow trapped wildlife to escape, and conducting final surveys for wildlife during backfilling to prevent incidental injury or mortality to wildlife.

Removal of Tioga Road/Murphy Creek culverts, installation of new culverts within parking areas, roadside, restoration, and drainage improvements adjacent to Tenaya Lake, and construction of boardwalks and bridges in the Sunrise Trailhead, Murphy Creek, and East Beach areas could result in injury or mortality to Yosemite toad, if present in creeks, drainages, swales, lakeshore banks, or saturated meadows. Improvement of the boulder crossing within the Tenaya Creek outlet would require work and use of heavy equipment within wetland and meadow habitat suitable for Yosemite toad. Impacts to habitat and potential harm to the species could occur, if present. These impacts could be adverse, but can be mitigated by conducting pre- construction surveys for Yosemite toad to confirm presence or absence of species. Conducting these activities during the summer, when water levels are low, and outside of the Yosemite toad breeding season would reduce the potential for encountering this species. The breeding season is typically mid- April though mid- July, which coincides with the higher water levels in and around Tenaya Lake.

Ecological restoration would occur within sensitive habitats. Restoration would be conducted or supervised by NPS resource specialists to ensure avoidance of special- status species, and long- term enhancement of habitat. Due to the proposed methodology, the short- term effects to special- status plant and wildlife species would be negligible.

Revegetation and restoration activities along the South Trail would mainly occur along social trails and denuded lake edges. Trail repair would be limited to the existing trail limits. Fencing off areas inhabited by slender lupine and/or monitoring restoration activities along South Trail would avoid or minimize impacts to this species. While there may be a minor potential for impacts to Yosemite toad dispersing from aquatic areas, this can be mitigated with periodic monitoring and relocation of these species if necessary to avoid injury or mortality.

Impact Significance. Based on implementation of mitigation measures, implementation of Alternative 3 would not likely adversely affect rare, threatened, or endangered species.

Operation- related Impacts. Alternative 3 incorporates avoidance of special- status plants. Improved wayfinding, interpretive materials and signage, and restoration of spur trails would reduce the potential for visitor disturbance of slender lupine. Special- status wildlife species in the Tenaya Lake area are generally accustomed to vehicular traffic and the presence of visitors. Implementation of habitat restoration, construction of biofiltration areas, and the use of bridges and boardwalks within sensitive areas would improve habitat characteristics for terrestrial and aquatic species, resulting in a beneficial long- term effect.

Impact Significance. Based on the design of the proposed action alternatives, implementation of Alternative 3 would not affect rare, threatened, or endangered species.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area, including Alternative 3 would not likely result in adverse effects to rare, threatened, or endangered species.

Impairment. Alternative 3 would result in localized, short- term, adverse changes from current conditions. The long- term effects would be beneficial, due to habitat enhancement. Because no resources specific to the park's purpose would be discernibly affected, and there would be no change to the natural integrity of the park, nor effects to resource values highlighted in the 1980 GMP, Alternatives 3 would not impair rare, threatened, or endangered species.

Alternative 4 (Lake Loop)

Construction- related Impacts. Trail work would result in ground disturbance within primarily previously disturbed areas, but incidental impacts to vegetation may occur, including disturbance, trampling, and uprooting. These impacts can likely be avoided or minimized with monitoring and careful work in areas with sensitive vegetation. Trail work would be routed through trees to avoid need for removal, but disturbance resulting from this work could impact nesting bird and/or roosting bat in the vicinity, as well potential direct disturbances to ground- dwelling species. Based on conceptual plans, direct impacts to slender lupine would be avoided. Implementation of protection measures, including temporary flagging or fencing of sensitive habitats, training of construction crews to avoid the species, and inspection by NPS resource specialists would ensure avoidance of this species.

The expansion and improvement of parking areas and facilities at the Sunrise Trailhead, Murphy Creek, and East Beach areas would require the removal of some lodgepole pine trees. These impacts could be adverse if conducted during the nesting bird season (typically March 15 through August 31) and bat maternity roosting season (typically April 15 through August 31) or if Sierra marten or Pacific fisher are present. Work adjacent to Tioga Road, including removal of roadside parking, trail development and improvements, and construction of biofiltration areas would primarily affect disturbed areas; however, this activity could impact nesting bird and/or bat maternity roosting behaviors in overhead canopy or adjacent trees. Impacts to Sierra marten and Pacific fisher are less likely due to habitat preferences and lack of documented occurrences. These impacts can be mitigated by implementing standard BMPs, including scheduling tree removal outside of the nesting bird and/or bat maternity roosting season seasons or conducting pre- construction surveys for nesting birds, bat maternity roosts, and America marten and Pacific fisher to confirm presence of absence of species.

Removal of the East Beach water pipe would require excavation, removal, and backfill. Although this activity would occur along the disturbed road edge, there remains the possibility of small special- status species becoming trapped during excavation of the pipe. This could be mitigated by monitoring of the activity by a qualified biologist, installing small ramps at linear intervals to allow trapped wildlife to escape, and conducting final surveys for wildlife during backfilling to prevent incidental injury or mortality to wildlife.

Installation of new culverts within parking areas, roadside, restoration, and drainage improvements adjacent to Tenaya Lake, and construction of boardwalks and bridges in the Sunrise Trailhead, Murphy Creek, and East Beach areas could result in injury or mortality to Yosemite toad, if present in creeks, drainages, swales, lakeshore banks, or saturated meadows. Construction of a bridge within the Tenaya Creek outlet would require work and use of heavy equipment within wetland and meadow habitat suitable for Yosemite toad. Impacts to habitat and potential harm to the species could occur, if present. These impacts could be adverse, but can be mitigated by conducting pre- construction surveys for Yosemite toad to confirm presence or absence of species. Conducting these activities during the summer, when water levels are low, and

outside of the Yosemite toad breeding season would reduce the potential for encountering this species. The breeding season is typically mid- April though mid- July, which coincides with the higher water levels in and around Tenaya Lake.

Ecological restoration would occur within sensitive habitats. Restoration would be conducted or supervised by NPS resource specialists to ensure avoidance of special- status species, and long- term enhancement of habitat. Due to the proposed methodology, the short- term effects to special- status plant and wildlife species would be negligible.

Revegetation and restoration activities along the South Trail would mainly occur along social trails and denuded lake edges. Trail repair would be limited to the existing trail limits. Fencing off areas inhabited by slender lupine and/or monitoring restoration activities along South Trail would avoid or minimize impacts to this species. While there may be a minor potential for impacts to Yosemite toad dispersing from aquatic areas, this can be mitigated with periodic monitoring and relocation of these species if necessary to avoid injury or mortality.

Impact Significance. Based on implementation of mitigation measures, implementation of Alternative 4 would not likely adversely affect rare, threatened, or endangered species.

Operation- related Impacts. Alternative 4 incorporates avoidance of special- status plants. Improved wayfinding, interpretive materials and signage, and restoration of spur trails would reduce the potential for visitor disturbance of slender lupine. Special- status wildlife species in the Tenaya Lake area are generally accustomed to vehicular traffic and the presence of visitors. Implementation of habitat restoration, construction of biofiltration areas, and the use of bridges and boardwalks within sensitive areas would improve habitat characteristics for terrestrial and aquatic species, resulting in a beneficial long- term effect.

Impact Significance. Based on the design of the proposed action alternatives, implementation of Alternative 4 would not affect rare, threatened, or endangered species.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area, including Alternative 4 would not likely result in adverse effects to rare, threatened, or endangered species.

Impairment. Alternative 4 would result in localized, short- term, adverse changes from current conditions. The long- term effects would be beneficial. Because no resources specific to the park's purpose would be discernibly affected, and there would be no change to the natural integrity of the park, nor effects to resource values highlighted in the 1980 GMP, Alternative 4 would not impair rare, threatened, or endangered species.

Alternative 5 (Immersive Nodes)

Construction- related Impacts. Trail work would result in ground disturbance within primarily previously disturbed areas, but incidental impacts to vegetation may occur, including disturbance, trampling, and uprooting. These impacts can likely be avoided or minimized with monitoring and careful work in areas with sensitive vegetation. Trail work would be routed through trees to avoid need for removal, but disturbance resulting from this work could impact nesting bird and/or roosting bat in the vicinity, as well potential direct disturbances to ground- dwelling species. Based on conceptual plans, direct impacts to slender lupine would be avoided. Implementation of

protection measures, including temporary flagging or fencing of sensitive habitats, training of construction crews to avoid the species, and inspection by NPS resource specialists would ensure avoidance of this species.

The expansion and improvement of parking areas and facilities at the Sunrise Trailhead, Murphy Creek, and East Beach areas would require the removal of some lodgepole pine trees.

Construction of campsites north of Tioga Road would require removal of understory habitat, and may include removal of lodgepole pine trees. These impacts could be adverse if conducted during the nesting bird season (typically March 15 through August 31) and bat maternity roosting season (typically April 15 through August 31) or if Sierra marten or Pacific fisher are present. Work adjacent to Tioga Road, including improvement of roadside parking, trail development and improvements, and construction of biofiltration areas would primarily affect disturbed areas; however, this activity could impact nesting bird and/or bat maternity roosting behaviors in overhead canopy or adjacent trees. Impacts to Sierra marten and Pacific fisher are less likely due to habitat preferences and lack of documented occurrences. These impacts can be mitigated by implementing standard BMPs, including scheduling tree removal outside of the nesting bird and/or bat maternity roosting season seasons or conducting pre- construction surveys for nesting birds, bat maternity roosts, and America marten and Pacific fisher to confirm presence or absence of species.

Removal of the East Beach water pipe would require excavation, removal, and backfill. Although this activity would occur along the disturbed road edge, there remains the possibility of small special- status species becoming trapped during excavation of the pipe. This could be mitigated by monitoring of the activity by a qualified biologist, installing small ramps at linear intervals to allow trapped wildlife to escape, and conducting final surveys for wildlife during backfilling to prevent incidental injury or mortality to wildlife.

Removal of Tioga Road/Murphy Creek culverts, installation of new culverts within parking areas, roadside, restoration, and drainage improvements adjacent to Tenaya Lake, and construction of boardwalks and bridges in the Sunrise Trailhead, Murphy Creek, and East Beach areas could result in injury or mortality to Yosemite toad, if present in creeks, drainages, swales, lakeshore banks, or saturated meadows. Impacts to habitat and potential harm to Yosemite toad could occur, if present. These impacts could be adverse, but can be mitigated by conducting pre- construction surveys for Yosemite toad to confirm presence or absence of species. Conducting these activities during the summer, when water levels are low, and outside of the Yosemite toad breeding season would reduce the potential for encountering this species. The breeding season is typically mid- April though mid- July, which coincides with the higher water levels in and around Tenaya Lake.

Ecological restoration would occur within sensitive habitats. Restoration would be conducted or supervised by NPS resource specialists to ensure avoidance of special- status species, and long- term enhancement of habitat. Due to the proposed methodology, the short- term effects to special- status plant and wildlife species would be negligible.

Impact Significance. Based on implementation of mitigation measures, implementation of Alternative 5 would not likely adversely affect rare, threatened, or endangered species.

Operation- related Impacts. Alternative 5 incorporates avoidance of special- status plants. Improved wayfinding, interpretive materials and signage, and restoration of spur trails would

reduce the potential for visitor disturbance of slender lupine. Special- status wildlife species in the Tenaya Lake area are generally accustomed to vehicular traffic and the presence of visitors. Implementation of habitat restoration, construction of biofiltration areas, and the use of bridges and boardwalks within sensitive areas would improve habitat characteristics for terrestrial and aquatic species, resulting in a beneficial long- term effect.

Impact Significance. Based on the design of the proposed action alternatives, implementation of Alternative 5 would not affect rare, threatened, or endangered species.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area, including Alternative 5 would not likely result in adverse effects to rare, threatened, or endangered species.

Impairment. Alternative 5 would result in localized, short- term, adverse changes from current conditions. The long- term effects would be beneficial. Because no resources specific to the park's purpose would be discernibly affected, and there would be no change to the natural integrity of the park, nor effects to resource values highlighted in the 1980 GMP, Alternative 5 would not impair rare, threatened, or endangered species.

NIGHT SKY

As described in the NPS's *Interim Outdoor Lighting Guidelines*, light pollution can be created by the upward spill of light from an unshielded light source. "Dust, water vapor and other particles will scatter and reflect light that is emitted into the atmosphere, creating a phenomenon called sky glow. This light that escapes directly upward into the night sky is a major contributor to the loss of the dark night sky. Thus, improper outdoor lighting can impede the view and adversely affect visitor enjoyment of a natural, dark, night sky" (NPS 2007c).

The NPS *Management Policies* (2006) direct the NPS to conserve natural lightscapes, and the policy also includes a Dark Sky Policy that promotes the "preservation and protection of the nighttime environment and dark sky heritage through quality outdoor lighting."

Affected Environment

Regional Setting

Yosemite National Park, because of its limited lighted facilities and distance from major metropolitan areas, has generally high- quality night skies. Airborne dust and pollutants from agricultural centers in the Central Valley and smoke from forest and grass fires can periodically diminish the park's night sky quality. Outdoor lighting in the park is generally scattered and in some cases is fully shielded. Park accommodations and other facilities in Yosemite Valley are the primary source of artificial light in the park; most of the park is designated Wilderness, and offers exceptional night sky viewing.

Project Setting

The night sky at Tenaya Lake is generally unaffected by artificial light sources, due minimal development in the area. Sources of lighting include vehicles traveling at night along Tioga Road,

but there are no light poles or beacons along this roadway, nor are there lights in parking lots or visitor use areas to illuminate the roads, signs, access paths and trails, or parking areas.

Environmental Consequences

Methodology. At present, there are no NPS lighting standards available for objectively quantifying the impacts of artificial, unshielded light sources on night sky viewing. The NPS does provide guidelines and recommendations for minimizing the potential impacts on the nighttime visual environment, as documented in the NPS *Interim Outdoor Lighting Guidelines* (NPS 2007c).

Types of Impacts. The creation of glare and illumination would have an adverse effect on night sky viewing. Sources include illumination for night hour construction work, operating light poles, and lit structures.

Intensity Level Definitions

Impact threshold definitions for night sky are as follows:

- Negligible:** The night sky of the area would not be affected, or effects would not be measurable. Any effects to the night sky would be slight and short- term.
- Minor:** Effects to the night sky, such as an increase or decrease in artificial light sources, would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.
- Moderate:** Effects to the night sky would be readily apparent. Mitigation would probably be necessary to offset adverse effects.
- Major:** Effects to the night sky would be readily apparent and would substantially change the quality of the night sky over the area. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.
- Impairment:** A permanent adverse change would occur to the night sky over a large area of Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the night sky resources of the park would be precluded.

Alternative 1 (No Action)

Construction and Operation- related Impacts. Under the No Action Alternative, and as described above under the project setting, there are no park- related light sources at Tenaya Lake. However, night lighting is intermittently produced by vehicles traveling along Tioga Road, and by visitor lanterns, flashlights, and other mobile light sources at park facilities.

Impact Significance. Local, long- term, negligible, adverse impact.

Cumulative Impacts. Cumulative effects to night sky are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

There are no past actions that contribute to sources of light within the immediate project area; however, developments within Yosemite Valley and Wawona generate sources of light that cumulatively impact night sky in the region. Present actions that contribute to cumulative impacts to night sky include Curry Village and East Yosemite Valley Campgrounds Improvements and the Yosemite Institute Environmental Education Campus. Development is designed to preserve the natural lightscape of the park. In the event the Tioga Road Rehabilitation and Parkwide Communication Data Network projects require night- time construction work, short- term adverse effects to night sky may occur within the project area.

Based on the design of projects within the park, and compliance with existing standards and requirements regarding night lighting, past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would result in localized negligible impacts to night sky.

Impairment. Alternative 1 (No Action) would result in no change from current conditions. No additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural and cultural integrity of the park, nor effect to resource value highlighted in the 1980 GMP; therefore, Alternative 1 would not impair night sky.

Alternatives 2, 3, 4, and 5

Alternatives 2, 3, 4, and 5 would result in similar effects to night sky, because no artificial light is proposed within the use areas.

Construction- related Impacts. In the short- term, parking area construction, construction staging areas, and facility construction sites would likely be lit during the night for security purposes. These light sources would likely have localized adverse, but minor, impacts on night sky viewing during the period of construction. These impacts would be localized at the Sunrise Trailhead and Old Campground, Murphy Creek, and East Beach areas because these areas are proposed for the most intense levels of trail development, facility re- construction, and facility consolidation, and because it is likely that security- lit construction staging areas would be located in these areas. Mitigation to reduce these short- term impacts would include constructing lighting consistent with the following standards:

- Low in height and illuminates only the intended area;
- Shielded so that light is not directed skyward;
- Fitted with bulbs or fluorescent tubes that provide only the light intensity required to meet security needs; and
- Designed or installed to produce colors that minimize the potential for light pollution, such as using yellow light sources rather than white (yellow light scatters less in the atmosphere).

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. Under all of the proposed action alternatives, no lighting will be produced in the long- term, beyond the intermittent light presently produced by vehicles traveling Tioga Road, because none of the proposed facilities, trails, or visitor use areas would be

artificially lit. Lighting associated with operation of the campground under Alternative 5 would be limited to flashlights and camping lanterns within the 10 sites, which would not generate a significant source of light and glare affecting night sky conditions. Park operation- related impacts on the night sky at Tenaya Lake would be negligible because park operations would be conducted during the daytime, and no permanent lighting or illumination of proposed facilities is proposed.

Impact Significance. Local, long- term, negligible, adverse impact.

Cumulative Impacts. Based on the design of projects within the park, and compliance with existing standards and requirements regarding night lighting, past, present and reasonably foreseeable future actions within the project area in context of Alternatives 2, 3, 4, and 5 would result in localized negligible impacts to night sky.

Impairment. As described above, a significant impact would be produced if night sky lighting permanently impaired Park visitor enjoyment of the night sky. None of the proposed alternatives would have a significant impact on Tenaya Lake night sky viewing. The proposed actions under all of the action alternatives would have negligible long- term impacts on the night sky. The proposed actions under all of the action alternatives would not impair visitor use or enjoyment of the Yosemite National Park night sky.

SCENIC RESOURCES

Affected Environment

Regional Setting

Yosemite was designated by Congress in 1890 for the purpose of preserving Yosemite Valley's extraordinary natural resources. Preeminent among the resources that contribute to Yosemite Valley's uniqueness and early inclusion into the National Park System are its scenic quality and scenic attraction, and one of the primary reasons for establishment was to preserve the area's scenic quality for future generations. Yosemite is a "showcase of spectacular geological features" including massive granite domes, exposed granite monoliths, waterfalls and river corridors, and deep valleys. Other scenic resources include alpine and subalpine wilderness, groves of giant sequoia redwood trees, and a great diversity of wildlife (NPS 2010b). Thus the park, because of its extraordinary world- class scenic resources, is an extremely popular and internationally recognized sightseeing destination, receiving over three million visitors annually (NPS 2010c).

As mandated under the Organic Act (16 USC 1), all visual resources and scenic quality within National Parks are to be conserved and managed in an unimpaired condition for the enjoyment of future generations. Potential impairment of the resource is determined using context, intensity, duration, and timing to gauge the level of impacts of proposed projects within the National Park System.

Project Setting

Among those areas within the park that receives intense visitation because of high scenic quality and natural resource values is Tenaya Lake. It is a High Sierra mountain lake surrounded by granite domes, lodgepole forests, and Yosemite's vast wilderness. The lake and surrounding area have been captured by famous photographers, including Ansel Adams, Eadweard Muybridge,

Edward Weston, and Jerry Uelsmann. Tenaya is the largest natural lake in Yosemite, and because of its remarkable scenic qualities, its inviting blue water, and its proximity to Tioga Pass Road, the lake is a popular sightseeing destination for park summer visitors. The lake is easily accessible from Tioga Road, which runs along the lake's northern and western shoreline. The lake is surrounded by a variety of recreational facilities and sites, including picnic areas, hiking and equestrian trails, scenic viewpoints, and vehicle parking areas.

The Tenaya Lake area is comprised of five distinct visitation and use areas: Sunrise Trailhead and Old Campground, Murphy Creek, East Beach, South Trail, and Tioga Road (refer to Figures 2- 3 through 2- 6). Numerous visitor and recreational use support facilities and structures are concentrated within the Sunrise Trailhead and Old Campground, Murphy Creek, and East Beach areas. Existing facilities within these areas include vault toilets, trash containers, dumpsters, picnic tables, bear- proof storage containers, culverts, pedestrian paths and vehicle lanes, interpretive signs, and payphones. The existing scenic quality along the lakeshore consists of a combination of park development and natural landscape features. Representative photos are shown in Appendix D of this EA.

Scenic Viewpoints

The following areas represent key scenic viewpoints within the Tenaya Lake area. The discussion below includes a summary of the viewsheds and scenic qualities and characteristics within each area.

Sunrise Trailhead and Old Campground

Existing views at the west end of Tenaya Lake were documented from several shoreline day- use locations along the lake shoreline within the Sunrise Trailhead and Old Campground use areas. Views to the north and west show park- developed day use sites that include rustic paths, picnic areas, fire pits, and park signs. Tioga Road is visible through dense stands of conifers. When viewed to the northeast, the lake and lake- surrounding topography are clearly visible.

Topographically, the landscape is diverse, and includes steep to near- vertical, rugged granite cliffs and outcrops, which rise to the northeast near the lake shore when viewed from the west end of the lake. The shoreline area and the entire lake are flat, and present a strong and highly scenic contrast with the surrounding topography. There is a strong line edge- like contrast between the lake shoreline and the surrounding vegetation and rock rising beyond the shoreline. Colors are predominantly dark- green where dense to patchy stands of conifer cover the steep cliffs and granite outcrops, gray and white where granite slopes are unvegetated or covered with snow fields. Lake water is blue- green, but it should be noted that atmospheric and seasonal conditions (e.g., fog, rain, snow, clouds) would affect and modify all of these colors. Landscape textures are highly diverse, and include: smooth, even- textured lake water; dense, coarse conifers; coarse granite outcrops; and dense, patchy, unordered talus and rock fields at the base of the granite cliffs.

Murphy Creek Picnic Area

Representative views of the Murphy Creek area include viewpoints within or adjacent to the Murphy Creek access road and parking area. The existing park development is clearly visible from this perspective. Tioga Road lies visible to the north, and vehicle parking, pay telephones, toilets, and paved and unpaved roads and trails are nearby and clearly visible. Tenaya Lake and shoreline, and granite cliffs and outcrops are indistinctly visible through the dense stand of conifers, but park signs, garbage bins and dumpsters, and picnic areas are clearly visible. The area

is topographically flat and simple, dominated by uniformly spaced, vertical trees that tend to reduce the visibility of distant views. Linear contrasts are indistinct because of the obstruction of views by conifer tree trunks, however partial views of the horizontal Tenaya Lake shoreline do create contrasts with the vertical trees. Viewpoint colors are highly diverse and range from: brown and buff- colored exposed soil and forest floor duff; dark- green conifer needles; brown- gray conifer bark; light green grass; blue- green lake water and gray granite cliffs in the distance, and park- placed crushed gravel and decorative rocks and boulders. Park facility colors are also highly diverse, including dark brown, blue, red, and yellow. Textures range from uniformly dense, ordered, and coarse picnic area trees; coarse- textured granite rock along the lake shoreline; to smooth, finely textured lake water, asphalt, and gravel.

East Beach Picnic Area

The view from this perspective is near the northeastern end of the lake along the shoreline. The end of the short access trail from the East Beach parking lot is nearby and visible, as are picnic areas and a rustic trail leading southeast along the lake shoreline. Tioga Road and vehicles traveling along this road are clearly visible to the northwest. In general, the view of the lake and surrounding landscape is unobstructed and similar to the descriptions for Sunrise Trailhead and Old Campground, but viewed from the opposite end of the lake (see above description). Topographically, the landscape is diverse, and includes steep to vertical, rugged granite cliffs and outcrops, which rise to the northwest and to the south when looking southwest toward the far end of the lake. A relatively flat shoreline can be seen at the far end of the lake with undulating to rolling, forest- covered hills in the distance beyond the far shoreline. The near shoreline and the entire lake are flat, and present a strong and highly scenic contrast with the surrounding topography. There is a strong line edge- like contrast between the lake shoreline and the surrounding vegetation and rock rising beyond the shoreline. Colors are predominantly dark- green where dense stands of conifer cover the steep cliffs and granite outcrops, gray and white where granite slopes are unvegetated or covered with snow fields. Lake water is blue- green, but it should be noted that atmospheric and seasonal conditions (e.g., fog, rain, snow, clouds) would affect and modify all of these colors. Landscape textures are highly diverse, and range from: smooth, even- textured lake water; dense, coarse conifers; coarse granite outcrops; medium- textured hills; and dense, patchy, unordered talus and rock fields at the base of the granite cliffs.

Environmental Consequences

Methodology. While the NPS does not apply a visual classification system to managing scenic resources because all scenic resources are to be managed in an unimpaired condition, it does apply methods to consistently analyze potential impacts of park planning projects to scenic resources. One method used is contrast analysis. Contrast analysis can be summarized as: the degree to which a proposed project or activity affects scenic quality or visual resources depends on the visual contrasts created or imposed by a project on the existing landscape. The contrasts can be measured by comparing the project's features with the major features in the existing landscape (NPS 2010d, BLM 1986).

The criteria for measuring landscape contrasts are the forms, colors, textures, and lines that comprise the existing and potentially modified landscape. Landscape form refers to the unified masses or shapes of the landscape being analyzed, such as existing structures, topography, and natural objects (e.g., granite domes, jagged peaks, meadows). Landscape color refers to the landscape surface colors, as affected by viewing distance, atmospheric effects (e.g., smoke, haze,

fog, dust), and time of day. Landscape textures are the variations, patterns, density, and graininess of the landscape surface (e.g., uneven, sparse, and seemly random- ordered shrubs in an arid landscape; even, dense, continuous masses of trees in a coniferous forest), and the dimensions of those surface variations (e.g., tall conifers, short grasses, bare earth or rock). Linear landscape features are the real or imagined paths that the eye follows when perceiving abrupt changes in form, color, or texture. These are often noticeable as the edge effect created at the boundary of two contrasting areas (e.g., a line of trees along a rocky slope or ledge, the abrupt boundary between forest and grassland, a dark ridgeline silhouetted against a bright sky).

Using this method, specific, representative viewpoints are selected from which the existing affected environmental is described and the project's potential impacts on scenic quality are determined. The criteria for selecting representative viewpoints are:

- Those areas with “visual sensitivity.” These would be areas with landscapes that are most interesting and appealing, and for which any changes would likely attract public concern. Within the Tenaya Lake project area, these would likely be the lake and areas that provide visibility to the surrounding highly scenic granite domes, cliffs, forest, and skyline surrounding the lake.
- The potential number of viewers of the area. The most comprehensive views of the area for the greatest number of viewers would be from motorists traveling east and west along Tioga Road and those using the lake’s hiking trails, picnic areas, and sightseeing viewpoints.
- The length of time the area is in view. Motorists and pedestrian sightseers on the above-mentioned thoroughfares and at the lake’s shoreline viewing areas would likely have the best views of existing scenic quality and any changes to that quality for the longest time period.
- The angle of observation. More weight is given to those potential viewpoints that show more of the area, as more potential impacts would be visible. Views that are elevated, present slopes and aspects that show more of the area are preferred. Conversely, flat areas are not considered ideal representative viewpoints because a relatively small portion of the plan area is likely to be visible.

Viewpoints were selected to provide representative views of the existing landscape in and adjacent to these areas, and of potential impacts to the landscape from project development. The viewpoints selected for documenting the existing affected environment and for visual analysis are:

- The Sunrise Trailhead and Old Campground Area – with views toward the east along the length of the lake, Tioga Road, and park facilities at the west of the lake;
- Murphy Creek Picnic Area – with views from lake mid- point to east and west, of Murphy Creek where it flows into the lake, and park facilities adjacent to the creek;
- East Beach Picnic Area – with views of Tioga Road, Stately Pleasure Dome, views toward the west along the length of the lake, park facilities at the east end of the lake, and surrounding skyline.

Types of Impacts. In general, the contrast analysis concept assumes that development- related landscape changes that repeat the natural features of the landscape or are well integrated with existing landscape features are considered to be in harmony with their surroundings. These changes produce low levels of contrast and are considered to have a low impact on existing scenic quality or on the aesthetic values of the landscape. Landscape modifications that do not harmonize with the surrounding landscape are considered to be in contrast with that landscape. The contrasts appear obvious, they stand out, and they can be scenically displeasing to viewers because they are not well integrated with the existing natural landscape.

For the purposes of this analysis, scenic resource analysis involves determining the degree of visual change between the existing landscape (including any existing structures and infrastructure) and the landscape that would result from new development. Given the methodology and assumptions described above, the following criteria (intensity level definitions) have been developed to assess the level of impact to scenic resources from each of the alternatives.

Intensity Level Definitions

Negligible: No short- term or long- term changes to the views of the area or the degree of contrast would occur. Some transient (temporary) visual changes may occur, caused by construction or by the movement of equipment.

Minor: Changes to scenic quality or in the degree of contrast would be short- term only. Limited mitigation would be required.

Moderate: Short- term changes to scenic quality or in the degree of contrast could occur both within and beyond the site. Long- term changes would be limited to the site.

Major: Both short- term and long- term changes in scenic quality or in the degree of contrast would occur both within and beyond the immediate area, and some of these changes may be substantive.

Impairment: Long- term, development- related landscape contrasts imposed on the existing natural landscape would be extensive and would be obviously visible to the casual viewer. They would be a focus of attention and dominate the view resulting in an inability to fulfill the park's mission of protecting viewsheds.

Alternative 1 (No Action)

Construction and Operation- related Impacts. Under the No Action Alternative, there would be no changes to existing park infrastructure, and no changes to current conditions and activities. Park- related routine repairs, and facility operation and maintenance would continue to be conducted, and parking facilities and areas would remain in their present conditions and capacities. Site- specific natural and cultural resource protection would continue, as would site- specific landscape restoration. As seen from Tioga Road, roadside parking on the southern side of the roadway would continue to obstruct views, as seen from moving vehicles, and parked vehicles would continue to be clearly visible as seen from various points around and within the lake.

Impact Significance. Local, long- term, moderate, adverse impact

Cumulative Impacts. Cumulative effects to scenic resources are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

Past actions which cumulatively impact scenic resources include development of the Tenaya Lake area, including roadside parking and temporary stops for vehicles, buses, and shuttles.

Implementation of the Fire and Vegetation Management plans include thinning and trimming of vegetation, which would have a beneficial effect on scenic resources.

Present actions which cumulatively impact scenic resources within the project area include implementation of the Scenic Vista Management Plan would include management, trimming, and removal of vegetation within key scenic areas on Tioga Road. Activities associated with the Tioga Road Rehabilitation and Parkwide Communication Data Network projects would include grading, trenching, and disturbance along the Tioga Road corridor, potentially resulting in short-term adverse impacts (i.e., visibility of construction equipment, disturbed shoulders, and roadway). Upon completion of these projects, Tioga Road would be restored. Implementation of the New Merced and Tuolumne Wild and Scenic River Comprehensive Management Plans would include guidelines and measures to protect and enhance outstanding scenic resources within the applicable corridors.

There are no reasonably foreseeable future actions that could contribute to cumulative impacts to scenic resources within or in the vicinity of the project area. Continued implementation of the park's Invasive Plant, Fire, and Vegetation Management Plans would have a beneficial impact on scenic resources through programs such as invasive species management, fuel load reduction, and habitat restoration.

Past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would result in local, long- term, minor adverse cumulative impacts to scenic resources.

Impairment. Alternative 1 (No Action) would result in no change from current conditions. No modifications in the project area would occur, and scenic resources would not be impaired.

Action Alternatives (2, 3, 4, and 5)

Based on the location, design, and surrounding landscape, implementation of Alternatives 2, 3, 4, and 5 would result in similar impacts to scenic resources. An analysis of comment elements, and the specific elements of each action alternative is provided below.

Under all of the action alternatives (2, 3, 4, and 5), there would be an additional picnic area constructed adjacent to the existing East Beach parking area and the removal of a water pipe. Additional signs, culverts, and biofiltration areas would be developed along Tioga Road. Additional trails would be constructed throughout the Tenaya Lake planning area. The overall long- term effect would be negligible, because proposed improvements and facilities would be similar to those currently present at Tenaya Lake, and design features would be compatible with the setting and character of the area. Potentially adverse impacts to scenic quality would be minor because the impacts would be short- term and construction- related. The adverse impacts would include visually intrusive construction equipment and construction personnel that could create form and color contrasts with the area's natural setting. These short- term impacts would be

mitigated by existing park development and surface disturbance, facilities, and structures along Tioga Road and at the East Beach parking area. The actions common to all alternatives would have negligible long- term impacts because they would be consistent with the existing level of park- related development and surface disturbances around the lake, and would not obscure or create visual contrasts with the area's highly scenic background landscapes.

Alternatives 2 (Tenaya Confluence, Preferred Alternative)

Construction- related Impacts. The impacts of construction on scenic resources would be adverse, but minor, in the short- term because of visually intrusive light and heavy construction vehicles, equipment, materials, personnel, and construction staging areas. Surface disturbances within the construction areas would also contribute to temporary localized impacts. The physical presence of construction personnel, material and equipment, activity, and surface disturbances would likely be obvious to park visitors at Tenaya Lake. Construction would introduce localized form, line, color, and texture contrasts into the landscape that would be inconsistent with the area's local and background scenic quality. Once the proposed re- location, re- construction, and consolidation of facilities is complete, the impacts of finished construction would be negligible because 1) construction would be conducted in areas of existing park development and thus consistent with existing levels of disturbance, and 2) no structures would be built that would impede or affect Tenaya Lake background and lakeshore scenic quality.

Under this alternative, the existing parking lot would be improved and expanded, the existing Old Campground parking loop would be improved, existing facilities would be consolidated and improved, and existing trails would be consolidated and re- organized. The impacts of these proposed actions on scenic quality would be adverse and minor in the short- term for visitors to this portion of the Tenaya Lake planning area because of localized, visually intrusive construction activities, heavy and light construction equipment and vehicles, and construction personnel. Fenced and cleared construction staging areas and stored building materials would also create construction- related adverse impacts.

The existing parking lot east of Murphy Creek would be removed and the area restored, and the western parking lot would be expanded. Existing facilities would be re- located and consolidated at the western parking lot. Existing trails would be either improved and/or relocated; the existing Murphy Creek culvert under Tioga Road would be removed and replaced with a box culvert. The impacts of removing the eastern parking lot would have adverse, minor, short- term impacts, including construction- related visual intrusions during the construction period, and visually intrusive staging areas and stored building materials that would temporarily degrade local scenic quality for visitors sightseeing or recreating in the area. Impacts and surface disturbances would be conducted in or adjacent to areas already disturbed by previous park construction, within the context of and consistent with existing park development.

The existing East Beach parking lot would be expanded, existing facilities would be consolidated and relocated to an area adjacent to the parking lot, picnic areas would be improved, and accessible trails would be constructed to join the parking lot with Tioga Road and with East Beach. A rustic trail would also be constructed from East Beach to South Trail. The short- term adverse impacts to scenic quality would be minor, and would result from construction activities, staging areas, and equipment.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. There would be no impacts to scenic resources caused by operation and maintenance of Alternative 2 beyond those already affecting scenic quality under the No Action Alternative, because the operation and maintenance of the proposed facilities would be similar to those presently conducted at Tenaya Lake. An overall reduction (or removal) of roadside parking along the south side of Tioga Road would improve the viewshed by reducing or removing obstacles, as seen from moving vehicles on the roadway. Pedestrian and accessible access to scenic views would be improved. Proposed interpretive signage would be rustic in character, and would incorporate granite, peeled log, and pre- stained steel materials, compatible with the surrounding landscape.

In the long- term, the expanded Sunrise Trailhead parking lot would likely be shielded from view by the existing and intervening dense stands of conifers for those visitors hiking the shoreline trails. There would be no impact to the background scenic topography surrounding the lake because none of the actions proposed under this alternative would include construction of structures tall enough to affect visitor background viewing.

Within the Murphy Creek area, restoration of the eastern parking area would introduce long- term beneficial, scenically pleasing form, color, texture, and line landscape features into this area, extending from the confluence of Murphy Creek and Tenaya Lake to north of Tioga Road. The proposed pedestrian bridge would not interfere with views of Tenaya Lake, and would be located within lodgepole pine forest habitat. The design of the bridge would be compatible with the existing setting. There would be no impact to the background scenic topography surrounding the lake from this locale because none of the actions proposed under this alternative would include construction of structures tall enough to affect visitor background viewing.

The long- term impacts to scenic resources in the East Beach areas would be negligible, because of existing, localized surface disturbances and facilities. Proposed improvements would be consistent with existing development. As seen from Tioga Road and other locations around the perimeter of the lake, proposed trails and facilities would not result in a long- term impact to the background scenic topography surrounding the lake because none of the actions proposed under this alternative would include construction of structures tall enough to affect visitor background viewing, and the surrounding lodgepole pine forest would partially obscure proposed facilities.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Actions under Alternative 2 in combination with past, present, and reasonably foreseeable future actions would result in local, long- term, minor, beneficial cumulative impacts to scenic resources in the project area.

Impairment. This alternative would not have a significant impact on scenic resources or visual quality at Tenaya Lake. Alternatives 2 would not cause impairment of park visual resources or scenic quality at Tenaya Lake.

Alternative 3 (Tenaya Ecotones)

Construction- related Impacts. The impacts of construction on scenic resources would be adverse, but minor, in the short- term because of visually intrusive light and heavy construction vehicles, equipment, materials, personnel, and construction staging areas. Surface disturbances within the construction areas would also contribute to temporary localized impacts. The physical

presence of construction personnel, material and equipment, activity, and surface disturbances would likely be obvious to park visitors at Tenaya Lake. Construction would introduce localized form, line, color, and texture contrasts into the landscape that would be inconsistent with the area's local and background scenic quality. Once the proposed re- location, re- construction, and consolidation of facilities was completed, the impacts of finished construction would be negligible because 1) construction would be conducted in areas of existing park development and thus consistent with existing levels of disturbance, and 2) no structures would be built that would impede or affect Tenaya Lake background and lakeshore scenic quality.

Under this alternative, the existing parking lot would be improved and expanded, the existing Old Campground parking loop would be improved, existing facilities would be consolidated and improved, and existing trails would be consolidated and re- organized. The impacts of these proposed actions on scenic quality would be adverse and minor in the short- term for visitors to this portion of the Tenaya Lake planning area because of localized, visually intrusive construction activities, heavy and light construction equipment and vehicles, and construction personnel. Fenced and cleared construction staging areas and stored building materials would also create construction- related adverse impacts.

The existing parking lot east of Murphy Creek would be removed and the area restored, and the western parking lot would be expanded along Tioga Road. Existing facilities would be re- located and consolidated at the western parking lot. Existing trails would be either improved and/or relocated; the existing Murphy Creek culvert under Tioga Road would be removed and rebuilt to include a vehicle bridge. The impacts of removing the eastern parking lot would have adverse, minor, short- term impacts, including construction- related visual intrusions during the construction period, and visually intrusive staging areas and stored building materials that would temporarily degrade local scenic quality for visitors sightseeing or recreating in the area. Impacts and surface disturbances would be conducted in or adjacent to areas already disturbed by previous park construction, within the context of and consistent with existing park development.

The existing East Beach parking lot would be expanded, existing facilities would be consolidated and relocated to an area adjacent to the parking lot, picnic areas would be improved, and accessible trails would be constructed to join the parking lot with Tioga Road and with East Beach. A rustic trail would also be constructed from East Beach to South Trail. The short- term adverse impacts to scenic quality would be minor, and would result from construction activities, staging areas, and equipment.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. There would be no impacts to scenic resources caused by operation and maintenance of Alternative 3, beyond those already affecting scenic quality under the No Action Alternative, because the operation and maintenance of the proposed facilities would be similar to those presently conducted at Tenaya Lake. An overall reduction (or removal) of roadside parking along the south side of Tioga Road would improve the viewshed by reducing or removing obstacles, as seen from moving vehicles on the roadway. Pedestrian and accessible access to scenic views would be improved. Proposed interpretive signage would be rustic in character, and would incorporate granite, peeled log, and pre- stained steel materials, compatible with the surrounding landscape.

In the long- term, the expanded Sunrise Trailhead parking lot would likely be shielded from view by the existing and intervening dense stands of conifers for those visitors hiking the shoreline trails. There would be no impact to the background scenic topography surrounding the lake because none of the actions proposed under this alternative would include construction of structures tall enough to affect visitor background viewing.

Within the Murphy Creek area, restoration of the eastern parking area would introduce long-term beneficial, scenically pleasing form, color, texture, and line landscape features into this area, extending from the confluence of Murphy Creek and Tenaya Lake to north of Tioga Road. The proposed vehicle/pedestrian bridge south of Tioga Road would not interfere with views of Tenaya Lake, and would be located within lodgepole pine forest habitat. The design of the bridges would be compatible with the existing setting. There would be no adverse impact to the background scenic topography surrounding the lake from this locale because none of the actions proposed under this alternative would include construction of structures tall enough to affect visitor background viewing.

The proposed bridge over Murphy Creek north of Tioga Road would not be visible from the road due to intervening topography and vegetation. The bridge would be constructed with a rustic design to enhance compatibility with the surrounding area. While visually compatible, the presence of the bridge may contrast with visitor expectations of Wilderness character (e.g., few to no structural or man- made elements), resulting in an adverse impact.

The long- term impacts to scenic resources in the East Beach areas would be negligible, because of existing, localized surface disturbances and facilities. Proposed improvements would be consistent with existing development. As seen from Tioga Road and other locations around the perimeter of the lake, proposed trails and facilities would not result in a long- term impact to the background scenic topography surrounding the lake because none of the actions proposed under this alternative would include construction of structures tall enough to affect visitor background viewing, and the surrounding lodgepole pine forest would partially obscure proposed facilities.

Impact Significance. Local, long- term, moderate, adverse impact.

Cumulative Impacts. Actions under Alternative 3 in combination with past, present, and reasonably foreseeable future actions would result in local, long- term, minor, beneficial cumulative impacts to scenic resources in the project area.

Impairment. This alternative would not have a significant impact on scenic resources or visual quality at Tenaya Lake. Alternatives 3 would not cause impairment of park visual resources or scenic quality at Tenaya Lake.

Alternative 4 (Lake Loop)

Construction- related Impacts. The impacts of construction on scenic quality would be adverse, but minor, in the short- term because of visually intrusive light and heavy construction vehicles, equipment, materials, personnel, and construction staging areas. Surface disturbances within the construction areas would also contribute to temporary localized impacts. The physical presence of construction personnel, material and equipment, activity, and surface disturbances would likely be obvious to park visitors at Tenaya Lake. Construction would introduce localized form, line, color, and texture contrasts into the landscape that would be inconsistent with the area's

local and background scenic quality. Once the proposed re- location, re- construction, and consolidation of facilities was completed, the impacts of finished construction would be negligible because 1) construction would be conducted in areas of existing park development and thus consistent with existing levels of disturbance, and 2) no structures would be built that would impede or affect Tenaya Lake background and lakeshore scenic quality.

Under this alternative, the existing parking lot would be expanded and re- organized, existing facilities consolidated and relocated, and existing trails consolidated, and re- organized or constructed, with short- term and long- term impacts similar to those discussed under Alternatives 2 and 3, because the level and degree of impacts to scenic quality would be similar. The existing Old Campground parking loop, Tioga Road culverts adjacent to the loop, and picnic areas near the loop would be removed and the area restored. These proposed actions would have short- term adverse impacts on scenic quality because of construction- related changes in the form, color, and textures of the surrounding landscape during the period of construction. In the long- term, the impacts to scenic quality from parking loop restoration would be moderately beneficial because restoration of this area would enhance the existing natural vegetation forms, colors, and textures near the lakeshore. There would be no impact to the background scenic topography surrounding the lake from this locale because none of the actions proposed under this alternative would include construction of structures tall enough to affect visitor background viewing.

Under Alternative 4, improvements within Murphy Creek would include expansion of the western parking lot at Murphy Creek, improvement of the eastern parking lot, construction of pedestrian bridges and trails, and consolidation and relocation of visitor facilities to the re- constructed western parking lot. Riparian restoration would be conducted from the mouth of Murphy Creek and Tioga Lake to Tioga Road, and a trail would be constructed across the Murphy Creek area. The short- term minor adverse impacts on scenic quality would include construction- related visual intrusions from vehicles, equipment, personnel, and staged building materials. With the exception of the accessible and rustic trail construction around the lake, the proposed actions under Alternative 4 would be similar to those discussed under Alternatives 2 and 3, with similar impacts.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. There would be no impacts to scenic quality caused by operation and maintenance of the proposed actions, beyond those already affecting scenic quality under the No Action Alternative, because the operation and maintenance of the proposed facilities would be the same as are presently conducted at Tenaya Lake. An overall reduction (or removal) of roadside parking along the south side of Tioga Road would improve the viewshed by reducing or removing obstacles, as seen from moving vehicles on the roadway. Pedestrian and accessible access to scenic views would be improved under each of the action alternatives. Proposed interpretive signage would be rustic in character, and would incorporate granite, peeled log, and pre- stained steel materials, compatible with the surrounding landscape.

Under Alternative 4, within the Sunrise Trailhead and Old Campground area, the long- term impacts on scenic quality would be negligible because proposed reconstruction activities would be consistent with existing park development. The proposed bridge over the Tenaya Creek outlet would be a new feature in the area; however, the design would be rustic and visibility would be

limited to the immediate area. Surrounding lodgepole pine forest would obstruct views of the bridge from other locations around the lake and Tioga Road.

The proposed wetland and riparian restoration along Murphy Creek would likely have long-term, moderate, beneficial impacts on local scenic quality because it would enhance the natural forms, colors, and textures of the area's existing vegetation. With the exception of the proposed accessible trail near Tioga Road, the long- term impacts would be similar to those discussed under Alternatives 2 and 3.

The proposed pedestrian bridges within the Murphy Creek and East Beach areas would not interfere with views of Tenaya Lake, and would be located within lodgepole pine forest habitat. The East Beach bridge would likely be visible from Tioga Road; however, due to the proposed rustic design and use of wooden materials, it would not be visually incompatible with the surrounding environment. While the presence of the bridges would be a new feature to the area, the rustic design would be compatible with the existing setting.

There would be no impact to the background scenic topography surrounding the lake because none of the actions proposed under this alternative would include construction of structures tall enough to affect visitor background viewing.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Actions under Alternative 4 in combination with past, present, and reasonably foreseeable future actions would result in local, long- term, minor, beneficial cumulative impacts to scenic resources in the project area.

Impairment. Alternative 4 would not have a significant impact on scenic resources or visual quality at Tenaya Lake. This alternative would not cause impairment of park visual resources or scenic quality at Tenaya Lake.

Alternative 5 (Immersive Nodes)

Construction- related Impacts. Under this alternative, construction- related impacts to scenic resources would be similar to those discussed under Alternatives 3. The impacts of construction on scenic resources would be adverse, but minor, in the short- term because of visually intrusive light and heavy construction vehicles, equipment, materials, personnel, and construction staging areas. Surface disturbances within the construction areas would also contribute temporary localized impacts. The physical presence of construction personnel, material and equipment, activity, and surface disturbances would likely be obvious to park visitors at Tenaya Lake. Construction would introduce localized form, line, color, and texture contrasts into the landscape that would be inconsistent with the area's local and background scenic quality. Once the proposed re- location, re- construction, and consolidation of facilities was completed, the impacts of finished construction would be negligible because 1) construction would be conducted in areas of existing park development and thus consistent with existing levels of disturbance, and 2) no structures would be built that would impede or affect Tenaya Lake background and lakeshore scenic quality.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. Under this alternative, operation- related impacts would be similar to those discussed under Alternative 3. There would be no impacts to scenic resources caused by operation and maintenance of proposed facilities south of Tioga Road, including Sunrise Trailhead and Old Campground, Murphy Creek, and East Beach areas. This alternative includes retaining approximately 30 spaces of roadside parking in the southern side of Tioga Road, which would be visible and would partially interfere with views of the lake as seen from moving vehicles; however, this quantity is substantially less than existing conditions, and will have a noticeable beneficial effect on the viewshed as seen from Tioga Road. Development of 10 campsites north of Tioga Road would include minimal facilities (i.e., picnic tables, one water spigot). Tents associated with the campground may be briefly visible as seen from Tioga Road; however, views would be partially obstructed by intervening vegetation and lodgepole pine trees. Due to the substantial reduction in roadside parking, pedestrian and accessible access to scenic views would be improved under Alternative 5.

Similar to Alternative 3, the proposed bridge over Murphy Creek north of Tioga Road would not be visible from the road due to intervening topography and vegetation. The bridge would be constructed with a rustic design to enhance compatibility with the surrounding area. While visually compatible, the presence of the bridge may contrast with visitor expectations of Wilderness character (e.g., few to no structural or man- made elements), resulting in an adverse impact.

Impact Significance. Local, long- term, moderate, adverse impact.

Cumulative Impacts. Actions under Alternative 5 in combination with past, present, and reasonably foreseeable future actions would result in local, long- term, minor, beneficial cumulative impacts to scenic resources in the project area.

Impairment. As discussed above for each alternative, none of the alternatives and proposed action under the alternatives would have a significant impact on scenic resources or visual quality at Tenaya Lake. Alternative 5 would not cause impairment of park visual resources or scenic quality at Tenaya Lake.

AIR QUALITY

Affected Environment

Regional Setting

Yosemite National Park is classified as a mandatory Class I area under the federal Clean Air Act (42 USC 7401 et seq.). This air quality classification is aimed at protecting parks and designated Wilderness areas from air quality degradation. The federal Clean Air Act gives federal land managers the responsibility for protecting air quality and related values from adverse air pollution impacts, including visibility, plants, animals, soils, water quality, visitor health, and cultural and historic structures and objects.

The U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) designate whether counties in California are in attainment of federal and state (respectively) ambient air quality standards for criteria air pollutants.

Tenaya Lake is located in Mariposa County, which is part of the Mountain Counties Air Basin. Air quality and emission sources in Mariposa County are regulated by the Mariposa County Air Pollution Control District. Portions of Mariposa County located within Yosemite National Park are designated nonattainment for national and state ozone standards (see Appendix E). The portion of Mariposa County within Yosemite National Park is also designated nonattainment for the state particulate matter smaller than 10 microns (PM₁₀) standard. Both counties are designated either attainment or unclassified for the remaining national and state standards. As nonattainment areas, conformity under Section 176 of the Clean Air Act is applicable.

The California Environmental Protection Agency (CalEPA) concluded that all of the ozone exceedances in 1995 in the southern portion of the Mountain Counties Air Basin (i.e., Mariposa County) were caused by transport of ozone and ozone precursors from San Joaquin Valley Air Basin (CARB 1996). Air quality in the Mountain Counties Air Basin is also significantly affected by pollutant transport from the metropolitan Sacramento area and the San Francisco Bay Area. In contrast, the San Joaquin Valley Air Basin is considered both a source and a receptor of pollutant transport.

Air quality in the park is affected by emission sources both in and outside of Yosemite National Park. Air pollution sources in the park include stationary sources such as furnaces, boilers, wood stoves, campfires, generators, barbecues, and prescribed fires. Motor vehicles, including personal vehicles and tour buses, are mobile sources, and emissions primarily include carbon monoxide, nitrogen oxides, and hydrocarbons (or volatile organic compounds). Most of the stationary and area sources are associated with park operations (NPS and concessionaire). Campfires and associated emissions, however, are typically generated by visitors.

The air quality in Yosemite National Park is also affected by the transport of pollutant emissions from stationary sources outside of Yosemite National Park. Operations at various power plants, food processors, and industrial facilities—some as far as 60 miles away—emit PM₁₀, sulfur dioxide, volatile organic compounds, carbon monoxide, and nitrogen dioxide that are transported within the park. Of the sources located within Yosemite Valley, mobile sources constitute the majority of the emissions generated within the valley. To a somewhat lesser extent, campfires and area sources (e.g., space and water heating, fireplaces, power generators, and fuel storage) also contribute to emissions within the valley. Land uses such as residences, schools, and hospitals are considered to be more sensitive than the general public to poor air quality because the population groups associated with these land uses have an increased susceptibility to respiratory distress. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas because people generally spend longer periods of time at their residences.

Global Climate Change

Climate within the Sierra Nevada Range is influenced by varying topography. Low and mid-elevations within the range experience hot and dry summers and cool rainy winters. Higher elevations experience much cooler temperatures and snowfall during winter months. The rainshadow effect results in reduced precipitation east of the Sierra crest. The northernmost portion of Yosemite National Park experiences the highest mean annual precipitation, which generally exceeds 55 inches per year. There are 22 active weather stations within the park.

Indicators of global climate change within the Sierra Nevada Range include changes to snowpack depth and spring runoff, which has shifted plant cycles and peak streamflow, affecting habitat types (NPS 2007b). Subsequently, plant and wildlife species would be affected if they are unable to adapt to changes in their habitat. Migratory birds and aquatic species including fish, frogs, and toads have demonstrated behavioral changes in response to climate change (National Science and Technology Council 2008). Additional climatic changes may include higher temperatures and decreasing rainfall, affecting fire regimes and outbreaks of pests and diseases.

Scientific Studies. A series of reports issued by the United Nations Intergovernmental Panel on Climate Change (UNIPCC) has synthesized the results of recent scientific studies of climate change (UNIPCC 2007a, 2007b, 2000c). Key findings of these reports include the following:

- Global atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased markedly as a result of human activities since 1750, and now far exceed pre-industrial levels. Global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use change, and global increases in methane and nitrous oxide are due primarily to agriculture.
- Warming of the global climate due to greenhouse gases (GHG) is unequivocal, as evidenced by increases in air and water temperatures, widespread melting of snow and ice, and rising global average sea level. Most of the increase in global average temperatures since the mid- 20th century is very likely due to increases in GHGs from human activities. GHG emissions increased 70% between 1970 and 2004.
- Numerous long- term climate changes observed have included changes in arctic temperatures and ice, precipitation, ocean salinity, wind pattern, and the frequency of extreme weather events such as droughts, heavy precipitation, heat waves, and tropical cyclone intensity.
- Continued GHG emissions at current rates would cause further warming and climate change during the 21st century that would very likely be larger than that observed in the twentieth century.
- Climate change is expected to have adverse impacts on water resources, ecosystems, food and forest products, coastal systems and low- lying areas, urban areas, and public health. These impacts would vary regionally.

California GHG Emissions and Climate Change. In California, the main sources of GHG emissions are from the transportation and energy sectors. According to CARB, draft GHG emission inventory for the year 2004, 39% of GHG emissions result from transportation and 25% of GHG emissions result from electricity generation. California produced 497 million metric tons of CO₂ equivalent (MMtCO₂e) in 2004 (CARB 2007). California produces about 2% of the world's GHG emissions.

The potential effects of future climate change on California resources include (California Climate Change Portal [CCCP] 2007):

- Air temperature: increases of 3 to 10.4 degrees Fahrenheit by the end of the century, depending on the aggressiveness of GHG emissions mitigation.

- Sea level rise: 6 to 30 inches by the end of the century, depending on the aggressiveness of GHG emissions mitigation.
- Water resources: reduced Sierra snowpack, reduced water supplies, increased water demands, changed flood hydrology.
- Forests: changed forest composition, geographic range, and forest health and productivity.
- Ecosystems: changed habitats, increased threats to certain endangered species.
- Agriculture: changed crop yields, increased irrigation demands.
- Public health: increased respiratory illness and weather- related mortality.

Yosemite National Park Climate Action Plan. Yosemite National Park participates in the Climate Friendly Parks Program implemented by the EPA and the NPS, and has been designated a “Climate Friendly Partner.” To obtain this designation, Yosemite has conducted a baseline GHG emissions inventory, developed a Climate Action Plan (Yosemite National Park 2006), and committed to educating park staff, visitors, and community members about climate change.

In 2005, Yosemite’s GHG emissions from non- fire management activities totaled more than 16,000 million metric tons carbon dioxide equivalent (MMtCO₂e). Of this total, 64% was caused by mobile combustion, 21% by stationary combustion, and 10% by purchased electricity, with the remainder caused by other sources.

The objective of Yosemite’s Climate Action Plan is to identify actions that Yosemite can undertake to reduce GHG emissions and thus address climate change. A specific goal is to reduce non- fire management-related GHG emissions to 10% below 2005 levels by 2010 through implementing emission mitigation actions. The Plan recommends three strategies:

- Reduce fuel use and GHG emissions from park facilities and operations
- Increase climate change outreach and education efforts
- Perform subsequent emission inventories to evaluate progress and develop future emission mitigation actions

Project Setting

The climate in the Tenaya Lake area is temperate, with hot, dry summers with sporadic thunderstorms and cold, wet, snowy winters. The highest months of snowfall occur from December through February. Average rainfall for the year is approximately 40 inches.

There are two monitoring stations located within the park, both of which are primarily funded by the Air Quality Division of the NPS and CARB. The Turtleback Dome monitoring station is located approximately 17 miles east of the project area and monitors ozone levels. The second monitoring station, which monitors PM₁₀ and particulate matter 2.5 microns or smaller (PM_{2.5}) levels, is located at the Yosemite Village visitor center, approximately 10 miles from the project

area. In 2008, Yosemite National Park was above state- recommended ozone levels for 11 days. Data was inconclusive for PM10 and PM2.5 levels.

Some land uses are considered more sensitive to air pollution than others. Sensitive receptors generally include facilities that house or attract children, the elderly, and people with illnesses, or others who are especially sensitive to the effects of air pollutants. Sensitive receptors in the project area include day use areas and trailheads. Although Tenaya Lake is not within the proximity of residential infrastructure, it is considered a recreational hub and therefore could be considered a sensitive receptor.

Turtleback Dome Monitoring Station

The Turtleback Dome Monitoring Station monitors ozone, visibility, dry deposition, and meteorology. At this station, data recorded between 2004 and 2008 indicate multiple- day exceedances of the state one- hour and eight- hour ozone standards and multiple- day exceedances of the national nine- hour ozone standard (refer to Appendix E). The general trend of the data, however, indicated a decrease in ozone pollutants from 2004 to 2007, and an increase in 2008.

Yosemite Valley Monitoring Station

The Yosemite Valley Monitoring station monitors PM10, PM2.5, ozone, nitrous oxides, and meteorology. Data recorded between 2000 to 2003 at this station indicate multiple- day exceedances of the state PM10 standard (data after 2003 was not available). No exceedances of the national PM10 standard were recorded between 2004 and 2008. The general trend of the data indicates an increase in particulate matter at this station (refer to Appendix E).

Environmental Consequences

Methodology: The air quality analysis was based on a qualitative analysis of air emissions from construction activities as well as long- term operations of visitor facilities and bus/shuttle stops. The creation of pollutants resulting from the implementation of a project can contribute to an impact on air quality; however, air quality is a regional issue that is influenced by factors outside the immediate area. In addition, many air quality issues are related to non- construction vehicles and air quality analysis often focuses on vehicle emissions related to increases or decreases in traffic volumes. Since this project is not expected to affect non- construction vehicle trips or traffic volumes, this section presents a qualitative assessment of air emissions related to the construction of proposed improvements and the continued use and routine maintenance of the Tenaya Lake area.

Types of Impacts: Types of impacts include short- term emissions generated during construction, and long- term emissions generated by stationary sources and vehicles.

Intensity Level Definitions

Impacts to air quality were evaluated using the process described in the introduction to this chapter. Impact threshold definitions are as follows:

Negligible: Air emissions would not be noticeable or visible.

Minor: Air emissions would be slightly visible and may be noticeable to highly sensitive receptors. Mitigation would be relatively simple to implement.

Moderate: Air emissions would be visible and noticeable to sensitive receptors. Mitigation would probably be necessary to offset adverse effects.

Major: Air emissions would be visible and noticeable to non-sensitive receptors. Extensive mitigation would be necessary to offset adverse effects.

Impairment: Effects to the park's air quality would be severe and long-term and would preclude the protection of the park's air quality for future generations.

Alternative 1 (No Action)

Construction and Operation- related Impacts. Under Alternative 1, air quality would continue to be affected by roadside traffic, shuttle buses, tour buses, and routine facility maintenance. There would be no construction-related impacts. Pollutant emissions would contribute to regional air quality conditions.

Mobile source emissions would be generated by vehicles, shuttle buses, and tour buses both passing through and stopping at Tenaya Lake. Pursuant to bus permit requirements, buses are not allowed to idle longer than five minutes (Clark 2009). Other vehicles include NPS maintenance and park operations staff. Air pollutants emitted by mobile sources include: Reactive organic gases (ROG), oxides of nitrogen (NOx), carbon dioxide (CO₂), carbon monoxide (CO), sulfur dioxide (SO₂), and diesel particulate matter (DPM). Stationary sources in the Tenaya Lake area include fire grills, which emit particulates during use.

Continued operation and use of the Tenaya Lake area would have no additional effect on air quality. Impacts to local and regional air quality are expected to long-term, negligible, and adverse.

Impact Significance. Long-term, negligible, adverse impact.

Cumulative Impacts. Cumulative effects to air quality are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

Past actions which cumulatively impact air quality include the continued use of Tenaya Lake, as discussed above. Actions which have resulted in long-term air quality emissions in the region include Curry Village Employee Housing. The Yosemite Valley Shuttle Bus Procurement project included the purchase of alternative fuel-shuttle buses, which are intended to reduce air emissions within the park, and result in beneficial effects to air quality.

Present actions which cumulatively impact air quality include construction projects such as the Curry Village and East Yosemite Valley Campgrounds Improvements, Curry Village Rockfall Hazard Zone Structures and Tent and Cabin Relocation projects, Glacier Point Road Rehabilitation, Rehabilitation of the Valley Loop Road, Parkwide Communication Data Network, Tioga Road Rehabilitation Project, and the Yosemite Institute Environmental Education Campus. Standard BMPs would be applied during construction to reduce air emissions, including: site watering, covering stockpiles, covering haul trucks, and vehicle emission controls to reduce both

tailpipe and fugitive dust emissions. Long- term stationary and mobile source emissions would be generated by the Curry Village housing and camping area projects, and the Environmental Education Campus. Based on the size and design of these facilities, the cumulative effect would be negligible.

Reasonably foreseeable future actions that could contribute to short- term, construction- related emissions include the Wawona Road Rehabilitation and Maintenance Facility projects.

Sources of GHG emissions are the same as for criteria air pollutants. GHG emissions from the alternatives would contribute to cumulative global climate change caused by global GHG emissions. However, cumulative impacts of the alternatives on global climate change are not considered significant because it is not possible to discern the effects of these emissions on global climate change.

Past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would result in local, long- term, negligible adverse cumulative impacts to air quality.

Impairment. Under Alternative 1, air quality in Yosemite National Park would not be impaired.

Alternatives 2, 3, 4, and 5

Implementation of Alternatives 2, 3, 4, and 5 would include use of construction equipment to implement trail improvements, construct boardwalks and bridges, remove and construct culverts, and grade for and construct parking areas. In context with air emissions and proposed phasing plans, the likely emissions generated during construction would be similar for all proposed action alternatives. Standard BMPs would be applied to reduce the potential for particulate dust, diesel particulates, and equipment- generated emissions during construction (refer to Appendix A). Operational emissions would continue to be generated by mobile sources, including visitors, buses, and NPS maintenance vehicles. The action is proposed to address current visitor safety and experience conditions, and does not include expanded parking capacity; therefore, the action would not likely result in additional vehicle trips compared to existing conditions.

Construction- related Impacts. Air quality impacts as a result of this alternative would relate primarily to construction equipment emissions and dust generated during construction activities. Emissions would occur in the immediate vicinity of grading and construction activities and trucks moving into and out of the project area. Effects would be related to heavy equipment and human intrusion and could include dust generation, soil disturbance and compaction, vegetation removal, and excavation, all of which may contribute to an increase in suspended particulate matter. Enhancement or degradation of these resources can directly or indirectly enhance or degrade the quality of the experience. Construction activities in each area are expected to be of relatively short duration. Construction- related GHG emissions would be generated by construction vehicles. Standard BMPs would be incorporated into the action, including use of dust control measures.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. Under Alternatives 2, 3, 4, and 5, air quality would continue to be affected by roadside traffic, shuttle buses, tour buses, and routine facility maintenance. Pollutant

emissions would contribute to regional air quality conditions, including GHG emissions. Operational emissions are not anticipated to significantly change from existing conditions; however, operation of improved shuttle stops and the reduced parking capacity may result in a reduction in individual vehicle trips to the area.

Impact Significance. Local, long- term, negligible, adverse impact.

Cumulative Impacts. Past, present and reasonably foreseeable future actions within the project area would contribute to short and long- term air pollutant and GHG emissions. Based on the size of the project, and existing use of the area, the cumulative effect of Alternatives 2, 3, 4, and 5 would be negligible.

Impairment. Under Alternatives 2, 3, 4, and 5, air quality in Yosemite National Park would not be impaired.

SOUNDSCAPES

Affected Environment

Regional Setting

In accordance with NPS *Management Policies* (2001) and Director's Order 47 (NPS 2000), *Sound Preservation and Noise Management*, an important part of the NPS mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human- caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials.

Sound levels are usually measured in A- weighted decibels (dBA), and descriptors, such as the energy equivalent noise level (Leq) and the day- night average noise level (Ldn), are commonly used to account for fluctuations of sound over time. Generally, a 3- dBA increase in ambient sound levels is considered the minimum threshold at which most people can detect a change in the sound environment; an increase of 10 dBA is perceived as a doubling of the ambient sound level.

Sounds found desirable during times of rest and relaxation are referred to as natural quiet, and include natural, outdoor ambient sounds, without the intrusion of human- caused sounds. Natural sounds throughout Yosemite National Park are not considered noise. The enjoyment of natural sounds along the river contributes to the Yosemite National Park visitor's experience, and natural quiet can be essential in order for some individuals to achieve a feeling of peace and solitude.

Natural sources of sound in Yosemite National Park include waterfalls, rushing water, wind, and wildlife. There is also noise from human activities and mechanical devices such as automobiles, trucks, and transit buses. Ambient sound levels in Yosemite National Park vary by location and also by season (the volume of water in the waterfalls and rivers is lower in the fall and higher in the spring). Ambient sound levels are also influenced by the number of visitors to the park and by the proximity of mechanical noise sources. The existing sound environment changes dramatically

throughout the year in direct proportion to the level of park use with ambient levels during the summer generally being higher than winter levels. Changes are due primarily to increases in vehicle traffic on area roadways and visitor- related noise (NPS 2000a).

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. Residences, hotels, campgrounds, schools, hospitals, and outdoor recreation areas are generally more sensitive to noise than commercial and industrial land uses.

Project Setting

Sources of noise at Tenaya Lake includes traffic on Tioga Road, which runs adjacent to the project area, and several day use areas and parking lots located on the eastern, northern, and western boundaries of the project area. High visitor use at the lake generates human- made sounds, including portable music and voices.

Environmental Consequences

Methodology. Impacts related to noise were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur at Tenaya Lake. Short- term impacts would be temporary impacts that typically occur during construction activities. Long- term impacts would be impacts that continue to occur after construction and typically last 10 years or more.

Types of Impacts. Factors affecting the soundscape include short- term use of vehicles, trucks, and equipment to deliver materials and implement construction activities. Long- term effects include the generation of noise from facilities (for example, closing doors and dumpster lids), visitor vehicles (for example, engines, brakes, and doors), voices, and personal electronics. The ambient noise level would likely be noticed by park visitors and employees in remote areas, including adjacent designated Wilderness, and trail sites where there is an expectation for silence and natural sounds (e.g., flowing water, wildlife). Impacts will be assessed based on the current noise environment, and the proposed action's change (increase or decrease in ambient noise) on the soundscape.

Intensity Level Definitions

Negligible: Negligible impacts would not be detectable.

Minor: Minor impacts would be slightly detectable, but would not be expected to have an appreciable effect on ambient noise levels.

Moderate: Moderate impacts would be clearly detectable and could have an appreciable effect on ambient noise levels; moderate adverse impacts may include introduction of noise associated with an activity or facility into an area with little or no ambient noise.

Major: Major impacts would be clearly audible against ambient noise levels, or would have a substantial, highly noticeable effect on ambient noise levels.

Impairment: Effects to the park's soundscape would be severe and long- term and would preclude the protection of the park's soundscape for future generations.

Alternative 1 (No Action)

Vehicle, equipment, and human noise along Tioga Road, and to a much lesser extent human noise along trails at the lake, contribute a relatively high amount of ambient noise to the soundscape at Tenaya Lake. Under the No Action Alternative, the soundscape would continue to be affected by these noises and would not be addressed.

Construction and Operation- related Impacts. No construction- related impacts would occur. Noise generated by vehicles on Tioga Road and the use of associated visitor amenities would continue to affect ambient noise levels in the Tenaya Lake area. Parking would not be expanded or re- organized around the lake. Vehicles engines, brakes, and doors would continue to create noise at Sunrise Trailhead, Murphy Creek, East Beach, and much of the length of Tioga Road at undesignated roadside parking areas between Sunrise Trailhead and East Beach. Sounds generated by visitors would continue to include human voices, personal electronics, footsteps, and the open and closing of doors, bear boxes, and other devices. These noises contribute to existing noise levels of Tioga Road although they are generally lower than those vehicle noise levels. Park visitors using the trails around Tenaya Lake would continue to notice these noises. Visitor use noises may occasionally dominate the soundscape (such as car alarms and loud voices or music), but are not typically the dominate source of sound in the vicinity (i.e., vehicle noise associated with Tioga Road). Implementation of Alternative 1 would not address existing noise levels at Tenaya Lake or noise associated with increased visitation but would also not generate any new short- term sources of noise that are associated with construction. Operation- related impacts would include local, long- term, moderate, adverse impacts from vehicle and visitor noise.

Impact Significance. Local, long- term, moderate, adverse impact.

Cumulative Impacts. Cumulative effects to the soundscape are based on the analysis of past, present, and reasonably foreseeable future actions in the Yosemite National Park region, in combination with potential effects under this alternative. The actions identified below are examples of action that could affect noise in combination with the alternative.

Past actions that cumulatively impact the soundscape at Tenaya Lake include beneficial impacts from implementation of the 1980 GMP and El Portal Road plus adverse impacts such as the construction of Tioga Road. Present actions that cumulatively impact the soundscape include Glacier Point Road rehabilitation, Scenic Vista Management Plan, Tioga Road Rehabilitation Project, and New Merced and Tuolumne Wild and Scenic River Management Plans. Reasonably foreseeable future actions that would cumulatively impact visitor experience within the project area include the Wawona Road Rehabilitation Project. The adverse effects from construction associated with these plans and present or future projects would be localized and short- term, and primarily related to construction- generated traffic on roadways throughout the park. Noise generated by the construction of cumulative actions would result in a local, short- term, minor, adverse impact to the ambient noise environment along park roads. Road resurfacing and traffic calming actions would have local, long- term, minor, beneficial impacts on the soundscape. Past, present, and reasonably foreseeable future actions within the project area in combination with the

potential effects of this alternative would result in local, long- term, moderate, adverse cumulative impacts to the soundscape.

Impairment. Alternative 1 would result in no change from current conditions. The soundscape at Tenaya Lake would continue to be adversely impacted by vehicle and visitor noise. Though continued use of Tioga Road and roadside visitor amenities creates adverse, localized effects to the soundscape, the park's soundscape would not be impaired under this alternative.

Alternatives 2 (Preferred), 3, and 4

Alternatives 2, 3, and 4 have similar impacts on the soundscape and are therefore analyzed together.

Construction- related Impacts. Implementation of Alternatives 2, 3, or 4 would result in short-term adverse impacts to the soundscape due to noise associated with the construction and redesign of parking lots, facilities, infrastructure, trails, restored areas, and signage. These construction- related impacts would occur in each of the project areas around Tenaya Lake. Examples of noise associated with construction include the operation of heavy equipment, voices of construction workers, and noise associated with material hauling vehicles. Such noise could affect nearby recreational users on trails, in nearby meadows and beaches, or at trailheads. Table 3- 6 provides typical noise levels generated by various types of heavy equipment that could be used during construction activities.

Table 3-6. Typical Construction Equipment Noise Levels

Equipment	Typical Noise Level (dBA) 50 Feet from the Source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85

Table 3-6. Typical Construction Equipment Noise Levels

Equipment	Typical Noise Level (dBA) 50 Feet from the Source
Paver	89
Pneumatic Tool	85
Pump	76
Rock Drill	98
Roller	74
Saw	76
Scraper	89
Truck	88

Source: Federal Transit Administration 2006

Although proposed improvement designs vary by alternative, noise associated with construction would be similar across all alternatives. For example, noise associated with constructing 61 standard parking spaces at Sunrise Trailhead under Alternative 2 would be comparable to noise associated with 61- or 81- space parking lots under Alternatives 3 and 4 respectively. Parking and facility construction noise would generally be concentrated in the Sunrise Trailhead, Murphy Creek, and East Beach areas across all alternatives. The construction of other improvements, such as bridges and trails, would have a similar impact on the soundscape. These impacts would potentially be audible throughout the Tenaya Lake area regardless of the specific construction location.

Impact Significance. Local, short- term, minor to moderate, adverse impact.

Operation- related Impacts. Under Alternative 2 (Preferred), 3, and 4, the volume and type of noise would be redistributed as many vehicles would no longer park at undesignated areas along Tioga Road. Visitors would be redirected to park primarily at Sunrise Trailhead, Murphy Creek, and East Branch and recreate along nearby trails, meadows, and beaches. Noise associated with frequent acceleration and braking as vehicles exit and enter numerous undesignated parking areas along Tioga Road impact the soundscape more than at the proposed parking areas where traffic calming features would facilitate quieter vehicle movement. The lower designated speeds (25 mph vs. 35 under the No Action Alternative) would also moderate the noise associated with vehicles. These impacts are expected to be local, long- term, minor, and adverse.

Noise associated with parking cars, visitors' voices, personal electronics, and pets would create local, long- term, minor, adverse impact to the soundscape. These noises contribute to existing noise levels of Tioga Road although they are generally lower than those vehicle noise levels. Visitor use noises may occasionally dominate the soundscape (such as car alarms and loud voices or music), but are not typically the dominate source of sound in the vicinity (i.e., vehicle noise associated with Tioga Road).

All action alternatives propose strategies for vehicle speed reduction and safety of pedestrian crossing at shuttle stops. These strategies include installation of rumble strips, which would potentially cause local, long- term, minor, adverse noise disturbance impacts.

Alternative 2 (Preferred) includes distributes the parking more evenly between Sunrise Trailhead, Murphy Creek, and East Beach. Five designated parking spaces would be provided along Tioga Road. The removal of fire grills at Murphy Creek would limit some picnic and evening use resulting in less noise associated with those activities. Noise associated with visitor use would be more generally dispersed around Tenaya Lake than Alternatives 3 and 4. Impacts associated with Alternative 3 would be local, long- term, minor, and adverse.

Alternative 3 (Tenaya Ecotones) includes slightly less parking than the other action alternatives but some parking would remain along Tioga Road. The removal of fire grills at Murphy Creek would limit some picnic and evening use resulting in less noise associated with those activities. The trails across Tenaya Creek would not be improved with bridges, which may limit use and visitor noise along the south shore. Noise associated with visitor use would be primarily concentrated at Sunrise Trailhead, Murphy Creek, and East Beach. Impacts associated with Alternative 3 would be local, long- term, minor, and adverse.

Alternative 4 (Lake Loop) concentrates parking more at Sunrise Trailhead, which would slightly increase noise at those areas while eliminating noise from parking along Tioga Road. Noise associated with the use of fire grills would continue at Murphy Creek. Bridge improvements, including the improved loop around Tenaya Lake, would facilitate more dispersed use and associated noise. The loop trail would offset the more concentrated parking configuration. Impacts associated with Alternative 4 would be local, long- term, minor, and adverse.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long- term, minor, beneficial, and adverse impacts while implementation of Alternatives 2, 3, or 4 would have local, long- term, minor, adverse impacts. Thus, the cumulative actions in combination with Alternative 2, 3, or 4 would result in net negligibly adverse cumulative impacts to the soundscape in the project area.

Impairment. Construction- related impacts would have a local, short- term, moderate, adverse impact on the soundscape under each alternative. Operation- related impacts would include local, long- term, minor adverse impact under each alternative. Because the soundscape would be improved in Alternative 2, 3, and 4, there would be no impairment of the soundscape with the implementation of these alternatives.

Alternatives 5 (Immersive Nodes)

Alternative 5 would generate more noise than Alternative 2, 3, and 4 during construction and operation phases because of comparatively more parking along Tioga Road and the additional facilities.

Construction- related Impacts. Implementation of Alternatives 5 would result in short- term adverse impacts to the soundscape due to noise associated with the construction and redesign of parking lots, facilities, infrastructure, trails, restored areas, and signage. These construction-

related impacts would occur in each of the five main areas around Tenaya Lake. Examples of noise associated with construction include the operation of heavy equipment, voices of construction workers, and noise associated with material hauling vehicles. Such noise could affect nearby recreational users on trails, in nearby meadows and beaches, or at trailheads.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. Under Alternative 5, the volume and type of noise would be redistributed but many vehicles would continue to park along Tioga Road. Some visitors would be redirected to park at Sunrise Trailhead, Murphy Creek, and East Branch and recreate along nearby trails, meadows, and beaches. Noise associated with frequent acceleration and braking as vehicles exit and enter numerous undesignated parking areas along Tioga Road would impact the soundscape more than at the proposed parking areas where traffic calming features would facilitate quieter vehicle movement. The lower designated speeds (25 mph vs. 35 under the No Action Alternative) would moderate the noise associated with vehicles though. These impacts are expected to be local, long- term, moderate, and adverse.

The more extensive visitor facilities at Sunrise Trailhead compared to the other action alternatives reflect the higher expected use and associated noise. More trash/recycling containers, bear boxes, and toilet stall would create the possibility of more noise. The addition of 10 walk- in campsites would also create additional noise compared to the other action alternatives, especially during the evening and early morning. The small water craft access may also encourage more activity and associated noise than would otherwise occur. Impacts associated with Alternative 5 would be local, long- term, moderate, and adverse.

Similar to Alternatives 2, 3, and 4, this alternative includes strategies for vehicle speed reduction and safety of pedestrian crossing at shuttle stops. These strategies include installation of rumble strips, which will cause local, long- term, minor, adverse noise disturbance impacts.

Impact Significance. Local, long- term, moderate, adverse impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long- term, minor, beneficial, and adverse impacts while implementation of the Alternative 5 would have a local, long- term, moderate, adverse impact. Thus, the cumulative actions in combination with the Alternative 2 would result in net minor adverse cumulative impacts to the soundscape in the project area.

Impairment. Construction- related impacts would have a local, short- term, moderate, adverse impact on the soundscape. Operation- related impacts would include local, long- term, moderate adverse impact. Alternative 5 would result in a minor adverse change from current conditions. The soundscape at Tenaya Lake would be adversely impacted by vehicle and visitor noise plus new noises, such as camping and heightened boat use. Though these activities create adverse, localized effects to the soundscape, the park's soundscape would not be impaired under this alternative.

WILDERNESS

Affected Environment

Regional Setting

The designated Yosemite Wilderness of Yosemite National Park offers an escape from human-made structures, crowds, artificial light, and noise, and allows visitors to experience solitude, natural quiet, and spectacular scenery. The vast Wilderness also allows visitors to explore and discover the incredible natural beauty of the many geologic features, rivers, streams, lakes, and many species of plants and animals. Visitors find that they can hike for considerable lengths of time without encountering other people along the trail. The remote areas of the Wilderness provide outstanding opportunities for solitude and a primitive and unconfined type of recreation. This is the basis of a Wilderness experience.

The Yosemite Wilderness was established by the California Wilderness Act of 1984. Of Yosemite National Park's 761,266 total acres, 704,624 acres (94.2%) have been designated Wilderness and another 927 acres (0.1%) are potential Wilderness additions. The Yosemite Wilderness is generally accessed by the almost 750 miles of marked and maintained trails. Visitor day use is by and large unregulated (current interim Half Dome day- use permit program regulates Wilderness use), but overnight use and access to the Wilderness is controlled by trailhead quotas implemented through a Wilderness permit system administered by the NPS. Trailhead quotas have been established to reduce resource impacts and to increase opportunities for solitude. Compared with the developed areas, visitor use is significantly less.

Camping is generally allowed anywhere in the Wilderness, provided it is at least 100 feet from any waterbody. Camping is discouraged in sensitive areas (i.e., meadows and other areas with fragile vegetation). In some areas there are no- camping or no- fire zones. No- camping zones include all areas within 1 mile of public access roads, within 1 mile of a High Sierra Camp, and within 4 trail-miles of Yosemite Valley, Tuolumne Meadows, Wawona, and Hetch Hetchy. Campfires are generally allowed below 9,600 feet, although restrictions exist in certain areas. Toilets have been installed in most designated campgrounds, and food lockers have been installed at all Wilderness trailheads. The control of human waste is among the most critical management issues in the Wilderness. Other practices designed to minimize or eliminate impact are either recommended or required.

The Yosemite Wilderness has 69 trailheads starting within the park and 48 trailheads on U.S. Forest Service lands that access almost 750 miles of marked trails. These trails are maintained by the NPS with crews augmented by the California Conservation Corps. NPS rangers and volunteers patrol the Wilderness area on foot, skis, or horseback. All marked and maintained Wilderness trails are open to private or commercial stock, with minor exceptions. Stock are generally not allowed more than 0.25 mile off marked and maintained trails, and then only for feeding and watering. Hikers in groups of eight persons or fewer are allowed to use cross- county routes and are encouraged to practice minimum- impact techniques.

Project Setting

The largest natural lake in Yosemite, Tenaya Lake is surrounded by granite domes, lodgepole forests, and designated Wilderness. In part because of its proximity to Tioga Road, Tenaya Lake is

one of the most popular destinations for summer visitors in Yosemite. Tenaya Lake and its shoreline are within the natural zone, and designated Wilderness is located north and south of Tioga Road. Several trailheads along Tioga Road lead into Wilderness areas. One trail leads around all but the northwestern shore of Tenaya Lake. While there is no official trail along that section, hikers can walk along the shoulder of Tioga Road to complete the loop of the lake.

Most of the project is not located in Wilderness, except for Murphy Creek Trail re-alignment and restoration activities north of Tioga Road proposed in Alternatives 2, 3, and 5. Wilderness resources surround the Tenaya Lake project area, and could be affected by the indirect effects of proposed activities. Wilderness extends 200 feet from the centerline of paved roads, including Tioga Road.

Environmental Consequences

Methodology. Impacts to the Wilderness experience have been assessed by considering the following: Wilderness characteristics and values, including the primeval character and influence of the Wilderness; preservation of natural conditions, including the lack of manmade noise; and assurances that there will be outstanding opportunities for solitude, that the public will be provided with a primitive and unconfined type of recreational experience, and that Wilderness will be preserved and used in an unimpaired condition.

Types of Impacts. Impacts to the Wilderness experience may occur as a result of changes to access, and management of transient populations within Wilderness areas. The experience is also affected by actions that influence natural and cultural resources, including air quality, water quality, ambient noise, vegetation, and scenic resources. Enhancement or degradation of these resources can directly or indirectly enhance or degrade the quality of the experience. Construction activities (i.e., generation of noise and dust, delays due to work within or adjacent to roadways), and changes to the visual setting, including introduction of built environments can result in both short- and long- term effects.

Intensity Level Definitions

Impacts to Wilderness were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for Wilderness are as follows:

- Negligible:** Wilderness would not be affected, or effects would not be measurable. Any effects to Wilderness would be slight and short- term.
- Minor:** Effects to Wilderness, such as increase in trail use, would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.
- Moderate:** Effects to Wilderness would be readily apparent. Mitigation would probably be necessary to offset adverse effects.
- Major:** Effects to Wilderness would be readily apparent and would substantially change the characteristics of the Yosemite Wilderness. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment: A permanent adverse change would occur to Wilderness in Yosemite National Park, affecting the resource to the point that the park's mission could not be fulfilled and enjoyment by future generations of Wilderness would be precluded.

Alternative 1 (No Action)

Under the No Action Alternative, the Tenaya Lake area would not be improved, except for continuation of existing restoration projects, emergency repairs, and routine and periodic maintenance activities. The existing facilities would continue to serve the area, trails would not be improved, and no new parking would be constructed. There would be no impact to Wilderness from the No Action Alternative.

Construction and Operation- related Impacts. No construction- related impacts would occur because the project would not be built. This alternative would require continuing repair and maintenance, and ongoing restoration activities in the Tenaya Lake area. Repair and maintenance activities would take place outside Wilderness boundaries, but in the immediate vicinity of the Wilderness boundary. Therefore, routine repair and maintenance may have an indirect effect on Wilderness, including the generation of noise. While these activities would have a short- term, adverse effect on Wilderness experience, due to the proximity to Tioga Road, these effects would be negligible.

Impact Significance. Local, long- term, negligible, adverse impact

Cumulative Impacts. Cumulative effects to Wilderness are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative.

Past actions which cumulatively impact Wilderness include the 1980 GMP, and Invasive Plant, Fire, and Vegetation Management Plans. The effect on Wilderness would be beneficial, due to management of fire regimes, and improvements to vegetative habitats. Present actions which cumulatively impact Wilderness include the Parkwide Communication Data Network project, Yosemite Institute Environmental Education Center, and New Merced and Tuolumne Wild and Scenic River Management Plans. Adverse effects, including tree trimming within Wilderness, would be minor. All activities within Wilderness would be conducted using minimal tool methods to reduce impacts and maintain a natural, primitive environment. Management of outstanding features within Wilderness under the Wild and Scenic River plans would have a beneficial effect. Implementation of the Half Dome Stewardship Plan would provide for long- term stewardship of the Half Dome trail route, which would benefit Wilderness character and experience. Reasonably foreseeable future actions, including the Wilderness Management Plan, would have a beneficial effect on Wilderness.

Past, present and reasonably foreseeable future actions within the project area in context of the No Action Alternative would result in local, long- term, minor beneficial cumulative impacts to Wilderness.

Impairment. No construction- related impacts would occur because the project would not be built. Operation- related impacts would be local, long- term, minor, and beneficial. Alternative 1 (No Action) would result in no change from current conditions. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would

be no change to the natural and cultural integrity of the park, nor effect to resource value highlighted in the 1980 GMP; therefore Alternative 1 would not impair park Wilderness.

Alternative 2 (Tenaya Confluence, Preferred Alternative)

Construction- related Impacts. Under Alternative 2, proposed actions within Wilderness would include realignment of a portion of the Murphy Creek Trail and restoration of the abandoned sections. Short- term effects would include noise and dust from construction activities. Use of hand tools would be required within Wilderness to minimize these effects. While visitors would likely notice the activities, the activities would be short- term, and limited to the trailhead area, and would not impact Wilderness experience in the backcountry areas. Construction activities in the immediate vicinity of Wilderness include trail improvements and restoration activities. The South Trail is located immediately adjacent to the Wilderness boundary. The topography east of the trail slopes steeply upward and there are no trails or use areas in the vicinity. Construction activities, including expansion of parking areas and new visitor facilities, would generate noise, which may have an indirect effect on Wilderness areas. Due to distance and intervening topography, these short- term effects would be negligible. During the construction phase, there will be a period between removal of existing parking areas and construction of expanded or new parking lots when parking availability is limited or unavailable in specific areas. This would result in a negligible impact, due to the brevity of the effect, and proposed phased construction schedule.

Impact Significance. Local, short- term, negligible, adverse impact.

Operation- related Impacts. Under Alternative 2, the removal of roadside parking would result in an overall loss of available parking (86% of maximum observed vehicles). Day- use visitors would use designated parking lots, including the Murphy Creek and Sunrise Trailhead lots. This may limit the available parking for overnight use during peak visitor use periods, resulting in an adverse impact to Wilderness users. Overall, proposed parking areas, wayfinding and interpretive materials, and facilities would provide for improved visitor experience, including those stationing at Tenaya Lake while accessing Wilderness and backcountry areas. The South Trail is adjacent to Wilderness, so any routine repairs or maintenance would have a short- term, negligible effect on visitor experience as a result of noise from repair activities. While the proposed rumble strips would generate noise, the sound would attenuate due to distance and intervening topography.

Impact Significance. Local, long- term, negligible, adverse impact.

Cumulative Impacts. Over time, Wilderness resources in the park have been affected by the creation of access trails and amenities to allow for visitor use and enjoyment. Since these lands were designated under the Wilderness Act, they have remained largely untouched and impacts to them, aside from increases in visitor use, have diminished. The implementation of Alternative 2 would result in negligible cumulative adverse impacts to Wilderness as a result of restoration and stewardship. Once the activities are completed, cumulative restoration impacts would be beneficial to Wilderness lands.

Impairment. Alternative 2 would result in short- term and long- term, negligible, adverse impacts from construction. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural and cultural

integrity of the park, nor effect to resource value highlighted in the 1980 GMP, therefore Wilderness would not be impaired.

Alternatives 3 and 5

Alternatives 3 and 5 include similar actions within Wilderness, including realignment of the Murphy Creek Trail and construction of a bridge over Murphy Creek; therefore, these alternatives would result in similar construction and operation- related impacts, as discussed below.

Construction- related Impacts. Under Alternatives 3 and 5, actions within Wilderness would include re- construction and restoration of the Murphy Creek Trail, construction of a 50- foot bridge over Murphy Creek (north of Tioga Road), and restoration of the abandoned trail section. Short- term effects would include noise and dust from construction activities. Use of stock to transport equipment and materials, and use of hand tools would be required within Wilderness to minimize these effects. However, use of a helicopter may be required to transport bridge materials, which would generate a substantial level of noise in the immediate area. While visitors would likely notice the activities, the activities would be minor, and limited to the trailhead area, and would not impact Wilderness experience in the backcountry areas. Construction activities in the immediate vicinity of Wilderness include trail improvements and restoration activities. The South Trail is located immediately adjacent to the Wilderness boundary. The topography east of the trail slopes steeply upward and there are no trails or use areas in the vicinity. Construction activities, including expansion of parking areas and new visitor facilities, would generate noise, which may have an indirect effect on Wilderness areas. Due to distance and intervening topography, these short- term effects would be negligible. During the construction phase, there will be a period between removal of existing parking areas and construction of expanded or new parking lots when parking availability is limited or unavailable in specific areas. This would result in a negligible impact, due to the brevity of the effect, and proposed phased construction schedule.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. Under Alternatives 3 and 5, a 50- foot rustic bridge would be constructed over Murphy Creek. Under the Wilderness Act, wilderness is defined as “an area of undeveloped federal land” where “the imprint of man’s work [is] substantially unnoticeable.” The presence of the Murphy Creek bridge would clearly be a man- made element, which is inconsistent with the general characteristics of Wilderness. Long- term maintenance of the bridge would likely be accomplished by use of hand tools and stock to transport materials; however, occasional use of a helicopter may be necessary. These activities would generate noise in the immediate area, affecting Wilderness character.

The South Trail is adjacent to Wilderness, so any routine repairs or maintenance would have a short- term, negligible effect on visitor experience as a result of noise from repair activities. Operation of the camping area proposed under Alternative 5 would generate noise; however, this use would be located outside of Wilderness, near Tioga Road. Due to intervening topography and distance from backcountry Wilderness areas, the effect would be negligible.

Alternative 5 would provide 251 parking spaces, which equates to the maximum observed capacity during peak conditions. Under Alternative 3, the removal of roadside parking would result in an

overall loss of parking (83% of maximum observed vehicles). Day- use visitors would use designated parking lots, including the Murphy Creek and Sunrise Trailhead lots. This may limit the available parking for overnight use during peak visitor use periods, resulting in an adverse impact to Wilderness users. Overall, proposed parking areas, wayfinding and interpretive materials, and facilities would provide for improved visitor experience, including those stationing at Tenaya Lake while accessing Wilderness and backcountry areas.

Impact Significance. Local, long- term, moderate, adverse impact.

Cumulative Impacts. Over time, Wilderness resources in the park have been affected by the creation of access trails and amenities to allow for visitor use and enjoyment. Since these lands were designated under the Wilderness Act, they have remained largely untouched and impacts to them, aside from increases in visitor use, have diminished. The implementation of Alternatives 3 or 5 would result in negligible cumulative adverse impacts to Wilderness, due to other restoration and stewardship actions within the park.

Impairment. Alternatives 3 or 5 would result in short- term, negligible, adverse impacts from construction. Operation- related impacts would be local, long- term, moderate, and adverse. However, because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural and cultural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, therefore Wilderness would not be impaired.

Alternative 4 (Lake Loop)

Construction- related Impacts. Under Alternative 4, no project actions would occur in Wilderness. Construction activities in the immediate vicinity of Wilderness include trail improvements and restoration activities. The South Trail is located immediately adjacent to the Wilderness boundary. The topography east of the trail slopes steeply upward and there are no trails or use areas in the vicinity. Construction activities, including expansion of parking areas and new visitor facilities, would generate noise, which may have an indirect effect on Wilderness areas. Due to distance and intervening topography, these short- term effects would be negligible.

Impact Significance. Local, short- term, negligible, adverse impact.

Operation- related Impacts. There would be no long- term adverse impacts to Wilderness under Alternative 4. Routine repairs and maintenance would have a short- term, negligible indirect effect on visitor experience as a result of noise from repair activities.

Under Alternative 4, the removal of roadside parking would result in an overall loss of parking (85% of maximum observed vehicles). Day- use visitors would use designated parking lots, including the Murphy Creek and Sunrise Trailhead lots. This may limit the available parking for overnight use during peak visitor use periods, resulting in an adverse impact to Wilderness users. Overall, proposed parking areas, wayfinding and interpretive materials, and facilities would provide for improved visitor experience, including those stationing at Tenaya Lake while accessing Wilderness and backcountry areas.

Impact Significance. Local, long- term, negligible, adverse impact.

Cumulative Impacts. The implementation of Alternative 4 would not result in direct impacts to Wilderness, or require any activities within Wilderness areas; therefore, cumulative effects would be negligible.

Impairment. Alternative 4 would not result in a significant change from current conditions. Because no additional resources specific to the park's purpose would be affected beyond the current condition, and there would be no change to the natural and cultural integrity of the park, nor effect to resource value highlighted in the 1980 GMP, therefore Wilderness would not be impaired.

HISTORIC PROPERTIES

Historic Properties include sites, buildings, districts, structures, objects, landscapes, and traditional cultural properties. The quality of significance in American history, architecture, archeology, engineering, and culture is present in historic properties that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- a. that are associated with events that have made a significant contribution to the broad patterns of our history; or
- b. that are associated with the lives of persons significant in our past; or
- c. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- d. that have yielded, or may be likely to yield, information important in prehistory or history.

ARCHEOLOGY

Affected Environment

Regional Setting

To date, approximately 12% of Yosemite National Park lands have been inventoried for archeological resources, and more than 1,700 archeological sites have been documented. Most of the inventories focused on developed areas and road corridors; however, some Wilderness areas have also been surveyed. In most cases, inventories have been conducted in support of park development actions as part of the environmental and historic preservation compliance processes. Lithic scatters, primarily of obsidian, are the most common constituent of prehistoric archeological sites within Yosemite National Park. Other resources include milling stations (granite boulders with mortar cups or milling slicks); artifact caches and scatters (including obsidian waste flakes, obsidian and ground stone tools, soapstone vessel fragments, and dietary faunal remains); midden soils; rock shelters; pictograph panels; human burials; house floors; fire hearths; and rock alignments. Historical archeological sites include refuse deposits, building foundations, privy pits, utilities, human burials, and landscape features such as ditches, roads, rock alignments, non-native plants, and trails. Individual sites vary by type, size, depth,

complexity, length of occupation, variety of remains, and potential to yield important scientific information.

Yosemite National Park has been inhabited by people for thousands of years. Evidence of American Indian occupation dates to at least 6000 years before the present. These thousands of years of American Indian habitation of the park have left a rich material culture throughout the park.

Project Setting

The project- specific Area of Potential Effects (APE) was established by the lead federal agency, in consultation with SHPO, in accordance with 36 CFR 800.16(d). Section 106 defines an APE as:

The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

The project APE was delineated to ensure identification of significant cultural resources that may be directly or indirectly affected by the project, and are listed in or eligible for inclusion in the NRHP. The proposed 360.5- acre direct APE includes areas of direct ground disturbance, as well as areas with permanent site improvements and areas for staging and temporary construction activities.

The areas surrounding the lake contain numerous archeological sites that reflect occupation of this ideal setting for tool and food processing, and human habitation. Most archeological sites feature abundant representation of obsidian tools and flake debris. Some sites also feature rock mortar cups and slicks that indicate food processing. One site suggests rock shelter habitation. In addition, both on top of and separate from these earlier sites one can find evidence of more recent occupation such as can dumps. The archival record also suggests that a few historic sites have yet to be found, such as the Murphy Cabin site.

Many of these sites have been partially damaged through looting, erosion, and infrastructural development. Documented disturbances include inadvertent collection of historic material mistaken for trash during a parkwide litter removal project in 2009 (Montague 2010). Prehistoric archeological sites have likely also been affected by historical development.

Archeological Survey Results

In 2009, a total of 160 acres was surveyed by NPS archeologists. A list of potentially eligible properties is included in Table 3- 7 below. The survey methodology, research data, survey results, and recommendations are documented in the Report on Archeological Survey and Subsurface Survey, Tenaya Lake Area, Yosemite National Park (Montague 2010). One new site and nine isolates were recorded, three sites were re- documented, minor updates were completed for documentation at two sites, and all six sites were assessed. Minimal excavations were conducted at two sites (CA- MRP- 154/H and - 1954/H) to identify the nature and distribution of subsurface materials. In addition to the excavations, both sites were also re- recorded and condition assessments were updated. The results of the survey report are summarized below.

Table 3-7. Potentially Eligible Archeological Sites in the Area of Potential Effect

Property	Site Status and NR Status Code	Type
CA-MRP-153	Site tested in 2009, archeological materials not identified during testing, no further work recommended; NR Status Code 7*	Prehistoric Lithic Scatter Site
CA-MRP-1948	Previously recorded in 1986, NR Status Code 7*	Prehistoric Lithic Scatter and Milling Feature Site
CA-MRP-1946	Previously recorded in 1985, NR Status Code 7*	Prehistoric Lithic Scatter and Milling Feature Site
CA-MRP-1947	Previously recorded in 1985, NR Status Code 7*	Prehistoric Lithic Scatter Site
CA-MRP-1949	Previously recorded in 1985, NR Status Code 7*	Prehistoric Lithic Scatter and Milling Feature Site
CA-MRP-154/H	Minimal subsurface testing in 2009, site expanded from previous documentation; archeological materials identified during testing, monitoring is recommended; NR Status Code 7	Multicomponent prehistoric and historical site; two bedrock milling features, two pestles, and a widespread scatter of obsidian debitage and tools. Historical materials include two blazed trees, privy pits, and a light widespread trash scatter.
CA-MRP-1952	Originally recorded in 1985, site surveyed in 2009. Sparse Archeological materials identified during testing, avoidance is recommended; NR Status Code 7	Prehistoric Lithic Scatter Site
CA-MRP-1953	Originally recorded in 1985, site surveyed in 2009. Archeological materials identified during testing, avoidance is recommended, and subsurface testing to better delineate the boundary if necessary; NR Status Code 7	Prehistoric Lithic Scatter and Milling Feature Site
CA-MRP-442/H	Site surveyed in 2009, archeological materials identified during testing, retains high research potential. Avoidance is recommended; NR Status Code 7	Prehistoric Lithic Scatter, Milling Feature, rock construct, Rock Ring, Rock Shelter, Historic Dump, Historic Blazed Trees, Historic Artifact Scatter Combined Site
CA-MRP-1954/H	Minimal subsurface testing in 2009, archeological materials identified during testing, and site expanded. Avoidance and proactive preservation are recommended; NR Status Code 7	Prehistoric Lithic Scatter Site

Table 3-7. Potentially Eligible Archeological Sites in the Area of Potential Effect

Property	Site Status and NR Status Code	Type
CA-MRP-155	Site surveyed in 2009, archeological materials not identified during survey, no further work recommended; NR Status Code 7	Prehistoric Lithic Scatter Site
CA-MRP-1982H	Site surveyed in 2009, sparse archeological scatter of historical artifacts, avoidance is recommended; NR Status Code 7	Historic site, wood-lined privy feature, possible second privy, glass bottle and fragment.

Notes:

* California OHP Status Code 7, indicates site not evaluated for the National Register of Historic Places

CA- MRP- 154/H

CA- MRP- 154/H was originally recorded in the 1950s as “obsidian chips (rare)”. The site was subsequently re- recorded in 1985 as a sparse obsidian lithic scatter. At that time, a few pieces of amethyst- tinted glass were also observed. Surface tools documented in 1985 included two Desert Side- notched projectile points (post- A.D. 1300), a small projectile point fragment, one biface fragment, and one edge- modified piece, all manufactured of obsidian. During the 2009 survey and subsurface exploration, five features and five prehistoric artifacts were identified on the surface and two bedrock milling stations were recorded, in addition to flakes and three obsidian flaked- stone tools. Feature 1 contains 13 mortars (post- 1500 B.P), three slicks, and two granite pestles. Feature 4 contains a single mortar on a large granite outcrop. The surface inventory indicated a light to moderate density scatter of obsidian debitage, with noted concentrations.

Historical features evident on the surface included two panel tree blazes and a series of privies suggesting the area was used for camping, likely prior to establishment of the formal campground to the south in the early 1960s. A light, widespread scatter of historical artifacts, mainly metal can and bottle fragments, was observed on the surface and left in place.

Prehistoric Material. In total, 476 pieces of debitage and three flaked- stone tools were recovered from the site. All were obsidian except one quartzite flake. The combined surface and subsurface distributions comprise three concentrations (identified as Locus 1, 2, and 3) separated by wide expanses of little or no material. The presence of dense subsurface deposits, tools, and cultural features suggest Locus 1 retains high research potential. The absence or dearth of tools and other cultural features and materials within Locus 2 and 3 suggests research potential is relatively low in these areas.

Historical Material. Historical/modern materials included 407 items, primarily small, nondiagnostic, and fragmentary; 390 items (96%) occurred as sheet trash. Most specimens were manufactured after the 1930s and likely represent use of the campground from the early 1960s until it was closed in 1990. None of these items met the criteria for curation in the Yosemite Collections.

Seven nails were collected, including three cut nails (likely recent), three wire nails, one large spike, and, two crown caps with composite cork (1930 – 1960's). Metal can fragments were the most abundant finds (n=276), but these pieces represent only about six or seven individual cans. Five of these have church key openings (post 1930).

One item of note is a first aid kit manufactured by Bauer and Black of Chicago, Illinois. The original metal container is highly fragmented, but the contents (an assortment of ointments, gauze pads, bandage roll, tape, vials, and tubes) are in fair condition. The company made medical supplies for the military as early as 1916 and continues to manufacture supplies today.

Twenty- two glass fragments, mainly small pieces of small bottle glass, were recovered, including 15 clear, 3 light green, 1 green, and 3 aqua. Fifty- one small, unidentifiable bone fragments were recovered in association with other historical/modern materials. The site exhibits a wide array of disturbances, primarily in the form of NPS infrastructure (including Tioga Road), but also as ongoing visitor use and erosion, and casual collection of obsidian materials.

The limited data available for the site suggests the presence of multiple prehistoric components and a diverse range of activities. The presence of bedrock mortars, generally taken as indicators of post- 1500 B.P. use, provides further evidence of late prehistoric occupation, as well as use by larger social groups composed of men, women, and children, as opposed to all- male hunting parties. Earlier occupation may be reflected by the observed evidence. A diverse range of activities took place at or near the site, including tool manufacture, processing of plant and animal foods, and hunting, while the travel and exchange were also likely important, given the location of the site along the Mono trail. The temporal data available for historical artifacts suggest use during the mid- to late- twentieth century, consistent with the historical documentation for the area. The implied functions of the artifacts and features are also consistent with the known use of the site for camping and picnicking. No artifacts of Euroamerican manufacture were identified that might represent contact- era use by American Indians or the Mariposa Battalion.

Avoidance of impacts and proactive preservation measures at Locus 1 were recommended as a priority. If impacts to the site cannot be avoided through design, then further test excavations and analysis supporting an evaluation of the site's significance under the NRHP criteria may be necessary to satisfy compliance with Section 106 of the NHPA. If the site is determined to be eligible per the NRHP and impacts still cannot be avoided, data recovery excavations may be indicated. As a locus with estimated high research potential, additional measures are recommended to enhance preservation. Reducing human activity in the area via removal of the picnic area and maintaining the current status of the abandoned trail would likely decrease the probability of surface collection and preclude use of the area as a restroom. If planning results in predicted increased use of the area—for example, if a campground is established in its previous location—then some level of archeological work may be indicated to address the effects of increased visitation.

CA- MRP- 1954/H

CA- MRP- 1954/H was originally documented as a small scatter of approximately 40 obsidian flakes. In contrast to the 1985 observations, prehistoric materials were absent on the surface and very few materials were present in subsurface context.

Prehistoric artifacts included obsidian flakes, and historic artifacts included two small pieces of bottle glass (one clear and one amethyst), one clear glass flake, one wire nail, and four window

glass fragments. Five historical/modern features associated with a Ranger Station or later infrastructure included square/rectangular depressions, metal pipelines, and a wood- lined structure (privy). The site is estimated to be in poor condition due to infrastructure development over a long period of time. Visitor use is very high during the summer months, but direct impacts are unclear since surface visibility is fairly limited in the area. A small, intermittent drainage possibly affects subsurface deposit. The dearth of cultural materials suggest the site was used for a limited range of activities.

Based on historical documentation, the site encompasses the location of the Tenaya Lake Ranger Station, built in 1926 and razed in 1960. The dearth of artifacts indicates that this site does not contain important research potential; however, existing development obscures subsurface deposits. Therefore, if actions proposed as part of the current planning effort result in the disturbance of previously undisturbed sediments, monitoring of earth moving activities is recommended to identify and document any potentially intact deposits.

CA- MRP- 153 and - 155

CA- MRP- 153 and - 155 were originally documented in the 1950s as “very rare obsidian” and one obsidian flake, respectively. These sites were intensively examined during the 2009 current survey, but no cultural materials were observed. Heavy visitor use and development may have contributed to the removal of previously documented materials. Intensive surface examination revealed an absence of archeological materials at these site locations; thus, no further archeological work is recommended.

CA- MRP- 442/H

CA- MRP- 442/H was originally recorded in 1977 and subsequently re- recorded in 1985. Noted resources included obsidiandebitage and tool scatter, four milling features with a total of nine mortars and two slicks, two rockshelters, one rock ring, one possible rock construct, one blazed tree, three historical dumps, and scattered metal cans. The 2009 survey significantly expanded the site boundaries and new discoveries included a milling feature containing two mortars and a series of granite- carved inscriptions. 18 lodepole pine trees with blazes, few metal and glass fragments, and light quantities of obsidiandebitage were observed. The site has been affected by Euroamerican use of the area, modern visitor use and facilities, a park- wide garbage removal project, and hydrology.

Historical- period use of site dates to the 1850’s. Historical materials likely date to John Murphy’s settlement of the area from 1878 to 1916, and later tourism. Photographs show the location of Murphy’s cabin on the southern side of the site; structural remains are not evident on the surface. Other key historical site- specific events include construction of the Great Sierra Wagon Road in 1883, construction of the Murphy Creek trail (previously known as the McGee Lake trail) prior to 1865, construction of Tioga Road between 1957 and 1961, and use of the area for camping and picnicking. Recorded historical artifacts include cut nails, hole- in- top cans, applied- lip bottle finishes, and a Chinese ceramic tableware shard. A dense concentration of blazed trees and inscriptions represent dates ranging from 1906 to 1974.

The site is estimated to retain high research potential, and avoidance of impacts was recommended. If impacts to the site cannot be avoided, then test excavations and analysis supporting an evaluation of the site’s significance under the NRHP criteria may be necessary to satisfy compliance with Section 106 of the NHPA. If the site is determined to be eligible for listing

in the NRHP and impacts still cannot be avoided, data recovery excavations may be indicated. Given the continuing visitor- related impacts to the site, it is also recommended that the current be re- routed to enhance preservation of the site.

CA- MRP- 1952

CA- MRP- 1952 was originally recorded in 1985 as a light lithic scatter with 19 flakes and four flaked- stone tools. The site was estimated to be in fair condition due to a variety of disturbances, including construction of Tioga Road, trail development, hydrology, and visitor use. During the 2009 survey, only a few obsidian flakes were observed. Avoidance of impacts to the site is recommended.

CA- MRP- 1953

CA- MRP- 1953 was originally recorded in 1985 as three obsidian flakes, two obsidian tools, a bedrock mortar with eight mortars and two pestles, and a small metal can scatter. No flaked- stone materials were noted on the surface during the 2009 survey, which is not inconsistent with the original documentation of only three pieces. The site continues to be used by visitors as evidenced by modern trash and displaced pestles, but no other disturbances were noted. Observed bedrock mortars are thought to post- date 1500 B.P. in the region. Avoidance of impacts to the site is recommended. Because of the poor surface visibility in the site area, subsurface survey may be recommended to clarify the extent of the deposit if actions are proposed in the vicinity of the site.

CA- MRP- 1982H

CA- MRP- 1982H consists of the remains of two privys (likely related to previous informal campsites prior to 1960), a glass bottle (post- 1904), and bottle fragment. This small site likely retains low research potential. Avoidance of impacts to the site is recommended.

Isolates and Historical Cabins

Nine isolated artifacts and features were documented, including six historical materials, including two blazed trees and three locations with metal can fragments, ceramic fragments, and glass fragments. Single obsidian flakes comprised the remaining three prehistoric isolates. In addition, three isolates composed of obsidian debitage were previously documented in the project area. Isolated artifacts and features included two blazed trees, and metal can, ceramic, and glass fragments (1880- 1917). In addition to the Murphy Cabin, two cabins attributed to John Murphy are shown in photographs; however, no surface evidence is present. Archeological monitoring may be proposed to identify and document any potentially intact subsurface remains.

Environmental Consequences

Methodology. Criteria established in 36 CFR Part 800 guide how to determine effects to historic properties relating to impact intensity, duration, context, and type. Section 106 of the NHPA defines three types of effects to historic properties that are considered pursuant to 36 CFR 800.5:

No historic properties affected: This determination indicates that no historic properties are in the area of potential effect (APE) or that the undertaking would not alter the characteristics that make it eligible for listing on the NRHP in a manner that would affect the integrity of the historic property.

No adverse effect: This determination indicates that there would be an effect on the historic property by the undertaking, but it does not affect the integrity in a way that would make the property ineligible for listing on the NRHP.

Adverse effect: This determination indicates that the undertaking would alter, directly or indirectly, the integrity of location, design, setting, materials, association, workmanship, or feeling characteristics of the property, thereby changing its eligibility status for listing on the NRHP. An adverse effect may be resolved in accordance with Stipulation VIII(A) of the 1999 PA through recordation, salvage, interpretation, and National Register reevaluation. Alternatively, adverse effects can be resolved by developing a three- party memorandum o PA with the SHPO and the ACHP, in consultation with the associated American Indian tribal governments, other consulting parties and the public to resolve the adverse impacts (36 CFR 800.6).

Types of Impacts. Adverse impacts (or an adverse effect determination) result when the proposed action directly or indirectly impacts any of the characteristics of the historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's design, setting, materials, workmanship, feeling, or association. Adverse impacts would include activities involving ground disturbance (including soil compaction) in the presence of an archeological site, or activities that would increase the potential for vandalism, illegal collecting of artifacts, or destruction of a site.

Alternative 1 (No Action)

Under the No Action Alternative, the Tenaya Lake area would not be improved, except for continuation of existing restoration projects, emergency repairs, and routine periodic maintenance activities. The current parking capacity would remain. Routine repair and maintenance actions, including toilet waste removal, trash and recycling removal, hazardous tree abatement, and snow removal would continue.

Construction and Operation - related Impacts. The No Action Alternative is not expected to result in direct disturbance of archeological historic properties.. Existing visitor use patterns would result in ongoing degradation of culturally sensitive areas. This alternative does not include capital improvements, and thus would not result in construction- related impacts to archeological historic properties within the project APE.

Impact Significance and Determination of Effect. The No Action Alternative will result in no adverse effect to historic properties.

Cumulative Impacts. Past development, operation and maintenance of facilities surrounding Tenaya Lake has disturbed or impacted the integrity of archeological sites within the APE. However, most still retain integrity. General visitor traffic has minor adverse impacts on archeological sites, largely resulting from soil compaction and unauthorized collection, impacts that will likely continue in the future. Ongoing activities associated with the No Action Alternative could have an adverse cumulative impact on archeological resources, but would be reduced to have no adverse effect by implementing the 1999 Programmatic Agreement.

Present and reasonable foreseeable actions in the area include the Tioga Road Rehabilitation and Parkwide Communication Data Network projects. The road rehabilitation project would affect Tioga Road adjacent to Tenaya Lake. The communication data network project would include

trenching within the Tioga Road road prism, from May Lake Junction to Tuolumne Meadows, which would traverse the Tenaya Lake APE. Adverse effects would be avoided or minimized by design, resulting in no adverse effect to historic properties.

Cumulatively, this Alternative is expected to have no adverse effect to historic properties.

Impairment. Potential adverse effects associated with Alternative 1 (No Action) are expected to be mitigated through mitigation measured in accordance with the 1999 Programmatic Agreement. Standard mitigation measures (SMM) detailed in the 1999 PA Stipulation VIII(A) include: 1) recordation; 2) salvage; 3) interpretation; 4) National Register reevaluation. Stipulation VIII(B) requires consultation to take place if the mitigation measure may affect a national historic landmark (NHL), historic properties of national significance, a human burial, a traditional cultural property, or generates significant controversy among the public or consulting entities. Therefore, this alternative would not impair the park's archeological resources.

Alternative 2 (Tenaya Confluence, Preferred Alternative)

Construction and Operation- related Impacts. Construction of Alternative 2 will require alterations to the existing recreational facilities surrounding Tenaya Lake. Most of the proposed actions under Alternative 2 would result in no effects to archeological sites because they occur within areas where there are no known archeological sites, or are within areas that were previously disturbed by visitors and park improvements. Actions that occur within or adjacent to archeological sites and may result in potential adverse effects are discussed below.

Construction of a trail and vegetated buffer between Sunrise Trailhead Murphy Creek will occur within CA- MRP- 154/H and may result in adverse impacts when construction includes ground disturbance beyond previously disturbed ground. Other improvements to the Sunrise Trailhead Old Campground area, which include the expansion of the existing parking areas, new turnouts, biofiltration areas, and trail improvements will occur within the site, and could result in construction related effects to an archeological resource. Avoidance of impacts at CA- MRP- 154/H are recommended, however, if impacts cannot be avoided subsurface survey and possibly further testing could be required prior to construction in order to evaluate site significance. If the site is determined eligible for the NRHP, data recovery may be required, and preparation of a Cultural Resources Monitoring Plan, per the 1999 Programmatic Agreement. In the long- term, removal of the picnic area would likely result in less visitor use to one locus of the site estimated to have high research potential, and establishment of a formal trail might reduce the number of social trails in the area.

Within the Murphy Creek area, removal of the east parking area, ecological restoration, and trail improvements could also result in construction impacts to CA- MRP- 1952, CA- MRP- 1982H and CA- MRP- 442/H, a site identified as containing a high research potential. Avoidance of impacts at CA- MRP- 1982H and CA- MRP- 442/H are recommended, and would include designing the trail to route it around these sites, or key features within the sites. If impacts cannot be avoided subsurface survey and possibly further testing could be required prior to construction in order to evaluate site significance. If the site is determined eligible for the NRHP, data recovery may be required, as well as photographic documentation and preparation of a Cultural Resources Monitoring Plan, per the 1999 Programmatic Agreement. In the long- term, the consolidation of the picnic area, parking lot, and segment of the Murphy Creek Trail west of Murphy Creek would be beneficial because it would reduce overall visitor use within sensitive areas.

The East Beach area will include parking and facility improvements near and within CA-MRP-1954/H, however these improvements are not expected to result in any impact to the archeological site as most of the improvements will occur within the footprint of the existing parking and facility area. The construction of the raised walkway may occur within a small portion of the site boundary, however archeological monitoring could be implemented to limit the impacts to no adverse effect.

Impact Significance and Determination of Effect. Actions proposed under Alternative 2 would have no adverse effect on historic properties with the implementation of appropriate mitigation measures as described in the 1999 Programmatic Agreement, and incorporation of design features to avoid or minimize direct effects.

Cumulative Impacts. As previously noted, the archeological sites have not been assessed for inclusion in the National Register. Past development, operation and maintenance of facilities surrounding Tenaya Lake has disturbed or impacted the integrity of archeological sites within the APE. However, most still retain integrity. General visitor traffic has minor adverse impacts on archeological sites, largely resulting from soil compaction and unauthorized collection, impacts that will likely continue in the future. Activities associated with Alternative 2 could have an adverse cumulative impact on archeological resources, but would be reduced to have no adverse effect by design (avoiding disturbance within the boundaries of archeological resources) and implementing the 1999 Programmatic Agreement.

Present and reasonable foreseeable actions in the area include the Tioga Road Rehabilitation and Parkwide Communication Data Network projects. The road rehabilitation project would affect Tioga Road between Crane Flat and May Lake Junction, several miles northwest of Tenaya Lake. The communication data network project would include trenching within the Tioga Road road prism, from May Lake Junction to Tuolumne Meadows, which would traverse the Tenaya Lake APE. Adverse effects would be avoided or minimized by design, resulting in no adverse effect to historic properties. Cumulatively, this Alternative is expected to have no adverse effect to historic properties.

Impairment. Potential adverse effects associated with Alternative 2 are expected to be mitigated by design and applicable mitigation measures in accordance with the 1999 Programmatic Agreement. Standard mitigation measures (SMM) detailed in the 1999 PA Stipulation VIII(A) include: 1) recordation; 2) salvage; 3) interpretation; 4) National Register reevaluation. Stipulation VIII(B) requires consultation to take place if the mitigation measure may affect a national historic landmark (NHL), historic properties of national significance, a human burial, a traditional cultural property, or generates significant controversy among the public or consulting entities. Therefore, this alternative would not impair the park's archeological resources for future generations.

Alternative 3 (Tenaya Ecotones)

Construction and Operation- related Impacts. Construction of Alternative 3 will require alterations to the existing recreational facilities surrounding Tenaya Lake. Most of the proposed actions under Alternative 3 would result in no effects to archeological sites because they occur within areas where there are no known archeological sites, or are within areas that were previously disturbed by visitors and park improvements. Actions that occur within or adjacent to archeological sites and may result in potential adverse effects are discussed below.

Construction of road improvements, turnouts, trail, and vegetated buffer between Sunrise Trailhead Murphy Creek will occur within CA- MRP- 154/H and may result in adverse impacts when construction includes ground disturbance beyond previously disturbed ground. Other improvements to the Sunrise Trailhead Old Campground area, which include the expansion of the western parking area, ecological restoration and biofiltration areas, raised walkways and trail improvements will occur within the site and could result in construction related effects to an archeological resource. Avoidance of impacts at CA- MRP- 154/H are recommended, however, if impacts cannot be avoided subsurface survey and possibly further testing could be required prior to construction in order to evaluate site significance. If the site is determined eligible for the NRHP, data recovery may be required, and preparation of a Cultural Resources Monitoring Plan, per the 1999 Programmatic Agreement.

Within the Murphy Creek area, the expansion of the western parking area could potentially adversely impact CA- MRP- 1953; mitigation measures ranging from archeological monitoring to subsurface survey and testing could be implemented to limit the impacts to no adverse effect. The ecological restoration, trail and parking improvements south of Tioga Road, and east parking lot removal could also result in construction related effects to CA- MRP- 1952, CA- MRP- 1982H, and CA- MRP- 442/H. Mitigation would include designing features to avoid these sites. Additional mitigation applicable to CA- MRP- 1953 and CA- MRP- 442/H may include subsurface survey and possibly further testing prior to construction in order to evaluate site significance. If the site is determined eligible for the NRHP, data recovery may be required, and preparation of a Cultural Resources Monitoring Plan, per the 1999 Programmatic Agreement.

The East Beach area will include parking and facility improvements near and within CA- MRP- 1954/H, however these improvements are not expected result in any impacts to the archeological site as most of the improvements will occur within the footprint of the existing parking and facility area. The construction of the raised walkway may occur within a small portion of the site boundary, however archeological monitoring could be implemented to limit the impacts to no adverse effect.

Impact Significance and Determination of Effect. Actions proposed under Alternative 3 would have no adverse effect on historic properties with the implementation of appropriate mitigation measures as described in the 1999 Programmatic Agreement, and incorporation of design features to avoid or minimize direct effects.

Cumulative Impacts. Impacts resulting from past, present, and reasonably foreseeable actions in the area (as discussed above) would be avoided or minimized by design, resulting in no adverse effect to historic properties. Cumulatively, this Alternative is expected to have no adverse effect to historic properties.

Impairment. Potential adverse effects associated with Alternative 3 are expected to be mitigated by design and applicable mitigation measures in accordance with the 1999 Programmatic Agreement. Standard mitigation measures (SMM) detailed in the 1999 PA Stipulation VIII(A) include: 1) recordation; 2) salvage; 3) interpretation; 4) National Register reevaluation. Stipulation VIII(B) requires consultation to take place if the mitigation measure may affect a national historic landmark (NHL), historic properties of national significance, a human burial, a traditional cultural property, or generates significant controversy among the public or consulting entities. Therefore, this alternative would not impair the park's archeological resources for future generations.

Alternative 4 (Lake Loop)

Construction and Operation- related Impacts. Construction of Alternative 4 will require alterations to the existing recreational facilities surrounding Tenaya Lake. Most of the proposed actions under Alternative 4 would result in no effects to archeological sites because they occur within areas where there are no known archeological sites, or are within areas that were previously disturbed by visitors and park improvements. Actions that occur within or adjacent to archeological sites and may result in potential adverse effects include:

Construction of road improvements, turnouts, trails and vegetated buffers along and adjacent to Tioga Road could result in adverse impacts to CA- MRP- 154/H, primarily where construction includes ground disturbance beyond previously disturbed areas. Additionally improvements to the Sunrise Trailhead Old Campground area, which include the expansion of the western parking area, ecological restoration and biofiltration areas, raised walkways and trail improvements will occur within CA- MRP- 154/H, and could result in construction related effects to archeological resources. Avoidance of impacts at CA- MRP- 154/H are recommended, however, if impacts cannot be avoided subsurface survey and possibly further testing could be required prior to construction in order to evaluate site significance. If the site is determined eligible for the NRHP, data recovery may be required, and preparation of a Cultural Resources Monitoring Plan, per the 1999 Programmatic Agreement.

Mitigation measures ranging from archeological monitoring to subsurface survey and testing could be implemented to limit the impacts to no adverse effect.

Within the Murphy Creek area, construction of road improvements, turnouts, trails and vegetated buffers along and adjacent to Tioga Road could result in adverse impacts to CA- MRP- 1952, CA- MRP- 1953, CA- MRP- 1982H, and CA- MRP- 442/H, primarily where construction includes ground disturbance beyond previously disturbed areas. The existing trail within CA- MRP- 442 would not be relocated. Additionally, the biofiltration and parking improvements east of Murphy Creek result in construction related effects to CA- MRP- 442/H. Avoidance of impacts at MRP- 442/H are recommended, however, if impacts cannot be avoided subsurface survey and possibly further testing could be required prior to construction in order to evaluate site significance. If the site is determined eligible for the NRHP, data recovery may be required, and preparation of a Cultural Resources Monitoring Plan, per the 1999 Programmatic Agreement.

The East Beach area will include parking and facility improvements near and within CA- MRP- 1954/H however these improvements are not expected result in any impacts to the archeological site as most of the improvements will occur within the footprint of the existing parking and facility area. The construction of the trail may occur within a small portion of the site boundary, however archeological monitoring could be implemented to limit the impacts to no adverse effect.

Impact Significance and Determination of Effect. Actions proposed under Alternative 4 would have no adverse effect on historic properties with the implementation of appropriate mitigation measures as described in the 1999 Programmatic Agreement, and incorporation of design elements to avoid or minimize effects.

Cumulative Impacts. Impacts resulting from past, present, and reasonably foreseeable actions in the area (as discussed above) would be avoided or minimized by design, resulting in no adverse

effect to historic properties. Cumulatively, this Alternative is expected to have no adverse effect to historic properties.

Impairment. Potential adverse effects associated with Alternative 4 are expected to be mitigated by design and applicable mitigation measures in accordance with the 1999 Programmatic Agreement. Standard mitigation measures (SMM) detailed in the 1999 PA Stipulation VIII(A) include: 1) recordation; 2) salvage; 3) interpretation; 4) National Register reevaluation. Stipulation VIII(B) requires consultation to take place if the mitigation measure may affect a national historic landmark (NHL), historic properties of national significance, a human burial, a traditional cultural property, or generates significant controversy among the public or consulting entities. Therefore, this alternative would not impair the park's archeological resources for future generations.

Alternative 5 (Immersive Nodes)

Construction and Operation- related Impacts. Construction of Alternative 5 will require alterations to the existing recreational facilities surrounding Tenaya Lake. Most of the proposed actions under Alternative 5 would result in no effects to archeological sites because they occur within areas where there are no known archeological sites, or are within areas that were previously disturbed by visitors and park improvements. Actions that occur within or adjacent to archeological sites and may result in potential adverse effects discussed below.

Construction of road improvements, turnouts, trails and vegetated buffer along and adjacent to Tioga Road could result in adverse impacts to CA- MRP- 154/H, primarily where construction includes ground disturbance beyond previously disturbed areas. Additionally improvements to the Sunrise Trailhead Old Campground area, which include the expansion of the western parking area, new turnouts, ecological restoration, biofiltration improvements, construction of raised walkways and trail improvements will occur within CA- MRP- 154/H, and could result in construction related effects to archeological resources. Avoidance of impacts at CA- MRP- 154/H is recommended, however, if impacts cannot be avoided subsurface survey and possibly further testing could be required prior to construction in order to evaluate site significance. If the site is determined eligible for the NRHP, data recovery may be required, and preparation of a Cultural Resources Monitoring Plan, per the 1999 Programmatic Agreement.

Construction of road improvements, turnouts, trails and vegetated buffer along and adjacent to Tioga Road could result in adverse impacts to CA- MRP- 1953, CA- MRP- 1952, CA- MRP- 1982H, and CA- MRP- 442/H, primarily where construction includes ground disturbance beyond previously disturbed areas. Improvements along the east side of Murphy Creek, including installation of the ecological restoration area, trails and raised walkways, could also result in construction related effects to CA- MRP- 442/H. Avoidance of impacts at CA- MRP- 1953 and CA- MRP- 442/H is recommended, however, if impacts cannot be avoided subsurface survey and possibly further testing could be required prior to construction in order to evaluate site significance. If the site is determined eligible for the NRHP, data recovery may be required, and preparation of a Cultural Resources Monitoring Plan, per the 1999 Programmatic Agreement.

The East Beach area will include parking and facility improvements near and within CA- MRP- 1954/H; however these improvements are not expected result in any impacts to the archeological site as most of the improvements will occur within the footprint of the existing parking and facility area. The construction of the trail may occur within a small portion of the site boundary,

however archeological monitoring could be implemented to limit the impacts to no adverse effect.

Impact Significance and Determination of Effect. Actions proposed under Alternative 5 would have no adverse effect on historic properties with the implementation of appropriate mitigation measures as described in the 1999 Programmatic Agreement, and incorporation of design features to avoid or minimize effects.

Cumulative Impacts. Impacts resulting from past, present, and reasonably foreseeable actions in the area (as discussed above) would be avoided or minimized by design, resulting in no adverse effect to historic properties. Cumulatively, this Alternative is expected to have no adverse effect to historic properties.

Impairment. Potential adverse effects associated with Alternative 5 are expected to be mitigated by design and applicable mitigation measures in accordance with the 1999 Programmatic Agreement. Standard mitigation measures (SMM) detailed in the 1999 PA Stipulation VIII(A) include: 1) recordation; 2) salvage; 3) interpretation; 4) National Register reevaluation. Stipulation VIII(B) requires consultation to take place if the mitigation measure may affect a national historic landmark (NHL), historic properties of national significance, a human burial, a traditional cultural property, or generates significant controversy among the public or consulting entities. Therefore, this alternative would not impair the park's archeological resources for future generations.

HISTORIC STRUCTURES, BUILDINGS, AND CULTURAL LANDSCAPES

This section analyzes potential effects to historic structures, buildings, and cultural landscapes, and was designed to provide the substantial evidence required to address the scope of analysis recommended in Section 106 of the NHPA.

Affected Environment

Regional Setting

An important event in the history of Yosemite was the capture of Chief Tenaya's band of Yosemite Indians by the Mariposa Battalion at Tenaya Lake. Lafayette Bunnell, a private with the Battalion who also provided medical and interpretive services, described the incident in detail in his narrative, *Discovery of the Yosemite* (Bunnell 1990). A summary of these events is provided in the following section, American Indian Traditional Cultural Properties.

The post- contact history of the Tenaya Lake area revolved around homesteading, herding, transportation, development of facilities for park visitation and recreation, and continuation of traditional American Indian practices. In 1878, prior to the construction of the Great Sierra Wagon Road, John L. Murphy homesteaded the southern lake shore and a portion of the north shore, originally intending to graze sheep. In 1883, the Great Sierra Silver Mining Company completed construction of the Great Sierra Wagon Road to transport supplies to their mine at Tioga Hill, located on the northeast boundary of the park. In the vicinity of Tenaya Lake, the road followed the Great Sierra Wagon Road along the north shore of the lake, but deviated from the

original route to the west, where the controversial new segment rounded Olmsted Point (Montague 2010).

Recognizing the commercial possibilities, Murphy planted trout and established an inn for travelers and construction workers on the Great Sierra Wagon Road (Greene 1987). The inn was open in summer and in winter Murphy lived in Mariposa. Archie Leonard, later one of Yosemite's first rangers, operated a 10- horse saddle train between Yosemite and the mines to the east, stopping along the way at Murphy's. The hospice was a long, rectangular log structure, with a dry- laid masonry rock fireplace and a shake roof. A later addition was covered with horizontal shakes (Greene 1987). Some well- known visitors to Murphy's establishment included John Muir, Galen Clark, and Helen Hunt Jackson. Following Murphy's operation, the Desmond Park Service Company opened a Hikers' Camp at the east end of Tenaya Lake in 1916. The camp was closed in 1938 and replaced by a new facility at May Lake (Montague 2010).

Project Setting

The project- specific Area of Potential Effects (APE) was established by the lead federal agency, in consultation with SHPO, in accordance with 36 CFR 800.16(d). Section 106 defines an APE as:

The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

The project APE was delineated to ensure identification of significant cultural resources that may be directly or indirectly affected by the project, and are listed in or eligible for inclusion in the NRHP. The proposed 360.5- acre direct APE includes areas of direct ground disturbance, as well as areas with permanent site improvements and areas for staging and temporary construction activities. Because of the surrounding vegetation, and minimal nature of the proposed improvements, the indirect APE boundary mirrors the direct APE.

The number of cabins attributed to Murphy is somewhat unclear, with some historical maps showing two at the Murphy Creek outlet and others depicting a third structure at the east end of the lake (Montague 2010). Camping is depicted on historical maps along the west, northern, and eastern shores of Tenaya Lake. Surface historical materials at the eastern end of the lake are few in number, consisting of several isolates which could be associated with the camp or later use of the area. The NPS maintained the Tenaya Lake Ranger Station at the eastern end of the lake. The cabin (Building 3100) and a barn (Building 3101) were built in 1926, and a woodshed (Building 3102) was constructed in 1936. The cabin was completely renovated in 1944, and all three of the buildings were razed in 1960. Despite the history of post- contact use in the Tenaya Lake area, few historical materials have been documented archeologically, with the exception of deposits at CA-MRP- 442/H. Continuing development and restoration activities over the course of 150 years have likely removed or obscured earlier historical deposits (Montague 2010).

There were no historic structures or buildings documented within the APE. Tioga Pass Road is a linear historic property representing at least three eras of trans- Sierra travel. Some of the campgrounds, a ranger station site, and roads and trails may have historic features or qualities worth preservation considerations. The lake and surrounding glacial rock geography may be worth considering as a cultural landscape to be preserved for visual, aesthetic, and recreational

use and enjoyment by various categories of people, including campers, boaters, rock climbers, artists, backpackers, and those seeking various spiritual experiences. It was not within the scope of the present project to conduct the actions necessary to complete National Register Nomination Forms.

Environmental Consequences

Methodology: Historic properties were analyzed qualitatively, in accordance with 36 CFR 800 criteria of effect, based on the modifications that would be made to character-defining features (features that qualify the property for inclusion in the NRHP). Historic buildings and structures and cultural landscape impacts were analyzed qualitatively, in accordance with 36 CFR 800 criteria of effect, based on their presence in the project area and the modifications that would be made to character-defining features (features that qualify the structures or landscapes for inclusion in the National Register). Historic structures and landscapes for which a determination of eligibility has not been completed were considered eligible.

Types of Impacts: Adverse impacts (or an adverse effect determination) result when the proposed action directly or indirectly impacts any of the characteristics of the historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's design, setting, materials, workmanship, feeling, or association. Adverse impacts would involve ground disturbance or construction activities (including modifications to an existing structure) in the presence of a historic structure, building, or cultural landscape, or activities that would increase the potential for vandalism, illegal collection of resources, destruction of a property, or actions which diminish the overall integrity of the landscape (significant modifications to a scenic viewshed or distinct character of the landscape).

Alternative 1 (No Action)

Construction and Operation- related Impacts. Under the No Action Alternative, the facilities surrounding Tenaya Lake would remain in their current condition, and operations would continue to be limited to maintenance activities. No construction or operational related impacts would occur. Continued operation of the existing facility sites under Alternative 1 would result in no effect to historic properties.

Impact Significance and Determination of Effect. Under Alternative 1, no historic buildings structures or cultural landscapes would be affected by continued use and operation of the existing facility sites.

Cumulative Impacts. No cumulative impacts would occur under Alternative 1. Implementation of Alternative 1 would result in no effect to historic structures, buildings and cultural landscapes

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 1, historic structures, buildings and cultural landscapes in Yosemite National Park would not be impaired.

Alternatives 2, 3, 4, and 5

Construction and Operation- related Impacts. There are no historic buildings or cultural landscapes recorded within the APE, therefore there are no construction or operational impacts

associated with Alternatives 2, 3, 4, or 5. The Great Sierra Wagon Road and Tioga Road are considered historic structures. Work within the roadway would include the addition of crosswalks and rumble strips, adjacent shuttle stops, and improvement of roadside parking. These actions would affect the historic roadway; however, based on the design of these elements, these actions would not affect the integrity in a way that would make the property ineligible for listing on the NRHP. Therefore, there would be no adverse effect to the Great Sierra Wagon Road or Tioga Road.

As discussed in the Scenic Resources section of this document, none of the action alternatives would include elements that would adversely affect the cultural setting or degrade qualities which may qualify the area for inclusion on the National Register in the future, because scenic views would not be obscured, and proposed structures (boardwalks, bridges, interpretive materials and signs, visitor facilities) would not be located or sized such that they would interfere with historical views of the lake or surrounding geology.

Impact Significance and Determination of Effect. Under Alternatives 2, 3, 4, and 5, no historic buildings structures or cultural landscapes would be affected.

Cumulative Impacts. No cumulative impacts would occur under Alternatives 2, 3, 4, or 5. Implementation of Alternative 2 would result in no effect to historic structures, buildings and cultural landscapes.

Impairment. Under Alternatives 2, 3, 4, or 5 there would be no adverse effect on historic structures, buildings and cultural landscapes. Therefore, these alternatives would not impair the park's archeological resources for future generations.

AMERICAN INDIAN TRADITIONAL CULTURAL PROPERTIES

American Indian Traditional Cultural Properties (TCPs) are tangible resources to which living American Indian communities attach cultural and religious significance that are eligible for listing or listed on the NRHP as historic properties, subject to consideration under section 106 of the National Historic Preservation Act. TCPs can include objects, districts (trails), structures (sites), geological features, landscapes, and archeological sites. Traditional cultural significance is derived from the role the property plays in the cultural practices or beliefs of a living community that (a) are rooted in that community's history, beliefs, customs and practices, and (b) are important in maintaining the continuing cultural identity of the community (NPS Bulletin 38).

For the purposes of this EA, the Tenaya Lake area of potential effect (APE) is considered in accordance with Section 101(d) (6) (A) and (B) of the NHPA, National Register Criteria for Evaluation in 36 CFR Part 60.4, and National Register Bulletin 38 *Guidelines for Evaluating and Documenting Traditional Cultural Properties*, pursuant to the parks responsibilities under Section 106 of the NHPA. Pursuant to NRHP Bulletin 38 and section 106 implementing regulations at 36 CFR 800.4(i), a reasonable level of effort to identify TCPs depends in part on the likelihood that such properties may be present, and whether the undertaking is of the type that could affect TCPs. In support of the present planning effort, an assessment was made to determine the potential for the presence of a TCP within the planning APE.

Yosemite National Park is consulting with American Indian tribes having cultural association with this geographical area of the park, including the Bridgeport Paiute Indian Colony, the Mono Lake

Kutzadika'a Tribe, the Bishop Paiute Tribe, the American Indian Council of Mariposa County (aka Southern Sierra Miwuk), and the Tuolumne Band of Me- Wuk Indians. The park is also consulting with the North Fork Mono Rancheria Indians of California, and the Picayune Rancheria of Chukchansi Indians. Consultation was initiated at the July 22, 2008, All- Tribes meeting held in Wawona. The Tenaya Lake project area is within a larger American Indian traditional cultural landscape that holds religious and cultural significance to the associated tribes, and the project area proper has particular cultural value to American Indians. The tribes were invited to an internal scoping field visit on October 8, 2008, and representative from the Bridgeport Paiute Colony, Southern Sierra Miwuk, and the Tuolumne Band of Me- Wuk Indians attended, providing comment and input on the project. Consultation has continued throughout the planning process during monthly and quarterly face to face meetings, and in June 2009 correspondence was sent concerning the project status and proposed archeological investigations with an invitation to participate in the studies. American Indian representation was provided by the Tuolumne Band of Me- Wuk Indians during the archeological investigations in September and October 2009 (Simons 2010).

The Affected Environment sections for American Indian Traditional Cultural Properties and American Indian Traditional Cultural Practices were developed in consultation with the above mentioned tribes. In addition to literature cited in the text, personal communication as cited in the text informed about the cultural significance of the project area. A draft of both Affected Environment sections were reviewed by eleven individuals from five groups, and their comments were integrated into the document as it appears here. Consultation will continue throughout the planning and implementation of the project to ensure that American Indian interests are protected and concerns addressed.

Affected Environment

A brief summary of information gleaned from reviewing existing literature, presented below, demonstrates historical use of the Tenaya Lake landscape by American Indians as they traveled a well established trail system leading from all directions - north, south, east and west- to access resources for food, medicine, tools, trade, spiritual inspiration, and social interaction, in lands now managed by Yosemite National Park, using Tenaya Lake as a stop- over. The tales show familiarity with the trail system and characteristics of the land demonstrating frequent use, and augmenting archeological evidence that this area was used by American Indians for thousands of years. The event of the capture in 1851 of Chief Tenaya's Yosemite Band¹ of Indians at Tenaya Lake marks a significant point in the history of the Yosemite Band of Indians. These actions show a broad pattern of events significant in the history and identity of the living community of American Indians with ancestral cultural association with park lands, and marks Tenaya as person whose tangible, human existence is rooted in the history and beliefs of a specific segment of the American Indian community associated with park lands, the living descendants of the Yosemite Band of Indians.

American Indian trails from Yosemite Valley lead to Tenaya Lake, and from Tenaya Lake east to the Mono Lake past Walker Lake through Bloody Canyon, or north along Murphy Creek, up Cold Canyon and Virginia Canyon, over to Virginia Lake. The well- known trans- Sierra Mono

¹ Members of the Yosemite Band living in 1928 to fill out enrollment records list their tribal affiliation as Yosemite Band and Tenaya as the last chief of that band. Descendents of the Yosemite Band are members of the seven tribes having established ancestral cultural association with Yosemite National Park.

trail leads to Tenaya Lake. Ethnographic records document travel by Indians from both side of the Sierra for trade, hunting, gathering, and social exchange, and inter marriage between groups. In one account, Jim Lundy (Hulse 1935) tells about leaving Yosemite Valley by way of a trail the “old Indians” used on their way to Mono Lake, which they called *Quejabi*, for the prized fly larvae, stopping at Tenaya Lake to rest and then moving on to Soda Springs and Tuolumne Meadows where they hunted and then on to *Tu- no- ga- pa*, Farrington Ranch, by way of Bloody Canyon. After hearing about available food in the Mono Lake area, others from Yosemite Valley joined their family for the *Quejabi* gathering, using a trail from Tenaya Lake up Cold Canyon to Virginia Lake and over to join the others for *Quejabi* gathering. Tina Charley mentioned stopping over at *mobageehota*, a Paiute word referring to Tenaya Lake (Andrews 2006). In the Adventure of Towa, a trip from Mono Lake to Yosemite Valley mentions camping at Tenaya Lake on the way (Hulse 1935a). Towa was killed on his way to Yosemite Valley and was buried at Tenaya Lake.

The legend of *Woi- voi* as told by Bridgeport Tom, conveys how Basket Dome was made when the wife of coyote’s mean son was leaving him as advised by a medicine mans powers, and camping at Tenaya Lake on her way to Yosemite Valley.

Morris Jack (2007, 2009, pers. comm.), an elder of Bridgeport Paiute Colony, following traditional trails, traveled to Tenaya Lake by way of Virginia Lake and through Cold Canyon; then they would go to Tuolumne Meadows and return over Mono Pass through Bloody Canyon. Gaylen Lee (pers. comm. 2008), a member of the North Fork Mono Rancheria, speaks of family stories relating travel from the southern part of the park on the Isberg and Fernandez Paths, walking up through Chinquapin, to Little Yosemite Valley up to Tenaya Lake and over to Tuolumne Meadows. Tony Brochini (pers.com 2010), a member of the Southern Sierra Miwuk, tells a family story told by his grandmother Agnes Tom Castro when they made trips to Coleville just east of Lee Vining to visit his great- grandmother Leanna Sam Tom about how his great- grand father Bridgeport Tom ran races around Tenaya Lake; he could not be caught because he “ran like the wind.”

Archeological evidence suggests 6,000- 9,000 years of human activity in the area. There are archeological sites in the Tenaya Lake project area that contain bedrock milling features with mortars and slicks, obsidian lithic scatters, and rock shelters. Although the archeological sites have not been evaluated for eligibility for listing on the NR, they nevertheless hold significance to the living descendants of the American Indians whose ancestors left their mark as tangible resources representing ancestral lifeways. Montague (2010) notes archeological sites at Murphy’s Creek and the east side of the lake that may have been stop- over locations or even a village; possibly the location where the Mariposa Battalion spied the 35 Yosemite Indians and captured them in 1851 (see discussion below). In addition to the bedrock mortars that the parks’ Archeology Office recorded (Montague 2010), during a site visit for this project, culturally associated American Indians pointed out what they interpret to be mortars in granite outcrops around the lake. The bedrock mortars do not meet the parks criteria as an archeological site, however, the Indians believe the mortars are incipient having been used little but probably for a special purpose. These archeological features and features of significance to the associated American Indians are tangible link with their ancestors.

An event that figures prominently in the history of the descendants of the Yosemite Band Indians is the capture of the last 35 members of Chief Tenaya’s band in 1851 at Tenaya Lake by the Mariposa Battalion. While having a lesser impact on the lifeways of associated American Indian whose lifeways accessed park lands, including Tenaya Lake, from other locations north, south,

east, and west, this event marks a significant point in the history of the Yosemite Band of Indians, when Yosemite Valley was discovered by Euro- Americans and the Yosemite Indians were removed from the Valley, changing forever their association with their homelands.

Most of what is known today about the event and Chief Tenaya is recorded in *Discovery of the Yosemite and the Indian war of 1851 Which Led to That Event* (Dunnell 1990). Dunnell, who was a member of the Mariposa Battalion, describes the capture of Chief Tenaya, and the capture of the last remnants of his band at Tenaya Lake. The 1849 Gold Rush in the Motherlode brought a flood of Euro- Americans into the area and with it a fierce competition for resources. Many California Indians had been moved to reservations. Conflicts between the mountain Indians and the Euro- Americans escalated to the point that the California Governor organized the Mariposa Battalion to subdue the remaining tribes, including the Yosemite Band of Indians. The Battalion went into Yosemite Valley in March of 1851, the first time a non- Indian had been in the valley, in search of the Yosemite Band of Indians.

Finding no Indians, the Battalion burned the dwellings, acorn granaries, and other provisions the Yosemite's had left behind in their flight, and the Battalion retreated (Bunnell 1990: 76- 77). Indian scout messengers were dispatched in April to convince the remaining tribes, including the Yosemite Band, to treat promising food, clothing, and protection if they treated, and extermination if they did not (Lee 1998:63). Chief Tenaya was persuaded to make treat², and 72 of his followers surrendered to the Battalion to be taken to the Fresno River Reservation. Not believing that all of Chief Tenaya's tribe had surrendered, the Battalion returned again in May of 1851, during which time Chief Tenaya surrendered. With Chief Tenaya captive, the Battalion pursued the Yosemite's into the high country and found 35 of them encamped at Tenaya Lake, known then to the Indians as Pywiack. The hiding Indians fled to the lake and took up watching the Mariposa Battalion as they searched; many of the band members had already dispersed to Tuolumne and others were hoping to make it to Mono Lake.

The trails from Yosemite Valley that lead to Mono Lake that the Indian guide Cow- chit- ty used to guide the Battalion to Tenaya Lake were well known, as evidenced by Cow- chit- ty's skill in reading sign that the trails had been recently traversed, observing "fragments of stone and moss that had been displaced, and broken off and scattered upon the ground", it being "impossible to walk over these stony ridges without displacing some of the fragments", the Yosemite Indians having "kept on the rocky ridges" avoiding the tracking the snow or soft ground (Bunnell 1990: 204). Cow- chit- ty said "the hiding- place of the Yosemites is not far off. If they had crossed the mountains their scouts would not be so careful to hide their trail. They would follow the old trail if they come to watch you, because it is dirt, and would only hide their tracks when they were again far from the valley and near their rancheria" (Bunnell 1990: 202). The commander of the expedition attributed the skill to "instinct, for I reckon that is what it is that enables him to follow a trail that he imagines should be there" (Bunnell 1990:203). Chief Tenaya, tied with a cord on his wrist, offered no assistance, saying the sign were of the "Tuolumne Indians" (Bunnell 1990:203).

Cow- chit- ty said: "These signs tell me that the Yosemite scouts have been watching all the movements of the Americans, and the trails that will take you to their camps. They will not look for you on this trail. They are watching for you from the ridges nearer the valley. We will not have to go far to their camps. This trail will lead us to the head of the Py- we- ack [Py- we- ack was the

² None of the treaties with California Indians were ever ratified.

Indian name for the region that included the canyon, branch, and lake], where the Paiute or Mono trail crosses into the upper valley of the Tuolumne; and if we don't find them [the fleeing Yosemite Indians] at the lake, we will soon know if they have crossed the mountains" (Bunnell 1990: 204). From a ridge that looked down to the Py- we- ack they viewed a smoke where their appeared an Indian village that Cow- chit- ty called "rancheria." The village was situated on the border of the lake at the base of a large smooth granite peak, for which the Py- we- ack region derived its name.

The Battalion descended on the village, and the 35 remaining Yosemite Indians who had not fled already to the Tuolumne or Mono or elsewhere surrendered, agreeing to go the Fresno River Reservation a young chief saying "Where can we go now that the Americans will not follow us" (Bunnell 1990: 208). The Yosemite's had fled their Awani (the name they called their valley, probably meaning "green valley") home without food or clothing. When the Battalion reached the Indians at Tenaya Lake they were starving, tired, and cold for they had fled their homes, traveling day and night, with no provisions.

While escorting the captured American Indians to the reservation, Bunnell proposed to name the lake Tenaya Lake. When he told Chief Tenaya that they were going to name the lake Tenaya Lake in his honor, "because it was upon the shores of the lake that we had found his people, who would never return to it to live", Tenaya said "It already has a name; we call it Py- we- ack." (Bunnell 1990:211).

The Tenaya Lake area is an ancient stop- over within the trail system traversing the Sierra, including the well known Mono Trail. Davis- King and Snyder (2010) proposed that the trail system would likely be eligible for listing on the NRHP as a traditional cultural property (TCP) as a historic district. Trails in this ancient system access lands that are now managed by Yosemite National Park from all directions- north, south, east, and west. The trails were used by American Indians for thousands of years to access resources for food, medicine, tools, trade, spiritual inspiration, and social interaction. Living descendants of those who used the trails are affiliated with the tribes having cultural association with park lands. The living descendants and their families still use the trails, and have legends, oral histories, and family stories that link them to their ancestors and ancestral values.

Tenaya Lake and its surrounding environs achieves religious and cultural significance to the collective American Indian community comprised of tribes from all directions around park lands for the role it had in their ancestral life- ways, and the connection it is today to their ancestors and ancestral values. The lake water is considered sacred, having powerful healing properties, and water of the early spring runoff is especially highly coveted. To many culturally associated American Indian people, Tenaya Lake has a strong spiritual nature. The water, landforms, views, drainage patterns, plant and animal life, and archeological resources all combine to comprise a tangible link of the Tenaya Lake landscape connecting the living descendants to their ancestors. A fundamental characteristic in this living American Indian community's system of beliefs, customs, and practices is the continuous connection between the living and the ancestors.

The Tenaya Lake landscape would likely be a historic site within the boundary of the proposed trail system historic district. Being on the well worn Mono trail from Mono Lake to Yosemite Valley, the Tenaya Lake area is considered a shared territory (Hendricks, pers. comm. 2009), used and valued by the community of American Indian's from all directions surrounding the lands now managed by Yosemite National Park. It is difficult to assign tribal affiliation to Tenaya Lake for

several reasons. First, the American Indians did not organize themselves into tribes, but rather by families; tribal organization was imposed by anthropologist. Secondly, the concept of land ownership was not an aspect of the culture of the American Indians (Jack, pers. com. 2009; Leonard, pers. comm. 2009; Andrews, pers.comm. 2006; Hendricks, pers. comm. 2009).

Based on existing ethnographic data and consultation with culturally associated American Indians, for the purposes of this plan, the preliminary boundaries of the proposed Tenaya Lake historic site within the larger trail system TCP historic district would encompass the view shed from Olmsted Point where the lake is first seen coming up the trail from Yosemite Valley, taking in the lake, Tenaya Peak, Pywiack Dome, and Polly Dome. Murphy Creek, and back to Olmsted Point, and the portion of the trail system that the Mariposa Battalion followed in 1851 in pursuit of Chief Tenaya's Yosemite Band of Indians, while Chief Tenaya himself was a captive of the Battalion. Tangible features would include, but not be limited to, the lake water (consider to have sacred healing power), the trail around the lake, the Mono Trail, the archeological sites, Pywiack Dome, and Tenaya Peak, and the trail leading from Yosemite Valley that the Mariposa Battalion followed on the trek that lead to the capture of the 35 Yosemite Indians in 1851.

For the purpose of this planning effort, Tenaya Lake is considered a historic site that may be eligible for listing on the NRHP as Traditional Cultural Property and historic and archeological property under NRHP criterion (a), for the pattern of events, the travel across the Sierra that characterized the movement for trade, subsistence, and social exchange among the collective community of local American Indians; for its association with the ancient and historic period of American Indian land use in Tenaya Lake area, and with the central events of the Mariposa Battalion in 1851; the capture of the Yosemite Band of Indians that changed their lifeways and social patterns forever; and criterion (b), for its association with Chief Tenaya; criterion (c), as a significant and distinguishable entity integral to local community of American Indian folk life, traditions, practices, cosmology, religion, material culture, foodways, mentoring, and narratives; and, criterion (d), for the important cultural, historical, and scientific information it has yielded and/or may be likely to yield through archeology, history, and ethnography about access to resources, patterns of settlement, mobility, and land use.

While it is a long- term goal of the park to identify and evaluate the proposed trail system historic district, including the Tenaya Lake historic site, for eligibility for listing on the National Register, it was not within the scope of the present planning effort to conduct the detailed, extensive, costly, and protracted consultation, interview programs, and ethnographic fieldwork necessary to complete a determination of eligibility. In accordance with Bulletin 38 and section 106 implementing regulations at 36 CFR 800.4(i) *Level of Effort*, Yosemite National Park has made a reasonable and good faith effort to identify resources to which American Indians attach religious and cultural significance, considering the nature and magnitude of the planning project. Information gleaned from reviewing existing literature and consultation with culturally associated American Indians (see Chapter 4, American Indian Consultation) sufficiently identifies the probability that the project area contains significant properties, enabling planners to consider and avoid impacts to potential historic properties described herein. In the event that the selected alternative in this plan proposes actions that have potential to effect the historic property, a formal assessment, evaluation, and determination of eligibility would be undertaken for the Tenaya Lake historic site in accordance with 36 CFR 800.4(2) (Phased Identification), and measures would be developed to minimize or resolve effects prior to implementing the proposed action, in consultation with the culturally associated American Indians.

Environmental Consequences

Methodology. Traditional Cultural Properties were analyzed qualitatively, in accordance with 36 CFR Part 800 criteria of effect, based on the modifications that would be made to character-defining features that could potentially qualify the property for inclusion in the NRHP.

Types of Impacts. Adverse impacts (or an adverse effect determination) result when the proposed action directly or indirectly impacts any of the characteristics of the historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's design, setting, materials, workmanship, feeling, or association. Adverse impacts would involve ground disturbance, construction, and other activities within or adjacent to a TCP that would result in access limitations, or other disruptions to the connections between the tangible property and the intangible practices or beliefs that give the TCP its cultural significance.

Alternative 1 (No Action)

Construction and Operation - related Impacts. Under the No Action Alternative, the Tenaya Lake area would not be improved, and use of the area would continue. NPS would continue to consult with American Indian tribes, and areas of cultural and religious significance used for gatherings, walks, and ceremonies would remain unaffected. Under Alternative 1, there would be no effect to historic properties.

Impact Significance and Determination of Effect. The No Action Alternative will result in no effect to historic properties.

Cumulative Impacts. Past development, operation and maintenance of facilities surrounding Tenaya Lake has incorporated use of the area by American Indian tribes. Present and reasonable foreseeable actions in the area include the Tioga Road Rehabilitation and Parkwide Communication Data Network projects. The road rehabilitation project would affect Tioga Road including a segment adjacent to Tenaya Lake and within the project area. The communication data network project would include trenching within the Tioga Road road prism, from May Lake Junction to Tuolumne Meadows, which would traverse the Tenaya Lake APE. Adverse effects to potential TCPs would be avoided, and NPS would continue to consult with tribes to ensure that traditional and current uses are not adversely affected. Cumulatively, this Alternative would result in no effect to historic properties.

Impairment. Based on continued consultation between NPS and American Indian tribes, American Indian TCPs would not be impaired under Alternative 1.

Alternatives 2, 3, and 5

Under Alternatives 2, 3, and 5, improvements would be located in areas within the Tenaya Lake Area, which would result in similar effects to American Indian TCPs. Therefore, the analysis is incorporated into one discussion below.

Construction and Operation- related Impacts. Under Alternatives 2, 3, and 5, improvements would include development and improvement of trails, parking areas, and visitor facilities. The construction of facilities and structures would not interfere with the integrity of resources that contribute to the integrity of the TCP, including the lake and surrounding geology. Improvements

to trails would not adversely affect the integrity of trails used by American Indians during gatherings, ceremonies, and individual use of cultural and religious importance.

Drainage improvements and restoration projects would occur throughout the area. As discussed under the Geology and Hydrology sections of this document, ground disturbance may cause erosion and down-gradient sedimentation, adversely affecting the waters of Tenaya Lake, which are considered a sacred resource. Standard BMPs would be incorporated into project design to reduce the potential for pollutant discharge into the sacred waters of Tenaya Lake. In addition, use of construction equipment for major improvements (i.e., parking areas) would generate noise and dust, and would be visually obtrusive.

NPS will consult with American Indian tribes to ensure that construction activities are timed to avoid direct and indirect disturbance of areas and resources of cultural and religious significance (i.e., water, plants). With continuing consultation, the potential for an adverse effect on resources managed as TCPs would be minimized. Therefore, construction activities would result in no effect to TCPs.

The treatment of resources managed as TCPs in the Tenaya Lake area would continue with ongoing consultation between the NPS and American Indians with traditional cultural ties to the Tenaya Lake area. In the long-term, continued use of the Tenaya Lake area, as proposed under the Tenaya Lake Area Plan, would not result in the loss of areas of cultural or religious significance, and proposed actions would have a beneficial effect on the overall integrity of the resources identified in the TCP. Areas and resources of cultural and religious significance used by American Indians within the Tenaya Lake area would continue, which would result in no effect to resources managed as a TCP.

Impact Significance and Determination of Effect. A no effect determination is appropriate for the Tenaya Lake TCP under this alternative, because construction activities would be timed to avoid direct disturbance of areas and resources of cultural and religious significance used for tribal activities, and operation activities would not affect resources managed under the TCP.

Cumulative Impacts. Past development, operation and maintenance of facilities surrounding Tenaya Lake has incorporated use of the area by American Indian tribes. As discussed above, adverse effects to potential TCPs would be avoided, and NPS would continue to consult with tribes to ensure that areas and resources of cultural and religious significance used by American Indians would not be adversely affected. Cumulatively, Alternatives 2, 3, and 5 would result in no effect to historic properties.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternatives 2, 3, and 5, traditional cultural properties would not be impaired.

Alternative 4 (Lake Loop)

Construction and Operation- related Impacts. In general, effects to the Tenaya Lake TCP under Alternative 4 would be similar to those discussed under Alternatives 2, 3, and 5. However, under Alternative 4, direct disturbance and restoration activities are proposed within an area currently used by American Indian tribes for activities of cultural and religious significance, including parking, storage of food and materials, portable restrooms, and tables in support of

such activities. Relocation of this staging area would be required, which may affect the integrity of this area, if it is unavailable for use due to restoration. Other areas of cultural and religious significance would not be affected.

NPS will consult with American Indian tribes to ensure that construction activities are timed to avoid direct disturbance of areas used for tribal activities with cultural and religious significance at the lake, and to assign an alternative area for staging during such events. With continuing consultation, the potential for an adverse effect on resources managed as TCPs would be minimized.

The treatment of resources managed as TCPs in the Tenaya Lake area would continue with ongoing consultation between the NPS and American Indians with traditional cultural ties to the Tenaya Lake area. In the long- term, continued use of the Tenaya Lake area, as proposed under the Tenaya Lake Area Plan, would not result in the loss of areas of cultural or religious significance, and proposed actions would have a beneficial effect on the overall integrity of the resources identified in the TCP. Areas and resources of cultural and religious significance used by American Indians within the Tenaya Lake area would continue, which would result in no effect to resources managed as a TCP.

Impact Significance and Determination of Effect. A no effect determination is appropriate for the Tenaya Lake TCP under this alternative, because construction activities would be timed to avoid direct disturbance of areas with cultural and religious significance used for tribal activities, and operational activities would not affect resources managed under the TCP.

Cumulative Impacts. Past development, operation and maintenance of facilities surrounding Tenaya Lake has incorporated use of the area by American Indian tribes. As discussed above, adverse effects to potential TCPs would be avoided, and NPS would continue to consult with tribes to ensure that areas and resources with cultural and religious significance used by American Indians would not be adversely affected. Cumulatively, Alternative 4 would result in no effect to historic properties.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 4, traditional cultural properties would not be impaired.

AMERICAN INDIAN TRADITIONAL CULTURAL PRACTICES

Affected Environment

For the purposes of this EA, the Tenaya Lake Plan APE is considered in accordance with American Indian Religious Freedom Act (AIRFA), requiring federal agencies to consider the effects of their actions on American Indian traditional religious practices; and Executive Order 13007 requiring agencies to try not to damage Indian sacred sites on federal land, and avoid blocking access to such sites by traditional religious practitioners. The traditional cultural practices assessed in accordance with these laws are those associated with the annual Trans-Sierra Walk, and the stop- over at Tenaya Lake, discussed below.

The traditional cultural and religious significance of Tenaya Lake to the living American Indian community having ancestral cultural association with Yosemite National Park is summarized in the section of this EA titled American Indian Traditional Cultural Properties. That section takes a

brief look at ethnographic and historical accounts that document the historical use of the Tenaya Lake landscape by American Indians as they traveled a well established trail system leading from all directions - north, south, east and west- to access resources for food, medicine, tools, trade, spiritual inspiration, and social interaction, using Tenaya Lake as a stop- over; and the event of the capture in 1851 of Chief Tenaya's Yosemite Band of Indians at Tenaya Lake. Lake water is considered by the living associated American Indian community to have sacred healing powers.

In 1990, the associated American Indian tribal community initiated an annual Trans- Sierra Walk following the Mono Trail across the Sierra from Mono Lake to Yosemite Valley. The Walk is a reenactment of traditional lifeways, commemorating the well- used route between Yosemite Valley and Mono Lake, including the stop- over at Tenaya Lake, in honor of their ancestor's and ancestral values. The Walk occurs every July, and each year begins alternately at Mono Lake and Yosemite Valley to symbolically complete the round- trip their ancestors took for trade and social exchange, using trails their ancestors had used for thousands of years. In remembrance of the capture of 35 members of Chief Tenaya's Yosemite Band of Indians, living descendants of the Yosemite Band memorialize the flight of their ancestors from the Mariposa Battalion in 1851 during the stop- over at Tenaya Lake. American Indians from all seven tribes having ancestral cultural association with lands now managed by the park, as well as from tribes around the region, state, and nation participate in the Walk and the Tenaya Lake stop- over. Non- American Indian individuals showing an interest in American Indian culture are invited to participate in the Walk and the stop- over.

As a community, American Indians from both sides of the Sierra unite to organize the Walk and raise funds to support it. Participants provide donations. The tribes provide food, setting up kitchens along the trail at Tenaya Lake and Tuolumne Campground. The 1997 Agreement between the park and the American Indian Council of Mariposa County for traditional activities (NPS 1997) functions as a Special Use Permit for the event. The Yosemite National Park supports the annual trek, permitting camping at the Tenaya Lake stop- over, and providing bear- proof food storage containers. The camping at Tenaya Lake is staged at the Old Tenaya Lake Campground parking lot, near the Sunrise Trailhead, and traditional cultural activities radiate from there in all directions.

The American Indians gather at Tenaya Lake during this stop- over to conduct traditional cultural and religious activities such as hand game, exchange stories and traditional oral history, and perform ceremonies. These traditional cultural activities are essential to the survival and perpetuation of their cultural heritage as an authentic connection with their ancestors, for this generation and future generations. Tribal elders of the Indian people associated with park lands have admonished their descendants that traditional cultural and religious practices and ceremonies must be conducted to heal the land and keep the culture alive. The ceremonies they perform are for the healing of the land and the healing of the people. Even though this practice at Tenaya Lake has existed for 20 years, the practices and ceremonies are of ancient origin.

In 2009, the American Indians celebrated the 20th Anniversary of the Trans- Sierra Walk. Many celebrated their 20th year as cooks, organizers, and participants. The group recognized an elder in his mid- 80s, for having been on each walk since its inception. For this 20th year celebration, traditional singers and dancers from the Tuolumne Band of Me- Wuk Indians, West Point Miwuk, and Big Pine Paiute Reservation performed in full regalia. The 20- year celebration attracted about 200- 300 people, and following local American Indian custom, all were fed.

Tenaya Lake has not been evaluated and registered as a Sacred Site. The practices that are conducted at Tenaya Lake during the Walk are traditional; they are not necessarily traditionally associated with Tenaya Lake. However, it is the wish of the park to consider and protect to the extent practicable, the activities and practices of the American Indian tribes culturally associated with park lands.

Environmental Consequences

Methodology. This analysis evaluates traditional cultural practices in terms of how they might be affected as a result of the action alternatives. Analysis was based on identification of historical and current practices, as defined through interviews with American Indians (summarized above). Considerations included modifications to use areas, facility availability, restoration actions, and other uses that may affect traditional practices. Impacts were assessed in terms of duration, intensity, and type. In terms of duration, a short- term impact on would be temporary in duration due to construction, restoration, or demolition activities; short- term impacts would occur during the construction period. A long- term impact would have a permanent effect on traditional cultural practices. Intensity level definitions are provided below.

Types of Impacts. Impacts were evaluated in terms of whether they would be beneficial or adverse to traditional cultural practices. Beneficial impacts would enhance or support traditional cultural practices. Adverse impacts would include ground disturbance, construction, visitor use, and other activities that would result in access limitations, or other disruptions to traditional cultural practices.

Alternative 1 (No Action)

Construction and Operation- related Impacts. Under the No Action Alternative, the Tenaya Lake area would not be improved, and use of the area would continue. NPS would continue to consult with American Indian tribes, and use of the area would continue as it does under current conditions. Under Alternative 1, there would be no effect to traditional cultural practices.

Impact Significance. The No Action Alternative will result in no impact to traditional cultural practices.

Cumulative Impacts. Past development, operation and maintenance of facilities surrounding Tenaya Lake has incorporated use of the area by American Indian tribes. Present and reasonable foreseeable actions in the area include the Tioga Road Rehabilitation and Parkwide Communication Data Network projects. The road rehabilitation project would affect Tioga Road adjacent to Tenaya Lake. The communication data network project would include trenching within the Tioga Road road prism, which would traverse the Tenaya Lake APE. Adverse effects to traditional cultural practices would be avoided, and NPS would continue to consult with American Indian tribes. Cumulatively, this Alternative no effect to historic properties.

Impairment. Based on continued consultation between NPS and American Indian tribes, American Indian traditional cultural practices would not be impaired under Alternative 1.

Alternatives 2, 3, and 5

Under Alternatives 2, 3, and 5, improvements would be located in areas within the Tenaya Lake Area, which would result in similar effects to American Indian traditional cultural practices. Therefore, the analysis is incorporated into one discussion below.

Construction- related Impacts. Under Alternatives 2, 3, and 5, construction of improvements would generate noise and dust, and would be visually obtrusive. NPS will consult with American Indian tribes to ensure that construction activities are timed to avoid direct disturbance of annual culturally and religiously significant tribal activities at the lake. Other activities, including plant gathering, hiking, and meditation may be adversely affected by construction activity in the area. With continuing consultation, the potential for an adverse effect would be minimized. Therefore, construction activities would result in a minor, adverse effect to traditional cultural practices.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. Ongoing consultation between the NPS and American Indians with traditional cultural ties to the Tenaya Lake area would continue. Operation of the facilities under Alternatives 2, 3, and 5 would be limited to periodic maintenance activities, similar to existing conditions. American Indians present during traditional uses would be exposed to noise generated by the proposed rumble strips, to be located within Tioga Road, approximately 600 feet from a traditional gathering site. Additional sources of noise would include sounds generated by visitors and traffic. Due to distance and intervening topography and forest, it is expected that this additional noise would not adversely affect the integrity of the setting and feeling in this location.

Local American Indian tribes would continue to have access to and have use of special resources in the Tenaya Lake area. Ongoing visitor use of the Tenaya Lake area would not restrict local American Indian tribes' use of the area pursuant to the American Indian Religious Freedom Act of 1979 (AIRFA) or Executive Order 13007.

Impact Significance. Local, long- term, negligible, adverse, impact.

Cumulative Impacts. Past development, operation and maintenance of facilities surrounding Tenaya Lake has incorporated use of the area by American Indian tribes. As discussed above, adverse effects to traditional cultural practices would be avoided, and NPS would continue to consult with American Indian tribes. Cumulatively, this Alternative would have a negligible adverse effect on traditional cultural practices.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternatives 2, 3, and 5, traditional cultural practices would not be impaired.

Alternative 4 (Lake Loop)

Construction and Operation- related Impacts. In general, effects to traditional cultural practices under Alternative 4 would be similar to those discussed under Alternatives 2, 3, and 5. However, under Alternative 4, direct disturbance and restoration activities are proposed within an area currently used by American Indian tribes for culturally and religiously significant annual activities, including parking, storage of food and materials, portable restrooms, and tables. Consultation with affected tribes would be implemented by NPS to avoid direct disruption of

annual events. With continuing consultation, the potential for an adverse effect would be minimized. Therefore, construction activities would result in a minor, adverse effect to traditional cultural practices.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. Under Alternative 4, relocation of a temporary staging area would be required; other uses would not be affected. NPS will consult with American Indian tribes to ensure that construction activities are timed to avoid direct disturbance of annual tribal activities at the lake, and to assign an alternative area for staging during annual events. With continuing consultation, the potential for an adverse effect would be minimized.

Ongoing consultation between the NPS and American Indians with traditional cultural ties to the Tenaya Lake area would continue. Operation of the facilities under Alternative 4 would be limited to periodic maintenance activities, similar to existing conditions. Local American Indian tribes would continue to have access to and have use of culturally and religiously significant resources in the Tenaya Lake area. Ongoing visitor use of the Tenaya Lake area would not restrict local American Indian tribes' use of the area pursuant to AIRFA or Executive Order 13007.

Impact Significance. Local, long- term, minor, adverse, impact.

Cumulative Impacts. Past development, operation and maintenance of facilities surrounding Tenaya Lake has incorporated use of the area by American Indian tribes. As discussed above, adverse effects to traditional cultural practices would be avoided, and NPS would continue to consult with American Indian tribes. Cumulatively, this Alternative would have a negligible adverse effect on traditional cultural practices.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 4, traditional cultural practices would not be impaired.

VISITOR EXPERIENCE

Affected Environment

Regional Setting

Yosemite National Park is guided by the park's enabling legislation, which has two purposes: (1) to preserve the unique natural resources and scenic beauty at the park, and (2) to make these resources available to visitors for study, enjoyment, and recreation. The experience of visitors in Yosemite National Park is dependent on a number of factors, including the availability of recreational and interpretive opportunities, the availability of services, safety, and the quality of the recreational environment and facilities. Yosemite National Park offers a broad spectrum of recreation opportunities, including access to and availability of such activities as use of non-motorized watercraft (e.g., rafts, inner tubes, and kayaks), swimming and wading, hiking, backpacking, camping, rock climbing, fishing, sightseeing, photography, nature study, bicycling, and stock use.

Based on statistics from the last 10 years, approximately 3.5 to 4.1 million people per year visit Yosemite National Park. Most people visit between late- spring and early- fall. The number of

visitors begins to increase in February, with peak visitation occurring between July and August when an estimated 575,000 people per month visit the park. Visitation drops off sharply through September, October, and November. During December and January visitation is at its lowest with approximately 100,000 people per month visiting the park.

Most visitors travel to Yosemite by private vehicle. However, tour buses also accommodate a considerable percentage of visitors. Bus transportation within the park includes public transportation, charter and tour bus operators, concessionaire- operated tours, and shuttle bus services. Traffic congestion and access are important considerations for visitors.

Project Setting

Tenaya Lake is a magnificent High Sierra lake surrounded by granite domes, lodgepole forests, and Yosemite's vast wilderness. It is the largest natural lake in Yosemite. Because of its remarkable scenic qualities, its inviting blue water, and its proximity to Tioga Road, Tenaya Lake is a popular destination for summer visitors in Yosemite. In a 2009 visitor study, 26% of 646 visitor groups reported visiting Tenaya Lake, making it the 11th most popular site (NPS 2010e).

A recent study on visitor use at Tenaya Lake was collected by the park in late July to mid- August 2008 (NPS 2009b). Researchers recorded information on visitor volume and characteristics at Sunrise Trailhead Murphy Creek parking lots (the East Beach parking lot was not included in the study). Currently, Tenaya Lake offers a variety of recreation opportunities for visitors, ranging from very busy beach areas to more tranquil wilderness- like settings.

Based on the study, boat use is low on Tenaya Lake, and most observed boats were hard- sided kayaks or canoes. Approximately 4 to 5 boats were observed at one time within the western portion of the lake, and 1 to 2 boats were observed at one time within the eastern portion of the lake. Approximately 20 persons per day were counted on the South Trail. Approximately 80 persons per day on the trail leading to Cloud's Rest (visitors access the Cloud's Rest trail from the Sunrise Trailhead parking area).

The busiest shore area is located at East Beach. An average of 80 persons at one time were observed on weekends, compared to approximately 49 persons at one time on weekdays. Use is variable throughout the day; up to 105 persons were observed at one time. The lowest use area is the south shore (approximately 9 persons observed at one time).

Along Tioga Road, roadside parking is busiest from 1:00 to 3:00 p.m., between the Sunrise Trailhead parking lot and the Old Campground parking loop (with approximately 45% of all roadside parking occupied from 1:00 to 3:00 p.m.). The next busiest roadside parking area is along East Beach, with approximately 35% of all roadside parking occupied from 1:00 to 3:00 p.m.

At Sunrise Trailhead, the average number of visitors per hour ranged from 1 to 9.5 throughout the week. Compared to other parking areas along Tioga Road, Sunrise Trailhead experienced extremely high vehicle use, with the average vehicles at one time ranging from 38.6 to 47.6. Nearly all vehicles were private vehicles and parking overflow was common. Just over half (51.2%) of the vehicles observed used Sunrise Trailhead for pull off/drop off use. The remainder of visitor use observed included: restroom only (23.8%), day hikers (17.9%), sightseers (4.8%), and overnight/backpackers (2.4%). Visitor use composition was similar for weekends and weekdays except for higher proportions of day hikers (24.2%) and sightseers (6.1%) on the weekends. About

20% of all vehicles at Sunrise Trailhead stayed 45 minutes or longer. Common hiking and backpacking destinations were the local area, Sunrise High Sierra Camp, Yosemite Valley, and May Lake. Of those vehicles that stayed less than 45 minutes, the average length of stay was 3 minutes for uses such as sightseeing and the restrooms (NPS 2009b).

At Murphy Creek, the average number of visitors per hour ranged from 3.8 to 57.6 throughout the week. Average vehicles at one time ranged from 6 to 26.4 and parking overflow was common. Most visitors (54.4%) to Murphy Creek were sightseeing. In addition, large proportions of visitors were observed using the restroom only (29.8%), picnicking (14%), and pull off/drop off use (12.3%). No day hiking or overnight/backpacking was observed. Just over 31% of vehicles stayed longer than 45 minutes. Of those vehicles that stayed less than 45 minutes, the average length of stay was 12 minutes (NPS 2009b).

Environmental Consequences

Methodology. This analysis evaluates the quality of visitor experiences in terms of how they might be altered as a result of the action alternatives. Professional judgment was applied to reach reasonable conclusions as to the context, intensity, and duration of potential impacts.

Analysis was based on whether there was a complete loss of a recreation opportunity, a change in access to or availability of a recreation opportunity (including traffic congestion), a change in the quality of visitor experience or recreational opportunities (for example, visitor crowding) or a change in safety. Impacts to visitor experience quality and recreation opportunities were assessed in terms of duration, intensity, and type. In terms of duration, a short- term impact on visitor experiences would be temporary in duration due to construction, restoration, or demolition activities; short- term impacts would occur during the construction period. A long- term impact would have a permanent effect on the visitor experience. Intensity level definitions are provided below.

Types of Impacts. Impacts were evaluated in terms of whether they would be beneficial or adverse to visitor experience. Beneficial impacts would enhance visitor participation, quality of visitor experience, and service level. Adverse impacts would be effects that reduce visitor participation, quality of visitor experience, and service level.

Intensity Level Definitions

Negligible: Negligible impacts would result in little noticeable change in visitor experience.

Minor: Minor impacts would result in changes in desired experiences but without appreciably limiting or enhancing critical characteristics (critical characteristics are those elements of a recreational activity that are most important to those who pursue it (for example, it may be important to picnickers to be able to drive to a picnic site)).

Moderate: Moderate impacts would change the desired experience appreciably, (that is, changes to one or more critical characteristics or appreciable reduction/increase in the number of participants).

Major: Major impacts would eliminate or greatly enhance multiple critical characteristics or greatly reduce/increase participation.

Impairment: Effects to the visitor experience would be severe and long- term and would preclude beneficial visitor experiences within the park for future generations.

Alternative 1 (No Action)

There would be no new impacts to visitor experience under Alternative 1. Existing impacts to visitor experience would continue under the No Action Alternative. Impacts to visitor experience at Tenaya Lake include visitor crowding caused by limited or inadequate parking, infrastructure, and facilities plus poorly designated paths and limited interpretive resources. Safety issues along Tioga Road would also continue to impact visitor experience.

Construction and Operation- related Impacts. The park would retain the existing parking lots (including roadside parking) and limited facilities, infrastructure, and signage. Trails would not be improved. Under the no action alternative, 61% of available parking area (physical parking capacity) is actually used under observed, peak, maximum conditions. Visitor experience would continue to be impacted by limited access, inadequate services, and unsafe areas along Tioga Road. As a result, the No Action Alternative would have a local, long- term, moderate, adverse impact to visitor experience in the project area.

No construction- related impacts would occur. Operation- related impacts would include local, long- term, moderate, adverse impacts from continued limited or inadequate parking, infrastructure, facilities, and unsafe conditions. Alternative 1 would result in no change from current conditions. Visitor experience at Tenaya Lake would continue to be adversely impacted by traffic congestion, visitor crowding, poor access, limited visitor services, and inadequate wayfinding and interpretive materials.

Impact Significance. Local, long- term, moderate, adverse impact

Cumulative Impacts. Cumulative effects to visitor experience are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative. The actions identified below are examples of actions that could affect the visitor experience in combination with the alternative.

Past actions that cumulatively impact visitor experience at Tenaya Lake include beneficial impacts resulting from construction of Tioga Road, El Portal Road Improvements, and implementation of the 1980 GMP. The 1980 GMP included the establishment of park policies and programs for visitor use within Yosemite National Park that enhance visitor experience.

Present actions that cumulatively impact visitor experience include the Glacier Point Road rehabilitation, Scenic Vista Management Plan, the Tioga Road Trailheads Project, and the New Merced and Tuolumne Wild and Scenic River Management Plans. These actions would have a short- term adverse impact to visitor experience due to traffic delays and rerouting during construction. In the long- term, these projects would benefit visitor experience by facilitating recreational opportunities, improving the park's infrastructure, improving safety, and reducing traffic pressures on Tioga Road. Tuolumne Wild and Scenic River Comprehensive Management Plan would include measures to protect outstanding features, and natural and cultural resources.

Such measures may include management of visitor use in sensitive areas, and parking reduction. Reduced capacity at visitor destinations including Tuolumne Meadows may result in increased visitor use demands in other areas within the park.

Reasonably foreseeable future actions that would cumulatively impact visitor experience within the project area include resurfacing of Wawona Road. Past, present, and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative would result in local, long- term, beneficial cumulative impacts to visitor experience.

Action Alternatives (2, 3, 4, and 5)

While each action alternative includes a different set of parking, facilities, infrastructure, and trail improvements around Tenaya Lake, the overall amount and duration of construction would be similar. For example, each action alternative presents variations in the number and location of pedestrian bridges, parking spaces, and specific location of visitor facilities. The overall impact to visitor experience is similar but intensity of impact for specific visitor groups would vary by location and visitor activity.

Under all action alternatives, the visitor experience would benefit from the improved safety and decreased noise associated with a 25 mph speed zone and traffic calming devices along Tioga Road. Visitor facilities at East Beach, such as a new picnic area and boardwalk platform, would be added (though fire pits/grills would be removed). Drainage infrastructure under Tioga Road and within trail systems would improve safety, contain erosive flows, and capture pollutants to the benefit of drivers, hikers, and swimmers. Trails and signage would also be improved to help guide visitors, provide interpretation, and limit the pedestrian impact on natural areas. Restoration activities would improve aesthetics for visitors.

The reduction in roadside parking, which is addressed in varying degrees under each action alternative, would result in less overall parking available for visitors, and less or no parking adjacent to the lake along Tioga Road. This would have an initial adverse effect to visitors expecting to repeat a past experience (i.e., stopping along the road to take a photograph or immediately access the lake); however, the long- term effect would benefit visitor experience by improving views towards and surrounding the lake, consolidating parking areas near visitor facilities and interpretive materials, improving visitor safety by reducing congestion and increasing visibility, and enhancing experience by providing functional signage and interpretive materials.

The removal of some amenities (such as fire pits/grills) and the redistribution of others (such as parking, picnic tables, and trails) would be a local, long- term, adverse minor impact. These impacts, though, would be offset by more extensive local, long- term, moderate beneficial impacts to visitor experience, including congestion, safety, crowding, and recreational opportunities associated with improved and expanded parking, infrastructure, facilities, trails, and restoration.

Under each action alternative, removal of ineffective and inadequate signage would occur. Installation of additional interpretive materials, including wayfinding and educational signs and materials, would enhance the visitor experience by clearly identifying facilities, varying degrees and locations of experience opportunities, and unique information about the area and its history.

Alternative 2 (Tenaya Confluence, Preferred Alternative)

Construction- related Impacts. Implementation of Alternative 2 would result in short- term impacts to visitor experience due to construction activity, including the temporary closure of some parking spaces and recreation areas during construction. The quality of experience may diminish due to construction noise and increased congestion as visitors are displaced to other areas of Tenaya Lake and the park where construction activity is not underway. Limited or inconvenient access to Tenaya Lake and its backcountry trailheads may also lead some visitors to choose other destinations outside the park.

Impact Significance. Regional, short- term, minor to moderate, adverse impact.

Operation- related Impacts. Under Alternative 2, overall parking area would be reduced from current conditions, which may limit visitor capacity at the lake. This alternative would provide a total of 215 parking spaces, which would equate to 86% of maximum, peak, observed parking under current conditions. During these peak conditions, approximately 36 vehicles may not be accommodated, and these visitors may be required to modify their planned itinerary and experience other destinations within the park, or delay a day visit to Tenaya Lake or overnight parking for Wilderness trailheads. This may place additional burden on other areas within the park as they accommodate the displaced visitors. Overall, this would result in a regional, short-term, minor, adverse impact.

The expanded and re- organized parking area with designated shuttle stops and a pedestrian road crossing would address the overflow parking issue at Sunrise Trailhead improve safety The Old Campground Loop would be retained and improved but picnic tables would be removed. New and relocated facilities, such as a vault toilet stall and trash and recycling containers, would also benefit visitors. Trails would be consolidated and the Tenaya Creek crossing would be improved with a stepping stone crossing.

Within Murphy Creek, the western parking lot would be re- organized and expanded. A designated shuttle stop and pedestrian road crossing would also be added. New pedestrian and vehicle bridges would also improve aesthetics and facilitate access. New and relocated facilities, such as an additional vault toilet stall and trash and recycling containers, would also benefit visitors. Fire grills would be removed. Trail improvements including more accessible trails would address visitor crowding and improve the recreational experience.

Under Alternative 2, the re- organized and expanded parking area with designated shuttle stops and a pedestrian road crossing would address overflow parking and improve safety. The parking area would also include two ingress/egress driveways to improve access and new picnic tables. The fire pit/grills would be removed. The existing trail to the beach would be replaced with another trail that avoids the wetland with new routing and pedestrian crossings.

The trail parallel to Tioga Road would be improved. The South Trail would remain with repairs as needed. No improvements would be made.

Parking along Tioga Road would be significantly reduced, and would include five spaces south of Tioga Road, and an area of undesignated roadside parking on the northern side of the road between Murphy Creek and East Beach. Naturalistic barriers would prevent undesignated road shoulder parking in most areas. Reduced parking along Tioga Road reduces traffic congestion

and redirects vehicles to the expanded parking at other locations. A segment of the existing trail parallel to Tioga Road would be accessible; the remainder would be rustic. Interpretive nodes would be installed along trails and within parking areas. Boulders would be placed along the trail to provide for resting stops.

While displaced visitors would experience an adverse impact to their anticipated experience, this would only occur during maximum, peak, conditions. Proposed plan elements would result in a significant improvement to the visitor experience, resulting in an overall beneficial impact.

Impact Significance. Local, long- term, minor to moderate, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long- term, minor, beneficial impacts to visitor experience while implementation of Alternative 2 would have local, long- term, moderate, beneficial impacts. Thus, the cumulative actions in combination with Alternative 2 would result in net local, long- term, moderate, beneficial cumulative impacts to visitor experience in the project area.

Alternative 3 (Tenaya Ecotones)

Construction- related Impacts. Implementation of Alternative 3 would result in short- term impacts to visitor experience due to construction activity, including the temporary closure of some parking spaces and recreation areas during construction. The quality of experience may diminish due to construction noise and increased congestion as visitors are displaced to other areas of Tenaya Lake and the park where construction activity is not underway. Limited or inconvenient access to Tenaya Lake and its backcountry trailheads may also lead some visitors to choose other destinations outside the park.

Impact Significance. Regional, short- term, minor to moderate, adverse impacts.

Operation- related Impacts. This alternative would provide a total of 208 parking spaces, which would equate to 83% of maximum, peak, observed parking under current conditions. During these peak conditions, approximately 43 vehicles may not be accommodated, and these visitors may be required to modify their planned itinerary and experience other destinations within the park, or delay a day visit to Tenaya Lake or over- night parking for Wilderness trailheads. This may place additional burden on other areas within the park as they accommodate the displaced visitors. Overall, this would result in a regional, short- term, minor, adverse impact.

Under Alternative 3, the expanded and re- organized parking area with designated shuttle stops and a pedestrian road crossing would address the overflow parking issue at Sunrise Trailhead improve safety similar to Alternative 2. The Old Campground Loop would be retained but with parking designated for stock/horse trailers. New and relocated facilities, such as a vault toilet stall and trash and recycling containers, would also benefit visitors. Trail re- organization and consolidation, including improved stepping stones across Tenaya Creek, would improve the visitor experience. Alternative 3 includes a boardwalk but less length of accessible trails.

Under this alternative, parking would be reduced and re- organized. A designated shuttle stop and pedestrian road crossing would also be added. During high visitation periods, parking overflow could occur but overall the scenic qualities of Murphy Creek area would be improved by the removal and restoration of the eastern parking lot. Two new bridges would also improve

aesthetics and facilitate access. New and relocated facilities, such as a vault toilet stall and trash and recycling containers, would also benefit visitors. Fire grills would be removed. Trail improvements, including more accessible trails and stabilization of critical areas on the East Bank trail, would address visitor crowding and improve the recreational experience.

Under Alternative 3, parking would be expanded and re-organized with designated shuttle stops and a pedestrian road to address overflow parking and improve safety. More standard spaces would also be available to visitors than Alternative 2 and 4 but one less bus pull-through. The fire pit/grills would be removed. The existing trail to the beach would be replaced with another trail that avoids the wetland with new routing and pedestrian crossings/boardwalks. The trail parallel to Tioga Road would also be improved but the existing, informal log crossing over Tenaya Creek would remain. The South Trail would remain with improved access, such as constructed steps.

Parking along Tioga Road would remain but be reduced considerably. Naturalistic barriers would prevent undesigned road shoulder parking opportunities. A paved scenic turnout would also be included. Reduced parking along Tioga Road reduces traffic congestion and redirects vehicles to the expanded parking at other locations. The existing trail parallel to Tioga Road would be improved and expanded with designated lake access and viewpoint and interpretive nodes.

While displaced visitors would experience an adverse impact to their anticipated experience, this would only occur during maximum, peak, conditions. Proposed plan elements would result in a significant improvement to the visitor experience, resulting in an overall beneficial impact.

Impact Significance. Local, long- term, minor to moderate, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long- term, minor, beneficial impacts to visitor experience while implementation of Alternative 3 would have local, long- term, moderate, beneficial impacts. Thus, the cumulative actions in combination with Alternative 3 would result in net local, long- term, moderate, beneficial cumulative impacts to visitor experience in the project area.

Alternative 4 (Lake Loop)

Construction- related Impacts. Implementation of Alternative 4 would result in short- term impacts to visitor experience due to construction activity, including the temporary closure of some parking spaces and recreation areas during construction. The quality of experience may diminish due to construction noise and increased congestion as visitors are displaced to other areas of Tenaya Lake and the park where construction activity is not underway. Limited or inconvenient access to Tenaya Lake and its backcountry trailheads may also lead some visitors to choose other destinations outside the park.

Impact Significance. Regional, short- term, minor to moderate, adverse impact.

Operation- related Impacts. Alternative 4 would provide a total of 214 parking spaces, which would equate to 85% of maximum, peak, observed parking under current conditions. During these peak conditions, approximately 37 vehicles may not be accommodated, and these visitors may be required to modify their planned itinerary and experience other destinations within the park, or delay a day visit to Tenaya Lake or over- night parking for Wilderness trailheads. This

may place additional burden on other areas within the park as they accommodate the displaced visitors. Overall, this would result in a regional, short- term, minor, adverse impact.

Under this alternative, the expanded and re- organized parking area (including parking north of Tioga Road to replace parking removed at the Old Campground) with designated shuttle stops and two pedestrian road crossings would address the overflow parking issue at Sunrise Trailhead improve safety. Removal of parking and picnic areas in this location may have an adverse effect on the visitors who expect this area to be available; however, improvements in the Sunrise Trailhead area would accommodate parking, picnic, trail use, and other visitor expectations.

Alternative 4 provides the most parking at Sunrise Trailhead of all the action alternatives. New and consolidated facilities, such as a vault toilet stall and trash and recycling containers, would also benefit visitors. Trail re- organization with improved accessibility, including a pedestrian bridge across Tenaya Creek and boardwalk, would improve the visitor experience.

Under this alternative, Murphy Creek parking would be expanded and re- organized. A designated shuttle stop, pedestrian road crossing, and lake viewpoint would also be added. The east parking lot would not be removed. Three new pedestrian bridges would also improve aesthetics and facilitate access for pedestrians. New and relocated facilities, such as a vault toilet stall and trash and recycling containers, would also benefit visitors. The fire grills would not be removed. Trail improvements, including accessible trails and a boardwalk would address visitor crowding and improve the recreational experience.

Under Alternative 4, the East Beach parking lot would be expanded and re- organized to provide similar parking as Alternative 2. The expanded parking with two ingress/egress driveways would address overflow parking and improve safety and access. Two designated shuttle stops and a pedestrian road crossing would also be included. The fire pit/grills would be removed. The existing trail to the beach would be replaced with another trail that avoids the wetland with new routing and boardwalk. The trail parallel to Tioga Road would be improved and a pedestrian bridge would improve access across Tenaya Creek to the South Trail. The South Trail would remain with improved access, including possible enhancements to accommodate sight- impaired visitors.

Parking along Tioga Road would be eliminated except for a limited area of undesignated roadside parking between Murphy Creek and East Beach on the northern side of Tioga Road. Naturalistic barriers would prevent undesignated road shoulder parking in most areas. Reduced parking along Tioga Road reduces traffic congestion and redirects vehicles to the expanded parking at other locations. The existing trail parallel to Tioga Road would be made more accessible and expanded, including interpretive nodes.

While displaced visitors would experience an adverse impact to their anticipated experience, this would only occur during maximum, peak, conditions. Proposed plan elements would result in a significant improvement to the visitor experience, resulting in an overall beneficial impact.

Impact Significance. Local, long- term, minor to moderate, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long- term, minor, beneficial impacts to visitor experience while implementation of Alternative 4 would have local, long- term, moderate, beneficial impacts. Thus,

the cumulative actions in combination with Alternative 4 would result in net local, long- term, moderate, beneficial cumulative impacts to visitor experience in the project area.

Alternative 5 (Immersive Nodes)

Construction- related Impacts. Implementation of Alternative 3 would result in short- term impacts to visitor experience due to construction activity, including the temporary closure of some parking spaces and recreation areas during construction. The quality of experience may diminish due to construction noise and increased congestion as visitors are displaced to other areas of Tenaya Lake and the park where construction activity is not underway. Limited or inconvenient access to Tenaya Lake and its backcountry trailheads may also lead some visitors to choose other destinations outside the park.

Impact Significance. Regional, short- term, minor to moderate, adverse impact.

Operation- related Impacts. This alternative would provide a total of 251 parking spaces, which would equate to 100% of maximum, peak, observed parking under current conditions. The expanded and re- organized parking area (including parking north of Tioga Road) with designated shuttle stops and two pedestrian road crossings would address the overflow parking issue at Sunrise Trailhead improve safety. Facilities available in the other action alternatives would be provided and expanded. Visitors would benefit from more toilets, trash and recycling containers, bear boxes, and picnic tables. The 10 primitive walk- in camp sites north of Tioga Road and an access point for small watercraft would provide additional visitor amenities not included in the other alternatives.

The Old Campground Loop would be retained with limited parking and but picnic tables would be removed. Trail re- organization and consolidation, including a stepping stone crossing for Tenaya Creek and a boardwalk, would improve the visitor experience.

Under this alternative, parking would be re- organized, and a designated shuttle stop and pedestrian road crossing would also be added. New and relocated facilities, such as a vault toilet stall and trash and recycling containers, would also benefit visitors. Three new bridges would also improve aesthetics and facilitate access for pedestrians. Fire grills would be removed but a water spigot would provide convenient potable water to visitors at the camping area. Trail improvements, including more accessible trails and a boardwalk would improve the visitor experience.

Under Alternative 5, the expanded and re- organized parking area with designated shuttle stops and a pedestrian road crossing would improve safety. The fire pit/grills would be removed. The existing trail to the beach would be replaced with another trail that avoids the wetland with new routing and a boardwalk. The trail parallel to Tioga Road would also be improved but the existing, informal log crossing over Tenaya Creek would remain. The South Trail would remain with repairs as needed. No improvements would be made. The impact to visitor experience would be a local, long- term, negligible beneficial impact.

Parking along Tioga Road would be reduced but continue to provide spaces and turn- outs on the west and east side of Murphy Creek. Naturalistic barriers would prevent undesignated road shoulder parking opportunities and designated pedestrian lake access/viewpoints would be included. Reduced parking along Tioga Road reduces traffic congestion and redirects vehicles to

the expanded parking at other locations. The existing trail parallel to Tioga Road would be improved and expanded.

Impact Significance. Local, long- term, minor to moderate, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long- term, minor, beneficial impacts to visitor experience while implementation of Alternative 5 would have local, long- term, moderate, beneficial impacts. Thus, the cumulative actions in combination with Alternative 5 would result in net local, long- term, moderate, beneficial cumulative impacts to visitor experience in the project area.

PARK OPERATIONS

Affected Environment

Regional Setting

The park operations objectives are to maintain a safe, functional, and orderly environment that provides compatible opportunities for resource preservation and enjoyment by visitors and employees; and support an integrated system of compatible regional land uses providing opportunities for recreation, community development, preservation, and economic utilization of resources. Park operations consist of four basic categories: resources management, visitor protection, interpretation, and facility management. Resources management staff protects the natural, historic, and cultural resources of the park. Visitor protection staff performs various visitor management and resource protection duties, including enforcing laws, resolving disputes, providing emergency medical treatment, fighting fires, staffing Wilderness ranger stations, and conducting search and rescue operations. Interpretation personnel conduct programs such as ranger- led walks, talks, and tours, and staff visitor centers, produce park publications, and maintain the park's website. Facility management staff perform preventive and corrective maintenance on park infrastructure, including water, wastewater, and electrical utility systems, and park roads, trails, and structures.

Project Setting

Park facilities and infrastructure within the project area include Tioga Pass Road, paved and unpaved parking areas and roadside parking, and a shuttle stop. Other amenities include vault toilets, picnic areas, and bear boxes. There is no electrical power in the project area. Dumpsters are located at Sunrise Trailhead, Murphy Creek, and East Beach, and there are two trash/recycling containers at Murphy Creek. One pay phone is located at Murphy Creek. Fire grills are located at Murphy Creek and East Beach. Restrooms and trash/recycling containers are maintained by park staff.

Trailheads and trails include climber access to Stately Pleasure Dome; the Murphy Creek trailhead to the Glen Aulin High Camp; the Sunrise Trailhead to the Sunrise High Sierra Camp, Clouds Rest, Little Yosemite Valley, and Olmsted Point; and a trail extending from the Sunrise Trailhead to the beach on the east end of the lake, which extends to Tuolumne Meadows. The staging area for backcountry NPS stock (horses and mules) is located within the Old Campground parking loop. During NPS use, this area is closed to the public.

Environmental Consequences

Methodology. The Park Operations analysis was based on a qualitative assessment of park operations that could occur in the project area and the effects anticipated as a result of ongoing maintenance, rehabilitation, and/or construction. For purposes of this analysis, an alternative would have an impact (negative or beneficial) on park operations if it:

- Results in direct changes to park operation, facilities, or staffing requirements or policies associated with park operations; or
- Causes indirect effects on park operations staffing, such as effects on utility and roadway infrastructure, flooding, and impacts on provision of utilities, especially potable water and sewer services

Types of Impacts. The type of impact refers to whether the effect is considered beneficial or adverse. Beneficial impacts would improve park operations. Adverse impacts would negatively affect staffing requirements or other park operations services.

Intensity Level Definitions:

Impacts to park operations and facilities were evaluated using the process described at the beginning of Chapter 3. Impact threshold definitions for park operations and facilities are as follows:

Negligible: Impacts to park operations and facilities would be largely unnoticed by staff and the visiting public. Existing programs and activities would remain essentially unchanged.

Minor: Park operations and facilities would be affected, but the impacts would be limited in scope and not generally noticed by visitors. Increases or decreases in the park's operating costs and staffing workload would require some realignment of funds, but would not require substantial changes in the park's overall operating budget.

Moderate: Park operations and facilities would be measurably affected, and the impacts would be noticeable to some visitors. Increases or decreases in the park's operating costs and/or workload would require realignment of funds and would alter the scope or quality of some programs.

Major: Impacts to park operations and facilities would be widespread and readily apparent to most visitors. Increases or decreases in operating costs and/or workload would require substantial changes in funding allocation and would alter the scope and quality of multiple programs or basic operational activities.

Impairment: Impairment analysis is not applicable to this resource topic.

Alternative 1 (No Action)

Under the No Action Alternative, the Tenaya Lake area would not be improved, except for continuation of existing restoration projects, emergency repairs, and routine and periodic maintenance activities. The existing facilities would continue to serve the area, trails would not be

improved, and no new parking would be constructed. The No Action Alternative would continue to result in routine repair and maintenance actions, including removal of vault toilet waste, trash, and recyclables; hazard tree abatement; and snow removal.

Construction and Operation- related Impacts. This alternative would require increasing costs to make emergency repairs to parking lots and facilities, and would allow the continued deterioration of significant natural resources, including wetlands and cultural resources. Park operations costs would increase incrementally because the visitor safety issues associated with the location and design of existing trailheads, parking areas, driveway intersections with Tioga Road, and directional signage would not be addressed.

Impact Significance. Local, long- term, minor, adverse impact.

Cumulative Impacts. Park operations are currently hampered by the lack of adequate facilities in some areas of the park. A number of development projects (e.g., the communication data network upgrade) could occur within the park and would enhance the efficiency of park operations. Regardless, the efforts needed to maintain the Tenaya Lake area would generally remain the same over time, with periodic rehabilitation needs or emergency repairs.

Present actions which may affect park operations in the long- term include commercial use authorizations for commercial activities, and special use permit issuance for events and activities. These actions include authorization for operation of tour buses within the park (including stops at Tenaya Lake), and special permits for events (i.e., family gatherings, weddings) at Tenaya Lake. The actions require NPS staff time to review and issue permit requests, and enforce or verify permit conditions. Continued maintenance of visitor facility areas at Tenaya Lake, Tuolumne Meadows, Olmsted Point, Yosemite Valley, and numerous other facilities in the park, require park maintenance and facilities staff to conduct repair, maintenance, trash and recycling collection, and restroom maintenance on a routine basis. In addition, various construction projects throughout the park require staff time to manage contracts and construction crews. Road projects including Tioga Road Rehabilitation, Wawona Road improvements, and roadside trenching associated with the communication data network project would result in short- term adverse effects to the operation of roadways.

The No Action Alternative would contribute a minor, long- term adverse cumulative effect to park operations by drawing time and money away from the management of other park resources to conduct continued maintenance activities, site- specific restoration projects, watering of vegetation in newly planted areas, and emergency repairs.

Action Alternatives (2, 3, 4, and 5)

Implementation of Alternatives 2, 3, 4, and 5 would result in similar short and long- term effects to park operations. Construction of improvements and facilities would require staff time for contract management, resource protection, and management of construction crews. Operations within the Tenaya Lake area would be temporarily affected by construction activities, including closure of parking areas, trail routes, and partial closure of Tioga Road. Facilities requiring maintenance would include restrooms, bear- proof containers, trash and recycling bins, interpretive signage, culverts, and drainage systems, trails, and parking areas.

Construction- related Impacts. Impacts to park operations from construction would be minor and adverse and would result from visitor crowding and inconvenience during construction. There would be an increased risk of accidents on Tioga Road during traffic calming improvements and changes to the parking lots.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. Under Alternatives 2, 3, and 4, proposed parking would range from 83 to 86% of the maximum, peak, observed parking under current conditions. During peak conditions, there is a potential for approximately 36 to 43 vehicles to circulate the area seeking a parking space or to continue on to other opportunities and destinations within the park. These circulating vehicles may create an additional burden on law enforcement as these cars create additional turning movements onto, and from Tioga Road.

Aside from peak parking conditions, systematic improvements to the Tenaya Lake area would result in long- term improvements that would benefit park operations. The additional facilities, including a vault toilet stall and recycling and trash containers would incur increased staff time and costs to maintain, but the impact would be negligible. Drainage improvements would reduce the potential for erosion and flooding and would, therefore, diminish future long- term costs for maintenance and emergency repairs. The boardwalk platform would allow visitor to walk around the lake without disturbing the wetlands, which would protect significant resources from damage. Safety improvements such as the new boardwalk platform, improved trails and signage, and the reduced speed zone on Tioga Road, would result in long- term beneficial impacts to park operations by reducing the potential for accidents and visitors getting lost in these areas, therefore freeing park and law enforcement staff to do other work to preserve park resources, such as spending more time in high visitor use areas when visitors are present. The removal of all fire pits/grills at both East Beach and Murphy Creek would reduce the risk of fire, freeing visitor protection staff for other work. Operation of the camping area (Alternative 5) is not expected to result in a significant additional demand for park maintenance and law enforcement, compared to current conditions.

Impact Significance. Local, long- term, moderate, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long- term, minor, adverse cumulative impacts, while Alternatives 2, 3, 4, and 5 would result in local, long- term, minor, beneficial impacts. The cumulative actions in combination with these action alternatives would result in a net local, long- term, minor, beneficial impact to park operations in the project area.

TRANSPORTATION

Affected Environment

Regional Setting

Yosemite National Park is accessed by three state highways: California Highway 41 enters from the southwest; California Highway 120 (Tioga Road) has two entrances, one from the northwest (Big Oak Flat) and the other from the east (Tioga Pass); and California Highway 140 enters from the west. The highways are paved, primarily two- lane roads characterized by segments of steep

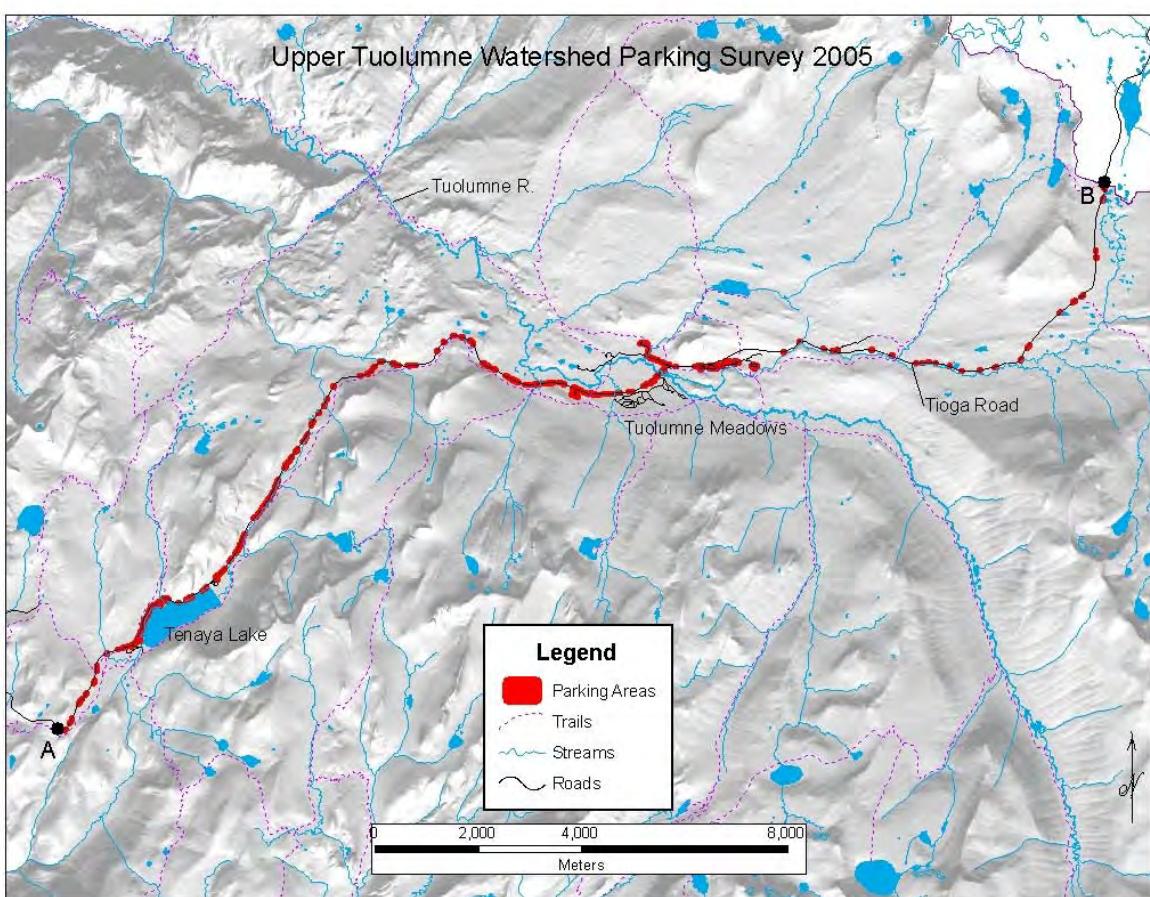
grades, winding curves, and narrower sections as they approach the park. Highway 120 between Crane Flat and Tioga Pass is closed during the winter, typically from November to May. Highways 41 and 140 are year-round routes to the park. The state highways leading into Yosemite National Park transition into the internal parkwide road system. There are no state highways within the boundaries of the park, though California Highway numbers are used on park signs to help orient visitors. A few spur roads are also located in the park, such as to the viewpoint at Glacier Point, visitor attraction at Mariposa Grove, and campground at White Wolf. Roads are generally limited to the western portion of the park, except for Highway 120 which crosses over the Sierra Nevada Mountains. Most of the park is designated or potential Wilderness (94.3%) served by a network of backcountry trails. Travel through the park is primarily by private automobile (90%) with the remainder of transportation by tour buses, Tuolumne Meadows Hiker Buses, Yosemite Area Regional Transportation System (YARTS) buses, park vehicles, and miscellaneous other modes (NPS 2006a).

Project Setting

Tenaya Lake lies on the southern shoulder of California Highway 120 (Tioga Road) between Olmsted Point and Tuolumne Meadows. No other roads access Tenaya Lake. Given its location along a major highway and its scenic qualities, Tenaya Lake is a popular destination and rest stop. In a 2005 visitor study, 19% of 742 visitor groups reported visiting Tenaya Lake, making it the 10th most popular site (NPS 2005).

From August 11th to 13th of 2006, the park collected traffic data for Tioga Road between Olmsted Point and Tenaya Lake. The average daily traffic count over three days of data collection (Friday through Sunday) was 1,879 northbound vehicles and 1,924 southbound vehicles (NPS/DEA 2006). The highest daily count was southbound Sunday traffic at 2,280 vehicles. The lowest daily count was southbound Friday traffic at 1,605 vehicles. The average three day average peak travel hour was between 11am and 12am with 188 northbound vehicles and 204 southbound vehicles in the hour.

The park currently provides parking at many undesignated and designated areas along Tenaya Lake and Tioga Road (Figure 3-6) (Kuhn 2006). Designated areas include Sunrise Trailhead, Murphy Creek, East Beach, and pullouts along Tioga Road. Parking along the road shoulder is in undesignated areas along Tioga Road and near designated parking areas. Current parking capacity is between 239 and 272 vehicles between Sunrise Trailhead East Beach, including undesignated areas. A study in 2006 found that the maximum hourly parking number in the Tenaya Lake area was 225 vehicles between the hour of 12pm and 1pm (NPS/DEA 2006). The minimum parking capacity target for Tenaya Lake is 193.

Figure 3-6. Parking Areas between Olmsted Point and Tioga Pass

Environmental Consequences

Methodology. The impact assessment focuses primarily on the effect of temporary changes to the roadway system and parking spaces on traffic volumes and associated traffic flow, access and circulation, and safety conditions. Transportation impacts are assessed in terms of duration, intensity, and type. In terms of duration, a short- term impact is one that would be created during the implementation phase of an action alternative (for example, temporary disruption of access created during construction of parking improvements). A long- term impact would be created through a permanent change to traffic generation, as well as changes to circulation patterns, following the implementation phase of an action alternative.

Types of Impacts. Impacts are considered either beneficial or adverse on traffic flow and/or traffic safety conditions. Beneficial impacts would improve traffic flow and traffic safety by reducing levels of congestion and occurrences of vehicle/vehicle, vehicle/bicycle, and vehicle/pedestrian conflicts. Adverse impacts would negatively alter traffic flow and traffic safety by increasing levels of congestion and occurrences of such conflicts.

Intensity Level Definitions

Negligible: Negligible impacts are effects considered not detectable and would have no discernible effect on traffic flow and/or traffic safety conditions.

Minor: Minor impacts are effects on traffic flow and/or traffic safety conditions that would be slightly detectable, but not expected to have an overall effect on those conditions.

Moderate: Moderate impacts would be clearly detectable and could have an appreciable effect on traffic flow and/or traffic safety conditions.

Major: Major impacts would have a substantial, highly noticeable influence on traffic flow and/or traffic safety conditions and could permanently alter those conditions.

Impairment: Effects to transportation would be severe and long- term and would preclude beneficial transport within the park for future generations.

Alternative 1 (No Action)

Construction and Operation- related Impacts. Under the No Action Alternative, the parking and related infrastructure would remain in its existing condition. Although necessary maintenance and repairs would continue, no new undertakings would address transportation concerns along Tioga Road at Tenaya Lake.

The park would retain the existing parking areas (including undesignated roadside parking) and limited infrastructure. No traffic calming devices, pedestrian crossings, or additional shuttle bus stops would be constructed. Culverts, bridges, and biofiltration swales would also not be constructed.

Due to uncontrolled parking, physical capacity has increased to accommodate 411 standard vehicles; however, maximum, peak, parking demand was observed at 251 vehicles. Under this alternative, these areas would remain, and the designated speed would remain at 35 mph along Tioga Road. Drivers, passengers, bicyclists, and pedestrians would continue to experience unsafe areas along Tioga Road. Unsafe conditions are associated with higher speeds, traffic congestion associated with many undesignated parking areas along Tioga Road, and sheet flow across roadways in inclement weather. Nonetheless, more parking would be available than under the action alternatives. Overall, the No Action Alternative would have a local, long- term, moderate, adverse impact on transportation in the project area.

Impact Significance. Local, long- term, moderate, adverse impact.

Cumulative Impacts. Cumulative effects to transportation are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative. The actions identified below are examples of actions that affect transportation in combination with the alternative.

Past actions that cumulatively impact transportation in the park include the construction of Tioga Road, El Portal Road Improvements, and implementation of the 1980 GMP. The 1980 GMP

included the establishment of park policies and programs for transportation within Yosemite National Park that enhance transportation.

Present actions that cumulatively impact transportation include the Glacier Point Road rehabilitation, Tioga Road Rehabilitation project, and Parkwide Communication Data Network project. These actions have a short- term adverse impact to transportation due to traffic delays and rerouting during construction. In the long- term, these projects would benefit transportation by improving circulation and safety, and reducing traffic pressures, including along Tioga Road, and management of visitor capacity and transportation data.

Tuolumne Wild and Scenic River Comprehensive Management Plan would include measures to protect outstanding features, and natural and cultural resources. Such measures may include management of visitor use in sensitive areas, and parking reduction. Reduced capacity at visitor destinations including Tuolumne Meadows may result in increased visitor use and parking demands in other areas within the park. Reasonably foreseeable future actions that would cumulatively impact transportation include the resurfacing of Wawona Road.

Past, present, and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative would result in local, long- term, minor, beneficial cumulative impacts.

Alternative 2 (Tenaya Confluence, Preferred Alternative)

Construction- related Impacts. Construction associated with the re- configuration of parking and the addition of infrastructure (for example, pedestrian road crossings, shuttle bus stops, and culverts) would be similar overall across all action alternatives except vary by location. Under Alternative 2, construction would be focused on expanding parking at Sunrise Trailhead, Murphy Creek, and East Beach while removing most parking along Tioga Road.

Implementation of Alternative 2 would result in short- term impacts to transportation along Tioga Road and within parking areas at Tenaya Lake. Construction activity would include the temporary closure of some parking spaces and slower travel times along Tioga Road due to construction- related traffic to/from Tenaya Lake, construction activity, and associated traffic controls. Traffic congestion may be higher in areas not under construction as visitors seek out other areas of Tenaya Lake and the park where construction activity is not underway. Limited or inconvenient access at Tenaya Lake and its backcountry trailheads may also lead some visitors to travel to other destinations outside the park during the construction period.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. As in all action alternatives, vehicles traveling through the Tenaya Lake area would benefit from the improved safety associated with a 25 mph speed zone, traffic calming devices, and drainage infrastructure. Vehicle circulation would be improved with re- configured parking areas and ingress/egress features. Signage would also be more informative about the location of facilities and visitor use areas at Tenaya Lake. Fewer overall parking spaces would be available but parking would be expanded at Sunrise Trailhead, Murphy Creek, and East Beach.

Alternative 2 would provide a total of 215 parking spaces, which would equate to 86% of maximum, peak, observed parking under current conditions. During these peak conditions, approximately 36 vehicles may not be accommodated, and these visitors may circulate within the Tenaya Lake area looking for an available parking space, or they may continue on to other destinations within the park. During peak conditions, this would contribute to the increased demand for parking within the park, resulting in a minor adverse impact.

Under Alternative 2, the expanded and re-organized 66-space parking area with designated shuttle stops and a pedestrian road crossing would address the overflow parking issue at Sunrise Trailhead and improve visitor safety. The Old Campground Loop would be retained with 11 standard spaces, which is more than all other action alternatives.

Within the Murphy Creek area, the western parking lot would be expanded to accommodate 48 spaces. Parking east of Murphy Creek would be removed. A designated shuttle stop and pedestrian road crossing would also be added. The designated pull-out parking area for oversize vehicles and RVs would improve circulation and decrease traffic congestion.

Within the East Beach area, the re-organized and expanded parking area with designated shuttle stops and a pedestrian road crossing would address overflow parking and improve safety. In addition to 68 parking spaces, the parking area would also include two ingress/egress driveways with pull-through parking for two tour buses to improve access and circulation.

Parking along Tioga Road would be limited to five spaces on the southern side of Tioga Road west of the Sunrise Trailhead area, and an area of undesignated roadside parking between Murphy Creek and East Beach on the northern side of Tioga Road. Naturalistic barriers would prevent most undesignated road shoulder parking. Reduced parking along Tioga Road would reduce traffic congestion and redirect vehicles to the expanded parking at other locations.

Impact Significance. Local, long-term, moderate, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long-term, minor, beneficial impacts to transportation while implementation of Alternative 2 would have local, long-term, moderate, beneficial impacts. Thus, the cumulative actions in combination with Alternative 2 would result in net local, long-term, moderate, beneficial cumulative impacts to transportation in the project area.

Alternative 3 (Tenaya Ecotones)

Construction-related Impacts. Construction associated with the re-configuration of parking and the addition of infrastructure (for example, pedestrian road crossings, shuttle bus stops, and culverts) would be similar overall across all Action Alternatives except vary by location. Under Alternative 3, construction would be focused on slightly expanding parking at Sunrise Trailhead Murphy Creek and doubling the parking at East Beach. Not all parking would be removed from along Tioga Road. A vehicle bridge would also be constructed at Murphy Creek.

Implementation of Alternative 3 would result in short-term impacts to transportation along Tioga Road and within parking areas at Tenaya Lake. Construction activity would include the temporary closure of some parking spaces and slower travel times along Tioga Road due to construction-related traffic to/from Tenaya Lake, construction activity, and associated traffic

controls. Traffic congestion may be higher in areas not under construction as visitors seek out other areas of Tenaya Lake and the park where construction activity is not underway. Limited or inconvenient access at Tenaya Lake and its backcountry trailheads may also lead some visitors to travel to other destinations outside the park during the construction period.

Impact Significance. Local, short- term, moderate adverse impact.

Operation- related Impacts. As in all action alternatives, vehicles traveling through the Tenaya Lake area would benefit from the improved safety associated with a 25 mph speed zone, traffic calming devices, and drainage infrastructure. Vehicle circulation would be improved with re-configured parking areas and ingress/egress features. Signage would also be more informative about the location of facilities and visitor use areas at Tenaya Lake. Fewer overall parking spaces would be available but parking would be expanded at Sunrise Trailhead, Murphy Creek, and East Beach.

Alternative 3 would provide a total of 208 parking spaces, which would equate to 83% of maximum, peak, observed parking under current conditions. During these peak conditions, approximately 43 vehicles may not be accommodated, and these visitors may circulate within the Tenaya Lake area looking for an available parking space, or they may continue on to other destinations within the park. During peak conditions, this would contribute to the increased demand for parking within the park, resulting in a minor adverse impact.

Under Alternative 3, the expanded and re- organized parking area with designated shuttle stops and a pedestrian road crossing would address the overflow parking issue at Sunrise Trailhead improve safety but offer the fewest parking spaces of the action alternatives. The Old Campground Loop would be retained and improved similar to Alternative 2 but without standard parking spaces (two trailer spaces are proposed).

Under this alternative, parking at Murphy Creek would be re- organized, including the removal and restoration of the Murphy Creek eastern parking lot, similar to Alternative 2. During high visitation periods, parking overflow could occur. A designated shuttle stop and pedestrian road crossing would also be added. The vehicle/pedestrian bridge would also facilitate access.

Under Alternative 3, parking at East Beach would be expanded and re- organized. Designated shuttle stops and a pedestrian road crossing would address overflow parking and improve safety. The parking area would also include two ingress/egress driveways with pull- through parking for three tour buses to improve access and circulation.

Parking along Tioga Road would be reduced considerably (30 designated and undesignated spaces) and restructured with naturalistic barriers to prevent most undesignated road shoulder parking opportunities. A paved scenic turnout would also be included. Reduced parking along Tioga Road would reduce traffic congestion and redirect vehicles to the expanded parking at other locations.

Impact Significance. Local, long- term, minor to moderate, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long- term, minor, beneficial impacts to transportation while implementation of Alternative 3 would have local, long- term, minor, beneficial impacts. Thus, the

cumulative actions in combination with Alternative 3 would result in net local, long- term, minor, beneficial cumulative impacts to transportation in the project area.

Alternative 4 (Lake Loop)

Construction- related Impacts. Construction associated with the re- configuration of parking and the addition of infrastructure (for example, pedestrian road crossings, shuttle bus stops, and culverts) would be similar overall across all Action Alternatives except vary by location.

Implementation of Alternative 4 would result in short- term impacts to transportation along Tioga Road and within parking areas at Tenaya Lake. Construction activity would include the temporary closure of some parking spaces and slower travel times along Tioga Road due to construction- related traffic to/from Tenaya Lake, construction activity, and associated traffic controls. Traffic congestion may be higher in areas not under construction as visitors seek out other areas of Tenaya Lake and the park where construction activity is not underway. Limited or inconvenient access at Tenaya Lake and its backcountry trailheads may also lead some visitors to travel to other destinations outside the park during the construction period.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. As in all action alternatives, vehicles traveling through the Tenaya Lake area would benefit from the improved safety associated with a 25 mph speed zone, traffic calming devices, and drainage infrastructure. Vehicle circulation would be improved with re- configured parking areas and ingress/egress features. Signage would also be more informative about the location of facilities and visitor use areas at Tenaya Lake. Fewer overall parking spaces would be available but parking would be expanded at Sunrise Trailhead, Murphy Creek, and East Beach.

Alternative 4 would provide a total of 214 parking spaces, which would equate to 85% of maximum, peak, observed parking under current conditions. During these peak conditions, approximately 37 vehicles may not be accommodated, and these visitors may circulate within the Tenaya Lake area looking for an available parking space, or they may continue on to other destinations within the park. During peak conditions, this would contribute to the increased demand for parking within the park, resulting in a minor adverse impact.

Under Alternative 4, the expanded and re- organized parking area (including parking north of Tioga Road to replace parking completely removed at the Old Campground) with designated shuttle stops and two pedestrian road crossings would address the overflow parking issue at Sunrise Trailhead improve safety. The impact on transportation would be a local, long- term, moderate beneficial impact.

Within the Murphy Creek area, parking would be expanded and re- organized including the designated shuttle stop and pedestrian road crossing. The east parking lot would not be removed. The impact on transportation would be a local, long- term, moderate beneficial impact.

The East Beach parking area would be expanded and re- organized to provide similar parking as Alternative 2. The expanded parking with two ingress/egress driveways would address overflow parking and improve safety and access. Two designated shuttle stops and a pedestrian road

crossing would also be included. The impact on transportation would be a local, long- term, minor beneficial impact.

Designated parking along Tioga Road would be removed with a limited area of undesignated roadside parking between Murphy Creek and East Beach. Naturalistic barriers would prevent most undesignated road shoulder parking. Reduced parking along Tioga Road would reduce traffic congestion and redirect vehicles to the expanded parking at other locations. The impact on transportation would be a local, long- term, moderate beneficial impact.

Impact Significance. Local, long- term, minor to moderate, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long- term, minor, beneficial impacts to transportation while implementation of Alternative 4 would have local, long- term, minor, beneficial impacts. Thus, the cumulative actions in combination with Alternative 4 would result in net local, long- term, minor, beneficial cumulative impacts to transportation in the project area.

Alternative 5 (Immersive Nodes)

Construction- related Impacts. Construction associated with the re- configuration of parking and the addition of infrastructure (for example, pedestrian road crossings, shuttle bus stops, and culverts) would be similar overall across all Action Alternatives except vary by location. Under Alternative 5, construction would be distributed throughout the Sunrise Trailhead, Murphy Creek, and East Beach areas while keeping more parking along Tioga Road than all action alternatives. No vehicle bridge would be constructed at Murphy Creek.

Implementation of Alternative 5 would result in short- term impacts to transportation along Tioga Road and within parking areas at Tenaya Lake. Construction activity would include the temporary closure of some parking spaces and slower travel times along Tioga Road due to construction- related traffic to/from Tenaya Lake, construction activity, and associated traffic controls. Traffic congestion may be higher in areas not under construction as visitors seek out other areas of Tenaya Lake and the park where construction activity is not underway. Limited or inconvenient access at Tenaya Lake and its backcountry trailheads may also lead some visitors to travel to other destinations outside the park during the construction period.

Impact Significance. Local, short- term, moderate, adverse impact.

Operation- related Impacts. As in all action alternatives, vehicles traveling through the Tenaya Lake area would benefit from the improved safety associated with a 25 mph speed zone, traffic calming devices, and drainage infrastructure. Vehicle circulation would be improved with re- configured parking areas and ingress/egress features. Signage would also be more informative about the location of facilities and visitor use areas at Tenaya Lake. Fewer overall parking spaces would be available but parking would be expanded at Murphy Creek and East Beach.

Alternative 5 would provide a total of 251 parking spaces, which would equate to 100% of maximum, peak, observed parking under current conditions. The expanded and re- organized parking area (including parking north of Tioga Road) with designated shuttle stops and two pedestrian road crossings would address the overflow parking issue at Sunrise Trailhead improve

safety. The Sunrise Trailhead parking lot would accommodate 89 vehicles, and the Old Campground Loop would be retained with limited parking for 8 standard spaces.

Under this alternative, within the Murphy Creek area, parking would be re-organized to provide 56 spaces. Oversize vehicle parking, designated shuttle stops, and pedestrian road crossings would also be included. The expanded and re-organized East Beach parking area would include designated shuttle stops and a pedestrian road crossing, which would improve safety. The parking area would also include a pull-through parking area for two tour buses to improve access and circulation.

Parking along Tioga Road would be reduced but continue to provide 45 designated spaces and turn-outs. Naturalistic barriers would prevent most undesignated road shoulder parking opportunities. The reduced parking along Tioga Road would reduce traffic congestion and redirect vehicles to the expanded parking at other locations.

Impact Significance. Local, long-term, minor, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area would result in local, long-term, minor, beneficial impacts to transportation while implementation of Alternative 5 would have local, long-term, minor, beneficial impacts. Thus, the cumulative actions in combination with Alternative 5 would result in net local, long-term, minor, beneficial cumulative impacts to transportation in the project area.

LAND USE

Affected Environment

National Park Service

Land use within and adjacent to Yosemite National Park is primarily publicly managed parkland. The gross area within the park's authorized boundary is 747,956 acres. This includes nonfederal ownership totaling 1,736 acres, of which approximately 10 acres are easements. There are 366 privately owned tracts within the park boundaries, totaling 233 acres. Local governments manage 21 tracts within the park boundaries, totaling 1,502 acres.

The NPS was established in the U.S. Bureau of the Interior by the Organic Act of 1916, which gave authority to the NPS to promote and regulate the use of national parks and monuments, including Yosemite National Park. The 1970 National Park System General Authorities Act, amended in 1978, prohibits the NPS from allowing any activities that would be adverse to the values and purpose for which the NPS was established. Together, the two laws provide a strict mandate for the NPS to protect park resources and values. The Yosemite National Park General Management Plan (GMP 1980) for Yosemite National Park, adopted in 1980, is the main policy document guiding park management.

The GMP divided land within Yosemite National Park into four primary zones and six subzones based on management objectives, resource significance, and legislative constraints. The GMP zoning is broad-based and was meant to give general guidance for future implementation of specific plans. The four primary zones are natural, cultural, development, and special-use. These

zones may overlap, and thus management decisions must be based on equal recognition of resources.

Natural Zone

This zone includes lands and waters that are managed to conserve natural resources and ecological processes and to provide for visitor use and enjoyment in ways that would not adversely affect natural environments. This zone includes all lands in the following four subzones: Wilderness, environmental protection, outstanding natural features, and natural environment. Areas classified as natural zones make up almost 94% of the park. Almost 95% of Yosemite National Park is designated Wilderness, which includes a small amount of land currently designated as potential Wilderness additions.

Cultural Zone

This zone is managed for the preservation, protection, and interpretation of cultural resources and their settings while providing for visitor use and enjoyment. This zone is composed of significant architectural, historic, and archeological resources that would be preserved unless such action causes unacceptable alteration of natural resources and/or processes. These areas are identified within two subzones, the historic and archeological subzones. In 1980, it was estimated that areas classified as cultural zones make up less than 3% of the park. Since that time, both cultural landscapes and traditional cultural properties have been included, as have many additions as listings or nominations to the National Register of Historic Places (NRHP). To date, only a small portion of the park has been surveyed.

Development Zone

This zone includes lands managed to provide and maintain roads and facilities serving visitors and park operations. Areas classified as development zones make up approximately 2% of the park. No subzones are within the development zone.

Special-use Zone

This zone includes lands and waters used for activities that are not appropriate in other zones. The reservoir subzone includes the Lake Eleanor and Hetch Hetchy reservoirs, which are managed by the San Francisco Water Department under the terms of the Raker Act. The special-use zone also includes private parcels in Wawona, Foresta, and Aspen Valley, as well as parcels managed by the City and County of San Francisco. Areas classified as special-use zones make up less than 0.5% of the park. No subzones are included within the special-use zone.

Project Setting

Tenaya Lake is designated as a natural zone. The purpose of this zone is to conserve natural resources and ecological processes while providing visitor use and enjoyment. The project area provides visitor day use areas and recreational opportunities, including hiking, picnicking, fishing, swimming, and paddling. The area supported camping until 1992. Facilities at Tenaya Lake include paved and unpaved parking areas and roadside parking, vault comfort stations, picnic areas, and food storage lockers. Surrounding land uses include Tioga Pass Road and hiking trails. Designated Wilderness is located north and south of Tioga Pass Road.

Environmental Consequences

Methodology. The land use analysis was based on a qualitative assessment of park land uses that could occur in the project area and the effects anticipated as a result of the project. Significant land use and planning impacts would occur if the action would have measurable effects on physical, natural, or cultural resources as they relate to the following:

- Land use (e.g., occupancy, income, values, ownership, type of use)
- Agency or tribal use plans or policies
- Urban quality, gateway communities
- Long- term management of resources or land/resource productivity

Types of Impacts. The type of impact refers to whether the effect is considered beneficial or adverse to land use patterns. Beneficial impacts would improve compatibility among land uses. Adverse impacts would negatively alter land use patterns or result in new land uses that would not be compatible.

Intensity Level Definitions

Impacts to land use were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for land use are as follows:

Negligible: Land use would not be affected, or effects would not be measurable. Any effects to any of the four primary zones would be slight and short- term.

Minor: Effects to land use, for example a change from undeveloped forest habitat to a park facility, would be detectable. If mitigation were needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to land use would be readily apparent. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to land use would be readily apparent and would substantially change any of the four primary zones in Yosemite National Park. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment: Impairment is not applicable to this resource topic.

Alternative 1 (No Action)

Under the No Action Alternative, the Tenaya Lake area would not be improved, except for continuation of existing restoration projects, emergency repairs, and routine and periodic maintenance activities. The existing facilities would continue to serve the area, trails would not be improved, and no new parking would be constructed. Existing uses including parking area, visitor facilities, trail systems, backcountry trailheads, and a variety of visitor use opportunities. There would be no impact to land use from the No Action Alternative.

Construction and Operation- related Impacts. No changes to land use would result from Alternative 1. The Tenaya Lake area would remain a natural zone. The existing facilities and trails would continue to function as they do now.

Impact Significance. No impact.

Cumulative Impacts. Cumulative effects to land use are based on analysis of past, present and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative. The actions identified below are examples of actions that affect transportation in combination with the alternative. Past actions that cumulatively impact land use in the area include the 1980 GMP and NPS *Management Policies*. Present actions that cumulatively impact land use include the New Merced and Tuolumne Wild and Scenic River Management Plans. The intent of these plans is to manage land use to ensure the protection of park resources. Past, present, and reasonably foreseeable future actions within the project area in combination with the potential effects of this alternative would result in local, long- term, minor, beneficial cumulative impacts.

Action Alternatives(2, 3, 4, and 5)

Based on the location and intent of the proposed action, and similar improvements under each alternative, potential impacts to land use would be similar.

Construction- related Impacts. Construction activities would be short- term and localized, and would not affect land use patterns. Construction may cause a slight inconvenience to visitors if areas were closed to visitors during construction.

Impact Significance. Local, short- term, negligible, adverse impact.

Operation- related Impacts. The GMP identifies the following goals and actions pertaining to visitor use of the Tioga Road campgrounds and picnic areas (including the Tenaya Lake area):

- Retain 50 campsites (status quo at the time the GMP was adopted)
- Retain picnic areas at their present location and capacity
- Eliminate volunteer parking from Tioga Road
- Limit parking to established use levels at backcountry trailheads
- Pave and delineate parking
- Restore damaged areas at parking sites and roadsides

Under Alternatives 2, 3, and 4, no campsites are proposed due to identified natural and cultural resource constraints, which is inconsistent with the GMP. With the exception of Alternative 4, varying degrees of southern side roadside parking are proposed under each alternative, and all action alternatives retain the approximately 10 to 15 spaces on the northern side of Tioga Road. While these actions are potentially inconsistent with the GMP, the overall purpose of each action alternative is to resolve current visitor safety issues, improve visitor experience, and protect and/or restore natural and cultural resources. Therefore, these inconsistencies would not result in an adverse land use impact.

All improvements would occur within the natural zone, which is intended to provide for visitor use and enjoyment in ways that would not adversely affect natural environments. The development footprint would be small and would be compatible with the intended land uses for the natural zone. Impacts from operation of Alternatives 2, 3, 4, and 5 would be long- term and beneficial.

Impact Significance. Local, long- term, minor, beneficial impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions within the project area in combination with the potential effects of Alternatives 2, 3, 4, and 5 would result in local, long- term, minor, beneficial cumulative impacts.

SOCIOECONOMICS

Affected Environment

Regional Setting

The project area lies within Mariposa County, adjacent to Tioga Pass Road, between Yosemite Valley and Mono Lake. According to the U.S. Census Bureau, the population of Mariposa County in 2000 was 17,130. Data estimates for 2008 reflect a population increase in the county of 846, representing an approximate 5% increase from 2000.

Unemployment rose in Mariposa County from 2000 to 2008 at a rate of 6.2% to 7.5%. In 2000, 10.5% of families fell below the poverty line. Median household income within the County at that time was \$34,626.

Yosemite National Park is the largest provider of recreation and visitor services within the County. Other major recreation areas near Mariposa County include the Stanislaus and Sierra National Forests, and the Merced Wild and Scenic River within the jurisdiction of the Bureau of Land Management.

The most predominant labor industry within Mariposa County involves service- oriented jobs, such as those involving recreation, accommodation, and food service. Service- oriented jobs account for 23% of employment within the County, followed by education, health, and social services (17.7%) and construction (9.1%). Between 2002 and 2006, construction, government, education, and other services experienced the highest rate of job growth, while professional and business services, and trade, transportation, and utilities industries experienced the greatest loss.

Project Setting

Tenaya Lake is located west of Tuolumne Meadows along Tioga Road, approximately 54 miles from Incline and 27 miles from Lee Vining—the nearest year round non- park areas with services and housing. Various campgrounds with limited facilities are located along Tioga Road; however the nearest ranger station to Tenaya Lake is at Tuolumne Meadows. Tioga Road and all services are closed from November to May each year between Crane Flat and Tioga Pass. No concessionaire- operated businesses operate at Tenaya Lake, though tour operators visit the area. Maintenance of roads, facilities, infrastructure, and trails is the primary activity of staff in the area. Park staff also provides public safety, interpretative, and backcountry ranger services.

Tenaya Lake is a popular destination for summer visitors to the park because of its scenic qualities, accessible lake, and its proximity to Tioga Road. In a 2005 visitor study, 19% of 742 visitor groups reported visiting Tenaya Lake, making it the 10th most popular site (NPS 2005).

Environmental Consequences

Methodology. Impacts related to socioeconomics were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur at Tenaya Lake. Short- term impacts would be temporary impacts that typically occur during construction activities. Long- term impacts would be impacts that continue to occur after construction and typically last 10 years or more.

Types of Impacts. Adverse impacts would degrade or otherwise negatively alter the characteristics of the existing environment as it relates to local communities, visitor population, regional economies, and concessionaires and contractors. Beneficial impacts would improve on characteristics of the existing social and economic environment as it relates to local economies, visitor population, regional economies, and concessionaires and contractors.

Intensity Level Definitions

Negligible: Socioeconomics would not be affected, or impacts would not depart measurably from existing conditions.

Minor: Impacts to socioeconomics would be detectable, but would have a small increase or decrease (less than 25% increase or decrease) on population and/or employment.

Moderate: Impacts to socioeconomics would be readily apparent and would result in a minor increase or decrease on population and/or employment (25% - 50% increase or decrease).

Major: Impacts to socioeconomics would be readily apparent and would substantially change the social and economic characteristics of a large area in the park and region.

Impairment: Not applicable to this topic

Alternative 1 (No Action)

Construction and Operation- related Impacts. Under the No Action Alternative, the parking, infrastructure, facilities, and trails at Tenaya Lake would remain in their existing condition and although necessary maintenance and repairs would continue, no new undertakings would occur.

In general, the socioeconomic characteristics (for example, population, employment, tourism, and housing) of the Tenaya Lake area and region are not expected to change measurably by the implementation of Alternative 1. Potential minor adverse effects on tourism as a result of not addressing parking and other visitor services would continue to be offset by the minor benefits of continued use of the Tenaya Lake area in its current condition. For example, visitors would continue to visit the area and park staff would continue to be employed in maintenance, public

safety, interpretation, and backcountry activities at Tenaya Lake. The overall impacts to socioeconomics are expected to be negligible.

Impact Significance. Regional, long- term, negligible, beneficial impact.

Cumulative Impacts. Cumulative impacts on socioeconomic conditions are based on analysis of past, present, and reasonably foreseeable future actions in the park and region, in combination with impacts under this alternative. The related actions identified in this cumulative analysis are those that could have a discernible effect on the region's socioeconomic conditions.

Socioeconomic cumulative impacts are expected to be dominated by the short- term impact of construction activities that would affect the region's construction industry and employment. It is important to note that construction impacts are generally short- term in nature, and their impacts last only for the duration of the construction period. As a result, scheduling of other construction actions would determine the magnitude of construction- related cumulative impacts. Future construction actions would have a beneficial cumulative impact on the regional economy by providing employment opportunities and bringing in additional construction spending in the region.

Past actions include the El Portal Road Improvements, Cascades Diversion Dam Removal, and the Tunnel View Overlook rehabilitation. Present actions include actions associated with the Tuolumne Meadows Concept Plan, Scenic Vista Management Plan, and the Comprehensive Transportation Plan. Present and reasonably foreseeable actions that would have a beneficial cumulative effect on the region's economy would be construction activities, such as various projects in Yosemite Valley, Yosemite Environmental Education Center, resurfacing Wawona Road, and actions associated with the Tuolumne Wild and Scenic River Management Plan. Implementation and construction of some of these proposed actions could occur concurrently during the scheduled construction period for actions proposed under the Tenaya Lake plan.

The combined effect of these cumulative actions is expected to result in a regional, short- term, moderate to major, beneficial impact on the regional economy from the increased spending and employment in the region. The negligibly beneficial impacts associated with the implementation of the No Action Alternative would contribute to this effect.

Action Alternatives (2, 3, 4, and 5)

The action alternatives are analyzed in combination because the socioeconomic impact of each alternative has a very similar overall type, duration, and intensity.

Construction- related Impacts. Under the action alternatives, multiple new improvements would be constructed throughout the Tenaya Lake area. The cost of implementing these alternatives would range from approximately \$14.6 million to \$16.2 million for construction (Alternative 2: \$15 million, Alternative 3: \$14.6 million, Alternative 4: \$15.9, Alternative 5: \$16.2 million). Construction- related activities at Tenaya Lake would employ construction workers as well as construction- related management and administrative staff. The construction work force is expected to draw from the regional work force. Therefore, construction spending, and to a lesser degree employment, are expected to have a regional, short- term, minor beneficial impact on the region's economy for the duration of construction.

Any regional construction work force would likely result in an increased demand for local, temporary housing. This increased demand would likely exacerbate the current housing shortage, and result in a short- term, negligible adverse impact. Despite potential adverse effects as a result of increased housing, overall impacts to socioeconomics are expected to be beneficial.

Impact Significance. Regional, short- term, minor, beneficial impact.

Operation- related Impacts. Under the action alternatives, the parking, infrastructure, facilities, and trails at Tenaya Lake would be improved. Maintenance and repairs would also be expanded to include the additional elements of each alternative. For example, additional trash/recycling containers would need to be emptied, new bridges maintained, and new boardwalks repaired.

The improvements would also allow visitors to continue to recreate in the Tenaya Lake area with less traffic congestion, visitor crowding, and risk of vehicle collision. As with maintenance and repairs, each action alternative varies in parking, facilities, and other improvements but the overall effect on socioeconomics is expected to be similar.

Socioeconomic characteristics (for example, population, employment, tourism, and housing) of the Tenaya Lake area and region are not expected to change measurably by the implementation of Alternative 2 (Preferred), 3, 4, or 5. The minor benefits of the proposed use of the Tenaya Lake area would continue to facilitate visitation and park staff would continue to be employed in maintenance, public safety, interpretation, and backcountry activities.

Impact Significance. Regional, long- term, minor, beneficial impact.

Cumulative Impacts. The combined effect of the cumulative actions described under Alternative 1 are expected to result in a regional, short- term, moderate to major, beneficial impact on the regional economy from the increased spending and employment in the region. The minor beneficial impacts associated with the implementation of the action alternative would contribute to this effect.

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CHAPTER 4: CONSULTATION AND COORDINATION

The park conducted both internal and external scoping with appropriate National Park Service (NPS) staff, agencies, American Indian tribes, and the public to determine the range of issues to be analyzed in the Environmental Assessment (EA). Internal scoping included analysis from specialists such as historical landscape architects, archeologists, hydrologists, biologists, social scientists, maintenance and facilities staff, park rangers, and other NPS staff from Yosemite National Park, the Denver Service Center (DSC), and the Pacific West Region. NPS staff, outside consultants, and specialists also participated in alternative development workshops and charettes and field visits to Tenaya Lake. This scoping process was used to define the project purpose and need, identify issues and impact topics, outline reasonable and feasible alternative actions, and to describe and evaluate the relationship of the preferred alternative to other planning efforts in the park.

INTERNAL AND PUBLIC SCOPING

The formal public scoping period for the Tenaya Lake Area Plan EA began on September 4 and ran until October 18, 2008. Members of the public were invited to submit comments on the Tenaya Lake Area Plan; the NPS accepted comments submitted by email, U.S. mail, and fax. The NPS provided information about the plan and the public scoping period through the following means: 1) a press release describing the intent to begin the public involvement process for the proposed plan was issued and published in the Mariposa Gazette on August 29, 2008; the scoping announcement was included in the Yosemite National Park Electronic Newsletter, which has about 7000 subscribers; 3) the scoping announcement was included in the park's Daily Report throughout the public scoping period; 4) the scoping period was announced via the park's website; 5) the plan's fact sheet was made available at Visitor Centers within the park; and 6) information regarding the project was disseminated monthly at Yosemite National Park Open House held in the Yosemite Valley auditorium.

During this planning process, comments on this project have been accepted at public meetings as well as by mail, fax, email, and through the Planning, Environment, and Public Comment (PEPC) electronic commenting system. Twenty-six scoping responses (including emails and letters) were received during the public scoping period including: 22 responses from individuals, one from the co-founder of the Yosemite Valley Campers Coalition, one from the Access Fund, one from the chair of the Sierra Club's Yosemite Committee, and one from the Central Sierra Environmental Resource Center. A Value Analysis and Choosing by Advantage (VA/CBA) workshop to select the "Preferred Alternative" was conducted on February 16, 2010. The workshop team included Yosemite National Park staff, regional NPS staff, NPS DSC facilitator, and outside consultants.

Based on internal and public scoping, comments received, and federal laws, regulations, and executive orders, the NPS determined that an EA was the appropriate level of National Environmental Policy Act (NEPA) compliance for this project.

AGENCY CONSULTATION

U.S. Army Corps of Engineers

The NPS is consulting with the U.S. Army Corps of Engineers (USACE) regarding the EA, wetlands delineation, and permit requirements necessary to implement proposed actions in the Tenaya Lake Area Plan EA, in accordance with Section 404 of the Clean Water Act. Prior to restoration and construction and drainage repair in wetlands, NPS would obtain authorization and required permits from USACE.

U.S. Fish and Wildlife Service

The Endangered Species Act (ESA) of 1973, as amended (16 United States Code [USC] 1531 et seq.), requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or adversely modify critical habitat. The NPS requested a list of federally listed endangered and threatened species for the project sites and surrounding areas. The list received from the USFWS on February 4, 2010, was used as a basis for the special- status analysis in this EA. Based on this list, park data, and park staff's professional knowledge and judgment, this EA has determined that the alternatives will not adversely affect species that are federally listed as threatened or endangered or their critical habitat. The NPS has notified the USFWS of this finding and has requested the agency review these findings and response.

State Water Resources Control Board

If required, NPS would file a Notice of Intent to discharge stormwater to the State Water Resources Control Board (SWRCB) and prepare and implement provisions of a Storm Water Pollution Prevention Plan (SWPPP) to control runoff from construction activities. The SWPPP would be prepared by the Contractor, and approved by NPS and the SWRCB prior to construction.

Regional Water Quality Control Board

If required, NPS would submit a *Section 401 Water Quality Certification Application Form* to the Regional Water Quality Control Board (RWQCB), to obtain certification that the proposed actions would comply with state water quality standards, if any activity would result in a discharge to a water body (in accordance with the Clean Water Act, Section 401).

California State Historic Preservation Officer/Advisory Council on Historic Preservation

The 1999 *Park Programmatic Agreement Among The National Park Service At Yosemite, The California State Historic Preservation Officer and The Advisory Council On Historic Preservation Regarding Planning, Design, Construction, Operations And Maintenance, Yosemite National Park, California* (1999 PA) was developed among NPS at Yosemite, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation, in consultation with American Indian tribes and the public and stipulates methods for the Park to carry out its responsibilities under Section 106 of the National Historic Preservation Act (NHPA).

In accordance with the 1999 PA, public involvement was coordinated with the public involvement and scoping discussed above. Pursuant to the 1999 PA, the park has responsibility to review projects of this nature and magnitude in- house.

The NHPA Section 106 review process is documented in this EA, and will be submitted to the State Historic Preservation Officer (SHPO) and Advisory Council on Historic Preservation (ACHP) as part of an annual report, and attached to the Finding of No Significant Impact (FONSI). The 1999 PA stipulates required consultation with SHPO, ACHP, Indian tribes, and interested persons when there is a disagreement among the park, the SHPO, any Indian Tribe, or any Interested Persons regarding proposed use standard mitigating measures. Pursuant to Stipulation VIII of the 1999 PA, this document facilitates notification to the SHPO and the public of the intention to implement standard mitigation measures. The SHPO will be provided with a copy of this EA, and will have an opportunity to review and comment on this project during the public comment period.

American Indian Consultation

Yosemite National Park is consulting with American Indian tribes having spiritual cultural associations with the area, including the American Indian Council of Mariposa County, Inc. (aka Southern Sierra Miwuk Nation), Tuolumne Band of Me- Wuk Indians, North Fork Mono Rancheria, Picayune Rancheria of Chukchansi Indians, Bridgeport Paiute Indian Colony, Mono Lake Kutzadika'a Tribe, and Bishop Paiute Tribe. Consultation and partnering will continue with the American Indian tribes throughout the planning and implementation of the Tenaya Lake Area Plan project to ensure that any potential concerns are addressed accordingly.

ENVIRONMENTAL ASSESSMENT REVIEW

Copies of this EA have been distributed to those that have requested it, including the public, state, and local governments and representatives, federal agencies, tribes, organizations, local businesses, public libraries, and the news media. This document and project information is available on the Yosemite National Park website at <http://www.nps.gov/yose/parkmgmt/tenaya.htm>. There will be a 30- day public comment period on this environmental assessment. Readers are encouraged to submit comments electronically through the NPS PEPC system. A link to PEPC can be found on the project website, above, or directly at <http://www.parkplanning.gov/yose> (click on the 'Open for Comment' link and select 'Tenaya Lake Area Plan Environmental Assessment').

Comments can be submitted in writing or by fax:

Superintendent, Yosemite National Park
ATTN: Tenaya Lake Area Plan
P.O. Box 577
Yosemite, California 95389

Fax: 209- 379- 1294

To request a printed copy or CD of this environmental assessment (available in limited quantity), please email: Yose_Planning@nps.gov.

Public meetings and site visits are scheduled throughout the public review period. Updated information about various aspects of the project will be periodically distributed via newsletters, mailings, the Yosemite National Park website (<http://www.nps.gov/yose/parkmgmt/tenaya.htm>), and regional and local news media.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Comments will be documented and analyzed at the close of the public review period. If no significant impacts from the proposed action are identified, the EA will then be used to prepare a FONSI, which will be sent to the NPS Pacific West Regional Director for signature.

During the public review period, additional consultation will occur to confirm determinations of effect (if needed) with the California SHPO, the USFWS, and the USACE. Notice of concurrence with the determinations of effect will be documented in the FONSI, if prepared, for this EA (see above).

For more information concerning this EA, please contact the park office of Environmental Planning and Compliance at (209) 379-1365.

LIST OF AGENCIES AND ORGANIZATIONS RECEIVING THIS DOCUMENT

FEDERAL

19th Congressional District
Advisory Council on Historic Preservation
Bureau of Land Management
Department of the Interior, Regional Solicitor
Federal Highway Administration
Groveland Ranger District
House Committee on Resources
House Subcommittee on National Parks & Public Lands
House Subcommittee on Interior Appropriations
Humboldt-Toiyabe National Forest
Inyo National Forest
Inyo National Forest, Mammoth Ranger District
Lassen National Forest
Lassen Volcanic National Park
Mono Basin National Forest Scenic Area
National Forest Association, Communication Dept
National Interagency Fire Center
National Park Service - DSC-TIC
National Park Service- CCSO
National Park Service- DSC-PDS
National Park Service- Pacific West Region
National Park Service- Water Resources Div
Natural Resources Council
Natural Resources Defense Council
Office of Attorney General
Pacific Southwest Forest & Range Exp Station
Senate Subcommittee on Interior Appropriations
Senator Dianne Feinstein
Sierra National Forest
Stanislaus National Forest
U.S. House of Representatives
United States Attorney's Office
US Army Corp of Engineers
US Congress
US Department of Justice
US District Court
US EPA / Region IX
US Fish & Wildlife Service
US Forest Service Region 5
US Geological Survey
US Post Office
USDOI Office of Environmental Policy & Compliance

STATE

California State Clearinghouse
California Air Resources Board
California Department of Fish & Game
California Department of Transportation
California Office of Historic Preservation
California Preservation Foundation
California State Library
California State University Humboldt
California State University San Jose
California State University Stanislaus
California State Water Resources Control Board
Central Valley Regional Water Quality Control Board
Central Valley Regional Water Quality Control Board - Region 5
Office of Assemblyman Dave Cogdill
State of California Governor's Office
University of California Berkeley
University of California Davis, Shields Library

LOCAL

East Bay Municipal Utility Dist
El Portal Public Library
El Portal Town Planning and Advisory Committee
Fish Camp Advisory Council
Fresno County Planning & Resource Mgmt
Groveland Community Services District
Groveland Public Library
Lee Vining Public Library, Mono County
Madera County Board of Supervisors
Madera County EDC
Mariposa County Board of Supervisors
Mariposa County Chamber of Commerce

LOCAL

Mariposa County Dept of Public Works
Mariposa County Environmental Health Dept
Mariposa County Fire Department
Mariposa County Planning Department
Mariposa County Visitors Bureau
Mariposa Public Utility District
Mariposa Public Library
Merced County Assn of Governments
Merced Irrigation District
Mono County Board of Supervisors
Mono Basin RPAC
Oakhurst Chamber of Commerce
Oakhurst Public Library
San Francisco Planning Department

San Francisco Public Utilities Commission
San Joaquin Valley Air Pollution Control District
Stanislaus County Environmental Review Committee
Stanislaus Council of Government
Tahoe Regional Planning Agency
Tuolumne County Alliance for Resources & Environ
Tuolumne County Board of Supervisors
Tuolumne County Community Development
Tuolumne County Dept of Public Works
Tuolumne County Transportation Council
Tuolumne County Visitor Bureau
Wawona Town Plan Advisory Committee
Yosemite Chamber of Commerce
Yosemite Valley Public Library

NATIVE AMERICANS

American Indian Council of Mariposa County, Inc.
Bishop Paiute Tribal Office
Bridgeport Paiute Indian Colony
Mono Lake Kutzadika'a Paiute Tribe

Mono Lake Paiute Indian Community
North Fork Mono Rancheria
Picayune Rancheria of Chukchansi Indians
Tuolumne Band of Me-Wuk Indians

OTHER ORGANIZATIONS

3 dGeo
ADA Compliance Service
American Alpine Club
American Hiking Society
American Stage Tours
Angeles National Forest
Arcadis U.S. Inc.
Aspen Environmental Group
Backcountry Horsemen of California
Baker, Manock & Jensen
Banks & Co.
Biophilia Society
Bioscience and Natural Resource Library
Bitterroot Restoration
Boulder Creek B&B
California Bicycle Coalition
California Bus Association
California State Horsemen's Association
Californians for Western Wilderness
Care-ousel Therapeutic Riding
Carpe Diem Experience

Cassabon, McIlhatton & Associates, LLP
Central California Hispanic Chamber of Commerce
Central Sierra Audubon Society
Central Sierra Environmental Resource Center
Central Sierra Wilderness Watch
Civic Center Library
Clarke Broadcasting
CNPS Monterey Bay Chapter
CNPS Sequoia Chapter
Colorado State University
Columbia College Library
Conservation Corps St Mus
Contra Costa Times
County Line Riders of Catalina, Inc
Cycle California! Magazine
Delaware North Corporation
Design, Community & Environment
Destination Villages
Earth Design, Inc.
Earth First! - Santa Cruz
Ecology and Environment Inc.

OTHER ORGANIZATIONS

EDAW Inc
EDN Magazine
El Portal Town Planning Adv Committee
Environment Now
Foothill Resources
Foster Wheeler Environmental Corp
Fresno Flats Historical Library, SHSA
Friends of the Earth
Friends of the Forest
Friends of the River
Friends of the River/American Rivers
Friends of Yosemite Valley
Frontier Pack Train
Gill Associates
Global Environmental
Gold River Discovery Center
Groveland Hotel
Groveland Yosemite Gateway Museum
HA Lewis, Inc
Halff Associates Inc
Havens Foundation
Heritage Trails
High Sierra Hikers Association
Indian Grinding Rock SHP
Institute of the Rockies
ISE Research
John Muir Project
KCRA TV
Kennedy Meadows Pack Station
Kennedy/Jenks Consultants
KGO Radio
KH Construction
K-M-J Radio
Knapsack Tours
KOVR TV
Lake McClure/Lake McSwain
Law Office of Michael Wainman
Law Offices of J Wallace Oman
Law Offices of Mark A Kanai
Leavitt Meadows Pack Station
Los Angeles Athletic Club
Los Angeles Times
Mammoth Mountain Ski Area
Margen & Associates
Marine Mammal Center
Mariposa Gazette
Mariposa Horse Association
Mariposans for the Environment & Responsible Govt
Mather Pack Station
Merced Sun Star
Mississippi National River & Recreation Area
Mono Lake Committee
MorComm Press
Morrison & Foerster
Mountain Defense League
Mountain Democrat
MTR Western
NBC TV
NewFields
North Coast Environmental Center
Northstar Grain LLC
NPCA Central Valley Field Office
NPCA Pacific Regional Office
NPCA Stockton
Nuemiller & Beardslee
Oakhurst Lodge
Official Trip Reports
Pacific Legal Foundation
PASCO Scientific
Planning & Conservation League
Polar Equipment Inc
Presidio Trust
Quantum Rock Extreme Sports
Rails to Trails Conservancy
Regional Council of Rural Counties
Remax
Restore Hetch Hetchy
Restore: The North Woods
Rossi Family Foundation
RRM Design Group
Salomon Smith Barney
San Francisco Chronicle
San Joaquin Raptor/Wildlife Rescue
San Mateo Lock Works Inc
Saving Yosemite
SEIU Local 521
SEIU Local 535
Sequoia Alliance
Sierra Club
Sierra Club Range of Light-Toiyabe Chapter

OTHER ORGANIZATIONS

Sierra Club Tehipite Chapter	Water Education Foundation
Sierra Club Yosemite Committee	Watershed Institute
Sierra Star	Wawona Area Property Owners Association
SLAC	Westar Associates
Sonoma County Horse Council	Whalen & Associates Inc
Stanford University Green Library	Whitley Consulting Group
Stockton Record	Wild Candid Research Group
The Access Fund	Wilderness Society
The Fresno Bee	Wilderness Society National Office
The Modesto Bee	Wimmer Yamada and Caughey
The Mountain Democrat Newspaper	Yosemite Area Audubon
Thurmond Law Office	Yosemite Campers Association
Tilden Wildcat Horsemen's Assn	Yosemite Conservancy
Tioga Lodge	Yosemite Conservancy Board of Trustees
Tuolumne River Preservation Trust	Yosemite Conservancy Council Member
University of Library Tech Services	Yosemite Mountaineering School
Valley View Trail Riders Association	Yosemite Sightseeing Tours
Virginia Lakes Pack Outfit	Yosemite Valley Campers Coalition

CHAPTER 5: LIST OF PREPARERS AND REVIEWERS

Table 5-1. List of Preparers and Reviewers

Name	Title	Education	Years Experience
National Park Service, Yosemite National Park			
Don Neubacher	Superintendent	M.S. Natural Resource Management B.S. Planning and Management	28 NPS
Dave Uberuaga	Acting Superintendent	M.A. Business Administration B.S. Biology	26 NPS 10 Other
Niki Stephanie Nicholas	Division Chief, Resources Management and Science	Ph.D. Forestry M.S. Ecology B.A. Biology	6 NPS 18 Other
Mark Butler	Division Chief, Project Management	M.P.A. Public Administration B.S. Soils and Water Science	28 NPS 2 Other
Gretchen Stromberg	Project Manager	M.L.A. Landscape Architecture B.A. Anthropology	8 NPS 3 USFS 2 Private
Yosemite National Park Technical Experts and Contributors			
Elexis Mayer	Environmental Planning and Compliance Program Manager	B.S. Natural Resources Planning	7 NPS 2 Other
Randy Fong	Branch Chief of Design, Division of Project Management	Master of Architecture Bachelor of Architecture	32 NPS 1 Other
Lisa Acree	Park Botanist	B.A. Environmental Studies	19 NPS
Tony Brochini	Facilities Management Liaison	Resource Management, 2 years undergraduate studies towards B.A.	34 NPS
Sue Beatty	Restoration Ecologist	B.S. Recreation Resources Management, 2 years graduate work towards M.S.	25 NPS
Susan Clark	NEPA Compliance Specialist	M.S. Candidate Natural Resources Management B.S. Plant and Soil Science	29 NPS 6 USFS

Table 5-1. List of Preparers and Reviewers

Name	Title	Education	Years Experience
Jim Donovan	Planning Division Liaison	M.A. Urban & Regional Planning B.A. Fine Arts	11 NPS 12 Other Public 3 Private
Dave Kari	Parkwide Trails Supervisor	B.S. Forest Management	28 NPS 1 Other
Kevin Killian	Supervisory Park Ranger, Law Enforcement	B.S. in Zoology	17 NPS
Victoria Mates	Branch Chief, Interpretive Field Operations	M.S. Resource Interpretation B.S. Environmental Science	13 NPS
Bret Meldrum	Branch Chief, Visitor Use and Social Science	PhD Student, Natural Resource Resource Studies M.S. Conservation Social Sciences B.S. Recreation Parks and Tourism	8 NPS
Ruth Middlecamp	Park Ranger, Permit Program Manager	B.S. Physical Education CA Teaching Credential Fed. Law Enforcement Academy	21 NPS 5 Other
Sonny Montague	Project Archeologist	M.A. Anthropology B.S. Anthropology	20 NPS 5 Private
Dave Pettebone	Outdoor Recreation Planner	Ph.D. Human Dimensions of Natural Resources M.S. Human Dimensions of Natural Resources B.A. Music	15 NPS 4 Other
Jim Roche	Park Hydrologist	M.S. Geology B.S. Chemistry	8 NPS 3 Other
Jeannette Simons	Park Historic Preservation Officer and American Indian Liaison	M.A. Anthropology B.A. Anthropology	14 Public 14 Private
Sally Sprouse	Supervisory Park Ranger, Law Enforcement	B.S. in Biology	15 NPS
Steve Thompson	Branch Chief, Wildlife Management	M.S. Ecology – Wildlife B.S. Biology	21 NPS 5 Other
Jennifer Treutelaar	Yosemite Conservancy Liaison	M.E. M. Resource Economics & Policy B.A. Biology	9 NPS 1 Other

Table 5-1. List of Preparers and Reviewers

Name	Title	Education	Years Experience
<i>Yosemite Conservancy</i>			
Schuylar Greenleaf	Director of Projects	M.S. Wildlife B.S. Biology	13 Private 2 Other
<i>SWCA Environmental Consultants</i>			
Bill Henry, AICP	Principal in Charge	M.C.R.P. Masters of City and Regional Planning B.S. Natural Resources Management	1 Public 19 Private
Shawna Scott	Project Manager – EA	B.S. Natural Resources	2 Public 8 Private
James Feldmann	Environmental Planner	M.S. Planning – Natural Resource Management B.A. Business Administration	7 Private
Geoff Hoetker	Senior Biologist	B.S. Forestry & Natural Resources	3 Public 4 Private
Shannon Carmack	Architectural Historian	B.A. History	9 Private
Jaimie Jones	Technical Editor	Coursework, Liberal Arts and Fire Science	6 Private
<i>Mithun</i>			
Dave Goldberg	President / Project Director	Master of Architecture B.S. Architecture	16 Private
Brendan Connolly	Project Manager / Associate Principal	Master of Architecture B.A. Architecture	15 Private
Susan Olmsted	Project Designer / Landscape Architect / Associate	Master of Architecture Bachelor of Landscape Architecture	1 Public 10 Private
T. Frick	Project Designer / Landscape Architect / Associate Principal	B.S. Landscape Architecture	12 Private

List of Preparers and Reviewers

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CHAPTER 6: GLOSSARY OF TERMS AND ACRONYMS

GLOSSARY OF TERMS

Area of Potential Effect (APE): The geographic area or areas where an undertaking has potential to affect historic properties. Consider physical, visual, auditory, and atmospheric effects; potential changes in land or building use, change in the setting and potential for neglect.

Archeological resources: Historic and prehistoric deposits, sites, features, structure ruins, and anything of a cultural nature found within, or removed from, an archeological site.

Best Management Practices: Effective, feasible (including technological, economic, and institutional considerations) conservation practices and land- and water- management measures that avoid or minimize adverse impacts to natural and cultural resources. Best Management Practices may include schedules for activities, prohibitions, maintenance guidelines, and other management practices.

Biodiversity: Biodiversity, or biological diversity, is generally accepted to include genetic diversity within species, species diversity, and a full range of biological community types. The concept is that a landscape is healthy when it includes stable populations of native species that are well distributed across the landscape.

Critical habitat: The area of land and water with physical and biological features essential to the conservation of federally listed threatened and endangered species and which may require special management considerations or protection.

Cultural Resources: The broad category of socio- cultural resources and historic properties that reflect the relationship of people with their environment.

Day visitor: Visitors that do not stay overnight in the park. Includes both local overnighters and day excursion visitors.

Decibel (dBA): A unit of measure of sound intensity.

Ecosystem: An ecosystem can be defined as a geographically identifiable area that encompasses unique physical and biological characteristics. It is the sum of the plant community, animal community, and environment in a particular region or habitat.

Emergent wetland: A wetland characterized by frequent or continual inundation dominated by herbaceous species of plants typically rooted underwater and emerging into air (e.g., cattails, rushes). The emergent wetland class is characterized by erect, rooted, herbaceous hydrophytes (e.g., cattails, rushes), excluding mosses and lichens. This vegetation is present for most of the growing season in most years. Perennial plants usually dominate these wetlands. All water regimes are included, except sub- tidal and irregularly exposed.

Environmental Assessment (EA): A public document required under the National Environmental Policy Act that identifies and analyzes activities that might affect the human and

natural environment. An EA is considered a concise public document which provides sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS), aids an agency's compliance with NEPA when no EIS is necessary, and it facilitates preparation of an EIS when one is necessary.

Excavator: A piece of heavy equipment that is used to dig or scoop material with a bucket attached to a hinged pole and a boom.

Facilities: Buildings, communications support structures, and the associated supporting infrastructure such as roads, trails, and utilities.

Finding of No Significant Impact (FONSI): The public document describing the decision made on selecting the “Preferred Alternative” in an EA. See “EA.”

Floodplain: A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Grader: A piece of heavy equipment used to level or smooth road or other surfaces to desired gradient.

Granitic rocks: Igneous rocks (intrusive magma) that have cooled slowly below the Earth’s surface typically consisting of quartz, feldspar, and mica. In contrast to granitic rocks, if magma erupts at the Earth’s surface, it is referred to as lava. Lava, when cooled, forms volcanic rocks.

Hazardous material: A substance or combination of substances, that, because of quantity, concentration, or physical, chemical, or infectious characteristics, may either: (1) cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hazardous waste: Hazardous wastes are hazardous materials that no longer have practical use, such as substances that have been discarded, spilled, or contaminated, or that are being stored temporarily prior to proper disposal.

Headwaters: The point or area of origin for a river or stream.

Historic and Cultural Resources: Under NEPA, culturally valued pieces of real property (not historic properties) and non-tangible values such as cultural use of the biophysical and built environments, and sociocultural attributes such as social cohesion, lifeways, religious practice and other social institutions (40 CFR 1508.27(b)(3)).

Historic Properties: Under NHPA and NEPA, a prehistoric or historic district, site, building, structure, object, landscape, or traditional cultural resource to which American Indians attach cultural and religious significance that is listed in, or eligible for listing in, the NRHP (36 CFR 800.16(l)(1) 40 CFR 1508.27(b)(8)).

National Environmental Policy Act (NEPA): The federal act that sets national environmental policies and requires preparation of an EIS for major federal actions that may significantly affect the quality of the human environment.

National Park Service Management Policies: A policy is a guiding principle or procedure that sets the framework and provides direction for management decisions. NPS policies are guided by and consistent with the Constitution, public laws, Executive proclamations and orders, and regulations and directives from higher authorities. Policies translate these sources of guidance into cohesive directions. Policy direction may be general or specific. It may prescribe the process by which decisions are made, how an action is to be accomplished, or the results are to be achieved. The primary source of NPS policy is the publication *Management Policies* 2001. The policies contained therein are applicable Service-wide. They reflect NPS management philosophy. Director's Orders supplement and may amend *Management Policies*. Unwritten or informal "policy" and people's various understandings of NPS traditional practices are never relied on as official policy.

National Park Service Organic Act: In 1916, the NPS Organic Act established the NPS in order to "promote and regulate use of parks..." and defined the purpose of the national parks as "to conserve the scenery and natural and historic objects and wild life therein and to provide for the enjoyment of the same in a manner and by such means as will leave them unimpaired for the enjoyment of future generations." This law provides overall guidance for the management of Yosemite National Park.

Natural processes: All processes (such as hydrologic, geologic, ecosystemic) that are not the result of human manipulation.

No Action Alternative: The alternative in an EIS that proposes to continue current management direction. "No action" means the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity or an alternative activity to go forward.

Non-native species: Species of plants or wildlife that are not native to a particular area and often interfere with natural biological systems.

Ordinary High Water Mark (OHWM): A change in vegetation, impression in the shoreline, or wrack lines approximately corresponding to the two-year flood. In lakes this can also include areas devoid of vegetation in steep terrain and adjacent to wetlands in areas of low relief.

Particulate matter (PM₁₀ and PM_{2.5}): Fractions of particulate matter characterized by particles with diameters of 10 microns or less (PM₁₀) or 2.5 microns or less (PM_{2.5}). Such particles can be inhaled into the air passages and the lungs and can cause adverse health effects. High levels of PM_{2.5} are also associated with regional haze and visibility impairment.

Riparian areas: The land area and associated vegetation bordering a stream or river.

Riverine: Of or relating to a river. A riverine system includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5%. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.

Sediment: A particle of soil or rock that was dislodged, entrained, and deposited by surface runoff or a stream. The particle can range in size from microscopic to cobble stones.

Snag: A standing dead tree.

Socio- Cultural Resources: Under NEPA, culturally valued pieces of real property (not historic properties) and non- tangible values such as social use of the biophysical and built environments and socio- cultural attributes such as social cohesion, lifeways, religious practice and other social institutions (40 CFR 1508.27(b)(3)), including those that may have acquired an historical relevance by virtue of their continued use over time but do not meet the NRHP standards to qualify as historic properties (see Historic and Cultural Resources above).

Succession: The process by which vegetation recovers following a disturbance or initially develops on an unvegetated site.

Threatened and endangered species: Species of plants that receive special protection under state and/or federal laws. Also referred to as “listed species,” “endangered species,” or “special-status species.”

Traditional Cultural Properties: A resource to which American Indian tribes attach cultural and religious significance that is eligible for listing or listed in the NRHP and includes structures, objects, districts, geological and geographical features and archeology. National Register Bulletin 38 provides guidance for identifying and evaluating such properties for eligibility.

Traditional cultural resource: Any site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it.

Treatment: Work carried out to achieve a historic preservation goal. The four primary treatments are Preservation, Rehabilitation, Restoration, and Reconstruction (as stated in Secretary of Interior’s Standards for the Treatment of Historic Properties).

User capacity: As it applies to parks, user capacity is the type and level of visitor use that can be accommodated while sustaining the desired resource and social conditions based on the purpose and objectives of a park unit.

Visitor experience: The perceptions, feelings, and reactions a park visitor has in relationship with the surrounding environment.

Watershed: The region drained by, or contributing water to, a stream, lake, or other body of water. Synonym: basin or drainage basin.

Wetland: Wetlands are defined by the U.S. Army Corps of Engineers (Code of Federal Regulations, Section 328.3[b], 1986) as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands, as defined by the U.S. Fish and Wildlife Service (often referred to as the Cowardin classification system) and adopted by the NPS, are lands in transition between terrestrial and aquatic systems, where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of

the following attributes: the land supports predominantly hydrophytes, at least periodically; the substrate is predominantly undrained hydric soils; and/or the substrate is saturated with water or covered by shallow water at some time during the growing season of each year.

Wilderness: Those areas protected by the provisions of the 1964 Wilderness Act. These areas are characterized by a lack of human interference in natural processes.

Wilderness Act of 1964: The Wilderness Act restricts development and activities to maintain certain places where wilderness conditions predominates.

ACRONYMS

ACHP	Advisory Council on Historic Preservation
AIRFA	American Indian Religious Freedom Act of 1979
APE	Area of potential effects
ARPA	Archeological Resources Protection Act of 1979
BLM	Bureau of Land Management
BMP	Best Management Practices
CalEPA	California Environmental Protection Agency
CARB	California Air Resources Board
CBA	Choosing by Advantage
CCCP	Climate Change Portal
CDFG	California Department of Fish and Game
CDWR	California Department of Water Resources
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CISN	California Integrated Seismic Network
CNDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	Carbon monoxide
CO₂	Carbon dioxide
dB	decibels
dB(A)	Decibels on the “A”- weighted scale
dbh	diameter at breast height
DOE	Determination of Eligibility

DPM	Diesel particulate matter
DSC	Denver Service Center
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
GHG	Greenhouse gas
GMP	General Management Plan
GPS	Global Positioning System
HABS	Historic American Buildings Survey
HAER	Historic American Engineering Record
Ldn	day- night average sound level
LEED	Leadership in Energy and Environmental Design
Leq	energy equivalent level
Lmax	maximum A- weighted noise level
LOS	level of service
MAPS	Monitoring Avian Productivity and Survivorship
MMtCO₂e	million metric tons carbon dioxide equivalent
mph	miles per hour
msl	mean sea level
MVZ	Museum of Vertebrate Zoology
NAGPRA	Native American Graves Protection and Repatriation Act
NCSHPO	National Conference of State Historic Preservation Officers

NEPA	National Environmental Policy Act
NFPA	National Fire Protection Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NOx	Nitrogen Oxide
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
PA	Programmatic Agreement
PEPC	Planning, Environment, and Public Comment
PL	Public Law
PM10	particulate matter less than 10 microns
PM2.5	particulate matter less than 2.5 microns
ROD	Record of Decision
ROG	Reactive organic gases
RV	Recreational vehicle
RWQCB	Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMM	standard mitigating measures
SO₂	Sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board

TCP	Traditional Cultural Properties
UC	University of California
UNIPCC	United Nations Intergovernmental Panel on Climate Change
USA	Underground Services Act
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VA	Value Analysis
VERP	Visitor Experience and Resource Protection

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CHAPTER 7: BIBLIOGRAPHY

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APPENDIX A: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES COMMON TO ALL ACTION ALTERNATIVES

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Construction Mitigation Measures	<p>The Construction Contractor shall prepare a Health and Safety Plan to address all aspects of Contractor health and safety issues compliant with OSHA standards and other relevant regulations. The Plan shall be submitted for park review and approval prior to construction.</p>	Contractor	Prior to project activities
	<p>An Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan shall be prepared by the Construction Contractor for the project to address hazardous materials storage, spill prevention, and response. The Plan shall include a schedule for regular inspections and maintenance of vehicles and equipment to reduce the potential for leaks and spills. The Plan shall be submitted for park review and approval prior to construction.</p>	Yosemite National Park, Project Manager, Contractor	Prior to project activities
	<p>A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared by the Construction Contractor and implemented for construction activities to control surface run-off, reduce erosion, and prevent sedimentation from entering water bodies during construction. The SWPPP shall be submitted for park review and approval prior to construction.</p>	Yosemite National Park, Project Manager, Contractor	Prior to project activities
	<p>The NPS shall apply for and comply with all federal and state permits required for construction-related activities, including a Section 404 Nationwide Permit from USACE, a Section 401 Water Quality Certification from RWQCB, and a Section 1602 Streambed Alteration Agreement from CDFG for project-related impacts that will occur in areas under the jurisdiction of these regulatory agencies.</p>	Yosemite National Park, Project Manager	Prior to project activities
	<p>NPS shall prepare and implement an engineered plan for all bridge structures, footings, drainage management, and culverts. The plan shall address geologic, hydrologic, and climatic factors, including underlying soils and foundation requirements, waterway flow patterns and rates, and snow and ice accumulation.</p>	Yosemite National Park, Project Manager	Prior to project activities

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Construction Mitigation Measures (continued)	<p>Construction plans shall include a site-specific Revegetation Plan. The plan shall be implemented in all disturbed areas. The plan shall include the use of native species from the local gene pool, and shall specify soil preparation, native seed/plant mixes, and mulching for all areas disturbed by construction activities. Weed and seed-free mulch shall be used to minimize the potential for invasive species introduction.</p> <p>Bank restoration shall incorporate the use of local willow (<i>Salix</i> spp.) pole cuttings as followed: The three to four-foot deep planted poles sprout at nodes along the length of the cuttings thus creating a dense matrix of roots in disturbed stream bank soils. These poles are planted in a grid pattern from the toe up the bank to an elevation rise of eight feet. This insures that the planted pole ends are in the ground water table nearly year round. The poles are planted alone or interwoven with horizon-tally planted willow brush layers near the toe of the bank. The pole cuttings are planted utilizing a "hydrodrill" in a grid pattern spacing of 1.5 feet apart. The hydrodrill consists of a high pressure water pump and a three-quarter inch diameter galvanized pipe water wand which is four feet long. The cuttings are inserted after the pressurized stream of water bores a three foot deep by one inch diameter hole. A two-foot top of the cutting is left above ground and will leaf out in the spring of the following year.</p>	Yosemite National Park, Project Manager, Contractor	Prior to project activities
	<p>Construction plans shall include a noxious weed abatement program including measures ensuring that: vehicles and equipment arrive on site free of mud or seed-bearing material, and all imported top soil (for use in the top twelve inches of the final grade), plant, seed, and straw materials brought onto the site are weed-free. Noxious weeds shall be mapped, and the program shall identify methods of weed-control (e.g., hand-pulling, tilling, mowing, use of herbicides, use of herbivores).</p>	Yosemite National Park, Project Manager, Contractor	Prior to project activities
	<p>The park shall develop a Visitor Outreach and Communications Strategy Plan to alert necessary park and Concessionaire employees, residents and visitors to pertinent elements of the construction work schedule.</p>	Yosemite National Park, Project Manger	Prior to project activities
	<p>Supervisory construction personnel shall attend an Environmental Protection briefing provided by the park prior to working on site. This briefing is designed to familiarize workers with statutory and contractual environmental requirements and the recognition of and protection measures for archeological sites, sensitive habitats, water resources, and wildlife habitats.</p>	Yosemite National Park, Project Manger	Prior to project activities
	<p>The Contractor shall establish a "Minimum Disturbance Protocol" for activities at all sites that includes:</p> <ol style="list-style-type: none"> Clearly defined access routes that have been established through coordination with NPS biologists. Minimizes impacts to or removal of rock substrates. Limits tree removal or trimming to those trees within parking and facility development areas. 	Contractor	Prior to project activities

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Construction Mitigation Measures (continued)	<p>d. Stockpiles and reapply native topsoil, where grading is necessary.</p> <p>e. Minimizes soils compaction and erosion.</p> <p>f. Minimizes the removal of woody debris or other ground cover.</p>		
	<p>Protective barriers (e.g., brightly colored construction fencing) shall be placed around areas adjacent to the project area that require special attention as identified by the park, such as specified staging areas, trees, plants, root zones, creek edges, aquatic habitats, wetlands, sensitive wildlife habitats, cultural resource features, and infrastructure to remain. Ropes, cables, or fences shall not be fastened to trees. Barriers shall be installed prior to construction and field inspected by natural and cultural resource personnel to verify proper placement.</p>	Yosemite National Park, Project Manager, Contractor	Prior to project activities
	<p>Construction Contractor shall ensure that any imported soils, fills, or aggregates are free of deleterious materials. Sources of imported materials shall be compiled by Construction Contractor and submitted for park review and approval prior to construction.</p>	Yosemite National Park, Project Manager, Contractor	Prior to project activities
	<p>The Underground Services Alert (USA) shall be informed by construction personnel 72 hours prior to any ground disturbance to enable Valley Utilities staff to verify the on site location and depth (elevation) of all existing utilities and services through field survey (potholing).</p>	Contractor	Prior to project activities
	<p>Grading operations using manual or heavy equipment shall follow industry-standard stabilization methods. After grading is complete, backfill compaction and related operations shall be initiated as soon as possible to establish and maintain stable soil surfaces. Soil surfaces shall be treated and restoration within approved NPS guidelines and specifications shall be performed.</p>	Contractor	Prior to and concurrent with project activities
	<p>The Construction Contractor shall implement and comply with all requirements of the Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan prepared and approved for the project.</p>	Contractor	Concurrent with project activities
	<p>The Construction Contractor shall implement and comply with all operational compliance required by the Storm Water Pollution Prevention Plan (SWPPP) issued for the project.</p>	Contractor	Concurrent with project activities
	<p>The Construction Contractor shall implement and comply with the requirements of the Revegetation Plan.</p>	Contractor	Concurrent with project activities
	<p>The Construction Contractor shall implement and comply with the requirements of the noxious weed abatement program.</p>	Contractor	Concurrent with project activities

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Construction Mitigation Measures (continued)	<p>Construction activities shall be monitored by qualified park natural and cultural resource specialists to ensure proper compliance with the implementation of mitigation measures, and that the project remains within the parameters of NEPA and National Historic Preservation Act compliance documents, U.S. Army Corps of Engineers Section 404 permits, and other applicable permits or permit conditions. Compliance monitoring would ensure adherence to mitigation measures and would include reporting protocols. □NPS shall Inspect the project to ensure that impacts stay within the parameters of the project and do not escalate beyond the scope of the environmental assessment, as well as to ensure that the project conforms to the U.S. Army Corps of Engineers, Central Valley Regional Water Quality Control Board Waiver of Waste Discharge Requirements and Water Quality Certification, and other applicable permits or project conditions.</p>	Yosemite National Park, Project Manager	Concurrent with project activities
	<p>Construction waste shall be separated into recyclable materials, green waste, and other debris that shall be placed in refuse containers daily and disposed of weekly. Recycled, toxic-free, and environmentally sensitive materials, equipment, and products shall be utilized whenever possible. Burning or burying of waste is strictly prohibited.</p>	Contractor	Concurrent with project activities
	<p>Wastewater contaminated with silt, grout, or other by-products from construction activities shall be contained in a holding or settling tank to prevent contaminated material from entering watercourses or wetlands.</p>	Contractor	Concurrent with project activities
	<p>Hazardous or flammable chemicals shall be prohibited from storage in staging areas, except for those substances identified in the Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan. Hazardous waste materials shall be immediately removed from project site in approved containers.</p>	Contractor	Concurrent with project activities
	<p>Machinery and equipment shall be parked over containment pads designed to trap any leaking oil, fuel, or hydraulic fluids and inspected daily.</p>	Contractor	Concurrent with project activities
	<p>Secondary containment shall be required for all fuel storage. Routine oiling, lubrication, and refueling shall be conducted with secondary containment and is prohibited within 100 feet of water courses or wetlands at any time.</p>	Contractor	Concurrent with project activities
	<p>Spill response materials including absorbent pads, booms, and other materials to contain hazardous material spills shall be maintained on the project site to ensure rapid response to spills.</p>	Contractor	Concurrent with project activities
	<p>The Park Project Manager shall be immediately notified of all spills or releases of hazardous materials. Any spill release shall be digitally photographed or videotaped as part of response activities.</p>	Contractor	Concurrent with project activities

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Construction Mitigation Measures (continued)	Disruption of utility service will require advanced notification to the park, concessionaire, and residents prior to scheduled disruptions. Unexpected interruptions due to construction activities shall promptly be reconnected.	Contractor	Concurrent with project activities
	All construction tools and equipment entering the park shall be cleaned by means of pressure washing and/or steam cleaning to arrive on-site free of mud or seed-bearing material. Each piece of equipment shall undergo inspections immediately prior to entry of the park.	Contractor	Concurrent with project activities
	Clearing of vegetation and ground disturbance shall be minimized to the greatest extent possible.	Contractor	Concurrent with project activities
	Topsoil shall be salvaged, segregated during storage, and reused in the proper location and depth. Wetland soils shall be salvaged and reused as fill in wetland areas. Stockpiles of soils infected with fungal pathogens (root rot) must not be moved and reused in non-infected areas of the park. Equipment buckets, tires, and hand tools used in areas containing root rot shall be cleaned prior to removal.	Contractor	Concurrent with project activities
	A Construction Contractor representative shall be designated to monitor the worksite daily for proper disposal of waste, wrappers, and food packaging.	Contractor	Concurrent with project activities
	All tools, equipment, barricades, signs, surplus materials, debris, and rubbish shall be removed by the Construction Contractor from the project work limits upon project completion.	Contractor	Upon completion of project activities
	Vehicle or equipment tracks shall be raked out or eradicated and revegetated after construction activities to reduce visual impact.	Contractor	Upon completion of project activities
	The park will monitor the success of the Revegetation Plan. Plant materials used for revegetation shall remain alive and in a healthy, vigorous condition for a period of one year after final acceptance of planting. The project site shall be monitored by qualified park personnel.	Yosemite National Park, Project Manager	Upon completion of project activities
Geology, Geohazards, and Soils	Construction plans shall identify areas susceptible to rockfall. Construction and trail crews shall be educated regarding this potential hazard, and shall comply with standard safety and protection measures (e.g., use of hard hats, placement of temporary protection fencing, netting, or barriers).	Yosemite National Park, Project Manager	Prior to site disturbance
	Interpretive signage shall include standard information regarding areas susceptible to rockfall, including Tioga Road and the South Trail.	Yosemite National Park, Project Manager	Concurrent with project activities

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Wetlands	Construction plans shall identify the boundaries of wetland features, and shall show the location of a silt fence along the perimeter of staging and work areas located outside of wetland features. The plans shall clearly show the silt fence as being located in previously developed substrates and shall include details for proper silt fence installation. The silt fence shall create a continuous barrier between the staging and work areas and the wetland features.	Yosemite National Park, Project Manager, Contractor	Prior to project activities
	All work activities shall be limited to the surface of the staging and work areas. All stockpiles, equipment storage, and materials storage shall be prohibited within the wetland features.	Contractor	Concurrent with project activities
	The silt fence shall remain in place and functional throughout the duration of work activities.	Contractor	Concurrent with project activities
	If surface water is present with Murphy Creek, or other drainages, during culvert removal and construction, and bridge construction, the park shall prepare and implement a dewatering and diversion plan. Water pump intakes shall be completely screened with wire mesh not larger than 0.2 inch to prevent Yosemite toad and other aquatic wildlife from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to avoid scour and sedimentation. The methods and materials used in any dewatering (diversion) will be determined by the NPS biologist, in consultation with regulatory agencies (i.e., USFWS, USACE, RWQCB, SWRCB). Upon completion of construction activities, any diversions or barriers to flow shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate. Alteration to the streambed will be minimized to the maximum extent practical. Any imported material will be removed from the streambed upon completion of construction activities within the waterway.	Yosemite National Park, Project Manager, Contractor	Prior to and concurrent with project activities
	The park shall develop and implement a Wetland Habitat Mitigation Monitoring Plan, which identifies areas temporarily and permanently impacted by grading, vegetation removal, and site development. Wetlands, creeks, waterways, and other waters affected by temporary disturbance and culvert removal shall be revegetated and restored. Wetlands, creeks, waterways, and other waters permanently affected shall be mitigated at a minimum 2:1 ratio, to ensure "no net loss." The plan shall include the use of native species from the local gene pool, and shall specify soil preparation, native seed/plant mixes, and shall identify measures for long-term maintenance and monitoring by park resource staff.	Yosemite National Park, Project Manager	Prior to project activities

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Wildlife	A construction work schedule shall be prepared by the Construction Contractor for the project that minimizes effects on wildlife in adjacent habitats, peaks in visitation, and noise levels. If feasible, construction activities requiring work within aquatic habitats and tree removal shall be scheduled outside of seasonal, sensitive periods (i.e., amphibian breeding season within aquatic areas, bird nesting season, bat hibernation, and maternal roosting).	Yosemite National Park, Project Manager, Contractor	Prior to construction
	The work schedule shall be submitted for park review and approval prior to construction.	Yosemite National Park, Project Manager, Contractor	Concurrent with project activities
	In the event construction work is required during night-time hours, controls on construction equipment shall be used to minimize the effects of noise and lighting on wildlife species. Noise controls may include, but not be limited to: manually-adjustable back-up alarms, use of rubber gaskets, use of bottom dump trucks, use of exhaust mufflers, use of noise tent or barrier around areas requiring use of a jack hammer, and avoidance of unnecessary truck and equipment idling. Light sources shall be controlled by the use of shields to focus light within construction areas and minimize off-site glare.	Yosemite National Park, Project Manager, Contractor	Concurrent with project activities
Rare, Threatened, and Endangered Species	Excavation sites and piping materials shall be monitored or covered to avoid trapping wildlife and routes of escape should be maintained. If a trench must remain open, small ramps shall be installed at regular intervals to allow for wildlife to escape. The construction site shall be inspected daily for appropriate covering and flagging of excavation sites. Each morning the project area shall be inspected for wildlife trapped in excavation pits and piping materials. A qualified biologist shall be available to inspect all excavations before refilling occurs.	Yosemite National Park, Project Manager, Contractor	Concurrent with project activities
	Populations of slender lupine shall be marked for protection by temporary fencing or clear flagging. Grading, construction, and staging activities shall avoid slender lupine plant populations.	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
	Restoration and revegetation activities within special-status plant populations shall be supervised by NPS resource specialists to ensure that actions do not result in disturbance, trampling, or uprooting of sensitive species.	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
	Natural features with obvious high value to wildlife shall be preserved, such as known breeding and roosting sites, large diameter tree snags, overhead cover, root masses, live branches, and multi-layered vegetation.	Yosemite National Park, Project Manager	Prior to and concurrent with project activities

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Rare, Threatened, and Endangered Species (continued)	<p>If ground disturbing or tree removal activities are to occur during the typical nesting bird season (February through September), pre-disturbance nesting bird surveys shall be conducted. Nesting bird surveys shall be conducted within the immediate project footprint and all suitable habitats within 500 feet of the project footprint. If nesting birds (common or special-status) are identified, construction activities within 100 feet of the nest (500 feet if raptor) shall be delayed until the nestlings have fledged. If surveys conducted immediately prior to construction do not reveal any nesting bird species present within the project area, the action shall begin within three days to prevent the destruction of any nesting birds that may move into the area after the survey.</p>	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
	<p>If ground disturbing or tree removal activities are to occur during the typical maternity roosting season, a roosting bat survey shall be conducted utilizing standard protocols (e.g., careful inspection of potentially occupied sites, night vision scopes, Anabat recordings, mist netting). If bats are utilizing the tree for a night or day roost, passive exclusion measures (netting or other deterrents) shall be employed to deter further roosting. If a natal roost is identified, all disturbing activities shall be avoided within 100 feet of the natal roosts.</p>	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
	<p>Pacific fisher and Sierra (American) marten surveys shall be conducted within the development footprint and a 500-foot buffer, and shall include inspection for essential habitat elements (e.g., downed logs, snags, hollow trees, etc.) or sign of these species. If individuals or active dens are identified, a 100-foot buffer/exclusion zone shall be established around the den. The park wildlife biologist shall be notified to determine the appropriate actions.</p>	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
	<p>Construction activities within 100 feet of aquatic and meadow habitat shall be scheduled outside of the Yosemite toad breeding season (typically mid-April through mid-July). Pre-construction surveys shall be conducted to verify presence/absence of the species. In the event Yosemite toad is observed, a NPS biologist shall monitor ground disturbance and construction activities within aquatic and meadow habitats.</p>	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
	<p>Construction equipment, truck, and maintenance vehicle speeds shall be limited to 15 miles per hour on facility site access routes to minimize the potential for harm to Pacific fisher, Sierra marten, and other wildlife within the roadway.</p>	Yosemite National Park, Project Manager	Prior to and concurrent with project activities

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Night Sky	If required, construction lighting shall comply with the following standards: be low in height and illuminates only the intended area; shielded so that light is not directed skyward; fitted with bulbs or fluorescent tubes that provide only the light intensity required to meet security needs; and, Designed or installed to produce colors that minimize the potential for light pollution, such as using yellow light sources rather than white (yellow light scatters less in the atmosphere).	Contractor	During construction
Scenic Resources	Construction equipment and materials shall be consolidated in designated staging areas when not in operation, to limit the visual intrusion of construction equipment during non-work hours. Staging areas located outside of existing NPS maintenance yards shall be fenced to the maximum extent feasible to visually screen construction materials.	Contractor	Prior to and concurrent with project activities
Air Quality	Cover and/or seal stockpiles to minimize blowing dust or loss of debris.	Contractor	Concurrent with project activities
	Truck and related construction equipment speeds in active construction areas shall be limited to 15 miles per hour. All park regulations and posted speed limits shall be strictly adhered to within the park boundaries.	Contractor	Concurrent with project activities
	When hauling dry materials, truck beds shall be securely covered to prevent blowing dust or loss of debris.	Contractor	Concurrent with project activities
	The Contractor shall maintain adequate dust suppression equipment, and shall use clean water to control excess airborne particulates at the staging area, access roads or trails, and all park roads leading to or from the site. Water shall not be applied when construction caused dust is not present.	Contractor	Concurrent with project activities
Soundscapes	Hydraulic or electric-powered impact tools shall be used when feasible.	Contractor	Concurrent with project activities
	All construction equipment shall be equipped with mufflers kept in proper operating condition.	Contractor	Concurrent with project activities
	Idling of motors shall be limited, except as necessary.	Contractor	Concurrent with project activities
	To the extent possible, all on-site noisy work above 76 dBA (such as the operation of heavy equipment) shall be conducted between the hours of 8:30 a.m. and 5:00 p.m.	Contractor	Concurrent with project activities

Impact Topic	Mitigation Measure	Responsibility	Critical Milestones
Wilderness	Grading and construction activities associated with realignment of the Murphy Creek Trail and associated bridge over Murphy Creek (north of Tioga Road) within Wilderness shall be conducted using minimal tool methods. Methods shall include, but not be limited to, the use of hand tools, non-motorized equipment for ground disturbance and construction, and use of mules or horses to transport materials.	Yosemite National Park, Project Manager, Contractor	Concurrent with project activities
Visitor Experience and Recreation	Construction plans shall include measures to reduce effects of construction on visitor safety and experience. A barrier plan shall indicate locations and types of barricades to protect public health and safety during both work and non-work hours.	Yosemite National Park, Project Manager, Contractor	Prior to and concurrent with project activities
Transportation and Traffic	The park shall develop and implement a comprehensive traffic control plan for park review/approval that complies with necessary U.S. Department of Transportation and Federal Highway Administration regulations.	Yosemite National Park, Project Manager, Contractor	Prior to and concurrent with project activities
Historic Properties	The park shall adhere to the Park Programmatic Agreement Among the NPS at Yosemite, the California State Historical Preservation Officer, and the Advisory Council on Historic Preservation Regarding Planning, Design, Construction, Operations, and Maintenance, Yosemite National Park, California (1999 PA) to mitigate adverse effects.	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
	Mitigation measures include avoiding impacts and designing new development to be compatible with surrounding historic resources. Standard mitigation measures, as defined in the 1999 PA, include photo documentation, salvage, and reevaluation of National Register status (updating National Register Nomination form).	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
	A Cultural Resources Monitoring Plan shall be prepared by the park to ensure proper compliance with the implementation of cultural resource mitigation measures as described in this section and as stipulated in the 1999 Programmatic Agreement.	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
	Undertake all treatments within historic landscapes in keeping with the Secretary of the Interior's Standards for the Treatment of Historic Properties.	Yosemite National Park, Project Manager	Prior to and concurrent with project activities
American Indian Traditional Cultural Practices	Continue to consult with culturally associated American Indian tribes throughout the site-specific design process and project implementation to avoid or mitigate damage to American Indian traditional and contemporary resources.	Yosemite National Park, Project Manager	Prior to and concurrent with project activities

APPENDIX B: CUMULATIVE IMPACTS PROJECT LIST

CUMULATIVE IMPACTS

Council on Environmental Quality (CEQ) regulations (42 USC 4321 et seq.) require an assessment of the cumulative impacts of proposed federal actions in NEPA documents. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non- federal) or person undertakes such other actions” (40 CFR 1508.7).

In this EA, cumulative impacts are assessed for each alternative. Cumulative impacts were assessed by combining the impacts of each alternative with the impacts of other past, present, and reasonably foreseeable future actions. The geographic scope for this analysis includes the Tenaya Lake area, and watersheds, airbasins, and other applicable areas within Yosemite National Park. The following actions are considered reasonably foreseeable future, present, and past actions:

Past Actions

- 1980 General Management Plan
- Cascades Diversion Dam Removal
- Cook’s Meadow Ecological Restoration
- Curry Village Employee Housing
- El Portal Road Improvements Project (Narrows to Pohono Bridge)
- Happy Isles Dam Removal
- Happy Isles Fen Habitat Restoration Project
- Happy Isles Gauging Station Bridge Removal
- Hetch Hetchy Communication System Upgrade Project
- Hodgdon Meadow Housing Area Trailer Replacement Project
- Lower Yosemite Fall Project
- Merced River Ecological Restoration at Eagle Creek Project
- Invasive Plant Management Plan
- Tunnel View Overlook Rehabilitation
- Yosemite National Park Fire Management Plan
- Yosemite National Park Vegetation Management Plan
- Yosemite Valley (hybrid electric- diesel) Shuttle Bus Procurement

Present Actions

- Ahwahnee Comprehensive Rehabilitation Plan
- Commercial Use Authorizations for Commercial Activities
- Comprehensive Interpretive Plan

- Crane Flat Utilities
- Curry Village and East Yosemite Valley Campgrounds Improvements
- Curry Village Rockfall Hazard Zone Structures Project
- Curry Village Tent and Cabin Relocation
- Glacier Point Road Rehabilitation
- Half Dome Day Visitor Use Management EA
- High Elevation Aquatic Ecological Recovery Plan
- Indian Cultural Center
- New Merced Wild and Scenic River Comprehensive Management Plan
- Parkwide Communication Data Network
- Rehabilitation of the Yosemite Valley Loop Road
- Scenic Vista Management Plan
- Special Use Permit Issuance for Events and Activities
- Tioga Road Rehabilitation Project
- Tioga Road Trailheads Project
- Tuolumne Meadows Water Treatment System Improvements
- Tuolumne Wild and Scenic River Comprehensive Management Plan
- Utilities Master Plan/East Yosemite Valley Utilities Improvement Plan
- Yosemite Institute Environmental Education Campus

Reasonably Foreseeable Future Actions

- El Capitan Meadow Restoration Project
- Visitor Use and Floodplain Restoration in East Yosemite Valley
- Wawona Road Maintenance Facility
- Wawona Road Rehabilitation Project
- Wilderness Management Plan
- Yosemite Museum Master Plan
- Yosemite Valley Loop Trail to West Yosemite Valley
- Yosemite Valley Shuttle Bus Stop Improvements

Of these, the following were particularly relevant and formed the basis of the cumulative impact analysis:

1980 General Management Plan. As defined in the NPS park planning program standards, the purpose of the GM is to ensure that park managers and stakeholders share a clearly defined understanding of the resource conditions, opportunities for visitor experiences, and general kind of management, access, and development that will best achieve the park's purpose and conserve its resources unimpaired for the enjoyment of future generations. The GMP is the blueprint for improving and preserving the park for the next century. It was finalized and signed in 1980. The plan describes actions that would achieve five broad goals: Reclaim Priceless Natural Beauty; markedly Reduce Traffic Congestion; Allow Natural Processes to Prevail; Reduce Crowding; and Promote Visitor Understanding and Enjoyment.

Comprehensive Interpretive Plan. The Comprehensive Interpretive Plan (CIP), which will outline a comprehensive approach to interpreting park natural and cultural resources. The CIP is necessary to ensure long- term protection of resources through visitor understanding and enjoyment. The final product of this effort will guide interpretation and education in Yosemite for the next five to 10 years.

El Capitan Meadow Restoration Project. The 60- acre El Capitan Meadow is located in west Yosemite Valley between El Capitan and the Merced Wild and Scenic River. A popular destination for many park visitors, El Capitan Meadow affords people an opportunity to enjoy magnificent views of Cathedral Spires and El Capitan, as well as take part in other recreational activities. El Capitan is also a world- renowned “big wall” that attracts rock climbers from all over with hopes of completing one of its many routes to the top. This often attracts people to the meadow where they wander the area and gaze, with necks craned, searching the massive rockface for climbers making the 3,589- foot ascent.

Vegetation and soils in the meadow are becoming increasingly degraded due to trampling from visitor foot- traffic and inappropriate vehicle parking. A significant impact to the meadow was the removal of a portion of the El Capitan Moraine in 1879, which lowered the water level 4 to 6 feet in the area. Although this was beneficial to early settlers because it allowed for more useable dry land, it greatly reduced the amount of water available to the meadow. Other historic actions such as tilling, ditching, culverts, and road building have also contributed to meadow deterioration.

The major goals of the proposed project are the following:

- Restore meadow vegetation and natural processes
- Minimize social trails
- Develop ecologically appropriate visitor access
- Improve visitor experience
- Protect sensitive meadow areas

Half Dome Trail Stewardship Plan. To address impacts caused by increased visitor use of the Half Dome trail, the NPS is developing a management plan. The purpose of the plan is to provide long- term stewardship of the Half Dome route in a manner that is consistent with the Wilderness Act and the NPS Organic Act. More specifically, the plan will:

- Consider all ways to preserve and enhance wilderness character. This may include a range of alternatives from removal of the cables, to access restrictions potentially involving day-use permits.
- Institute management prescriptions that protect and enhance the natural and cultural environment.
- Establish thresholds and management prescriptions for appropriate social conditions on the Half Dome trail.
- Provide unimpeded travel conditions, so that visitors may manage their own risk.
- Commit to a program of ongoing monitoring to ensure the goals listed above are met Data gathered during an interim permit system enacted in 2010 will help inform the plan.

High Elevation Aquatic Ecological Recovery Plan. The purpose of this plan is to restore and provide long- term stewardship of the high elevation aquatic ecosystems in the park. The ecosystems addressed in this plan include the lakes, ponds, marshes, and wet meadows found above approximately 5,500 feet. These ecosystems include the range of two formerly abundant endemic amphibian species, the Sierra Nevada yellow- legged frog and the Yosemite toad. The plan will provide guidance to the NPS in order to protect Yosemite's diverse high- elevation aquatic ecosystems and to restore natural composition, structure, and function to systems that have been disturbed by past or ongoing human activities. This plan is expected to be implemented over the next 15 years.

The High Elevation Aquatic Ecosystem Recovery & Stewardship Plan/Environmental Assessment is expected to be available for public review in summer 2010.

Invasive Plant Management Plan. There are over 150 non- native plant species in Yosemite National Park, which is approximately 10% of the park's flora. Of these, 28 species are listed for control by the U.S. Department of Agriculture, California Department of Food and Agriculture, or California Exotic Pest Plant Council. Species targeted for control in Yosemite include bull thistle, mullein, yellow star thistle, spotted knapweed, perennial pepperweed, purple vetch, rose and burr clovers, Himalayan blackberry, white and yellow sweet clover, non- native wildflowers, and escaped landscaping plants such as foxglove, ox- eye daisy, pink mullein, French broom, tree- of- heaven, and black locust. The current control program includes using Global Positioning System (GPS) technology to map plant populations. Crews then remove plants using a variety of techniques, including hand pulling. Treated areas are photographed and re- visited each year to assess the results and provide follow- up treatment.

The plan defines a set of comprehensive programs, including the following:

- Education and focused research.
- Prioritized prevention and control efforts using a variety of techniques and appropriate mitigation measures.
- Systematic monitoring and documentation of invasive plant status and the results of management efforts.
- Restoration of ecosystems altered by invasive plants.

Control methods being considered include some combination of the following: hand- pulling or using various machines to try and remove plants; releasing predatory insects or fungus to attack plants; educating users and staff about preventative measures; and using chemical treatments derived from natural products like vinegar, or manufactured chemicals like glyphosate. Program goals include eradicating (or at least controlling) invasive plant species; preventing new invasions; restoring and maintaining desirable plant communities and healthy ecosystem; enhancing the visitor experience; and educating park staff, partners, and users.

New Merced Wild and Scenic River Comprehensive Management Plan. In 1987 the U.S. Congress designated the Merced a Wild and Scenic River to preserve its free- flowing condition and to protect and enhance the unique values that made it worthy of special protection under the Wild and Scenic Rivers Act. Both the Merced River above, through, and below Yosemite Valley,

and the South Fork of the Merced above, through, and below Wawona have this special status. In accordance with the law, the NPS is preparing the Merced Wild and Scenic River Comprehensive Management Plan and Environmental Impact Statement (Merced River Plan/EIS) for the 81 miles of the river within Yosemite National Park. When completed, the plan will guide future management of activities in the river corridor, including site-specific actions needed to protect the river in Yosemite Valley, El Portal, and Wawona. The plan will include specifics on:

- The river corridor's boundaries;
- The Merced's Outstandingly Remarkable Values (ORVs) and their condition;
- A user capacity program that defines the kinds and amounts of visitor use to be allowed in the river corridor;
- Indicators and standards for monitoring the effects of visitor use on the ORVs;
- Site specific planning for Yosemite Valley, El Portal, and Wawona; and
- Section 7 procedures for protecting the river's free-flowing condition.

Parkwide Communication Data Network. This project proposes to upgrade Yosemite's internal communications system with more reliable, efficient technology and create a communications backbone that can support all the park's communication needs. The new network will employ modern technology to provide a uniform platform for computer LAN data, radio communications, security and safety video systems, telephony, burglar/intrusion and fire alarm systems, traffic collection data, and telemetry.

The communication network includes several existing communication sites in the park (such as at Henness Ridge), as well as a few new sites at: Rockefeller Grove Road repeater (at Big Oak Flat near Crane Flat), Hodgdon Meadow Maintenance Complex, Hetch Hetchy Entrance Station, May Lake Junction, and Wawona maintenance yard. An EA was prepared and released for public review in January 2010.

Scenic Vista Programmatic Management Plan. The purpose of the Scenic Vista Programmatic Management Plan for Yosemite National Park is to develop a systematic program to protect and restore Yosemite's important viewpoints, vistas, and the natural processes that created them. This plan will fulfill the park's obligations under the National Historic Preservation Act (NHPA) and National Environmental Policy Act (NEPA). The program will replace the park's current case by case approach and will enable and guide management actions by the NPS to:

- Develop an objective process to determine what methods would be used to manage vistas
- Preserve the historic and cultural settings in which the viewpoints were established
- Restore and maintain scenic vistas through appropriate vegetation management actions such as trimming or removing trees and clearing brush
- Accomplish scenic vista management, whenever practicable, by restoring natural species composition, structure, and function to systems, preferably by using traditional American Indian vegetation management practices, including fire

The EA is currently underway.

Special Use Permit Issuance for Events and Activities. Within Yosemite National Park, special use permits are required for first amendment activities, special events, business operations, public assembly, sale, or distribution of printed material, or construction. Approximately 50 special use permits are issued annually for special events (often weddings) at Tenaya Lake.

Tioga Road Rehabilitation Project. The NPS is initiating an environmental assessment (EA) to study rehabilitating 27 miles of the Tioga Road to make safety improvements, while preserving natural and cultural resources along the road providing access to Tuolumne Meadows, Tioga Pass, U.S. Route 395 and trailheads for the John Muir, Pacific Crest, Yosemite Creek, Lukens Lake, and South Fork of Tuolumne Trails. The affected road segments are between Crane Flat and Tuolumne Meadows.

The proposed project includes restoring the roadbed, repaving, restoring ditches and shoulders, and replacing undersized or failing culverts to facilitate drainage. Historic stone culvert headwalls would be maintained or carefully removed and reconstructed to accommodate culvert replacement. In addition to culverts, drainage ditches along this segment are in need of reconstruction to help facilitate proper drainage of the roadway. Selective thinning of roadside trees would improve sight distance and root penetration into the roadway, which is currently causing upheavals in the shoulder and paved roadway surface. Thinning of trees would also reduce ice build- up on the road, and reduce snow plow damage and interference. Public scoping was conducted in February/March 2010, and the EA is anticipated to be released in Spring 2011.

Tioga Road Trailheads Project. The Tioga Trailheads Project will establish corridor- wide trailhead design guidelines; it will identify actions needed to protect sensitive natural and cultural resources; and will identify areas where visitor safety, access, and enjoyment may be improved. The project will also consider alternative means to improve traffic and pedestrian travel patterns, wayfinding, accessibility, picnicking facilities, food storage, waste management and the location of interpretive materials at select trailheads along the Tioga Road.

This project will address eight of the twelve designated trailheads along the Tioga Road, including (from east to west): Gaylor Lakes at Tioga Pass, Mono Pass, Snow Creek, May Lake, Porcupine, Yosemite Creek/Ten Lakes, Lukens Lake, and Tamarack Flat/Aspen Valley. The Tioga Trailheads Project will: provide overall trailhead design guidelines; protect natural and cultural resources; and improve visitor safety, access, and enjoyment;

Tuolumne Wild and Scenic River Comprehensive Management Plan. Because of its free-flowing condition and "outstandingly remarkable values," in 1984, Congress added 83 miles of the Tuolumne River to the Wild and Scenic Rivers System, 54 miles of which flow through Yosemite National Park. In accordance with the Wild and Scenic Rivers Act, the NPS must prepare a comprehensive management plan to establish the long- term guidance for protecting water quality, free- flowing condition, and unique values for the portion of the Tuolumne River that flows through the park. This document will guide the future management of the river to ensure the protection and enhancement of the river's Outstandingly Remarkable Values and its free-flowing condition. The plan will also determine more specifically the programs and activities needed to meet river protection goals in Tuolumne Meadows and throughout the river corridor. To achieve these objectives, the Tuolumne River Plan will

- Review, and if necessary revise, the existing boundaries and segment classifications of the Wild and Scenic River corridor

- Establish management zoning in the river corridor to provide for a spectrum of interrelated resource conditions and visitor experiences
- Establish clearly stated long- term goals (desired conditions) for resource protection and visitor experiences, and identify the indicators and standards for a monitoring program that will ensure these goals are met and maintained over time
- Address user capacity by identifying the appropriate kinds and levels of use that protect river values while achieving and maintaining the desired conditions
- Identify specific programs and facilities needed to implement the long- term goals for the Tuolumne Meadows area established by the Tuolumne River Plan.

The process to create the Tuolumne Wild and Scenic River Comprehensive Management Plan and its accompanying environmental impact statement (Tuolumne River Plan/EIS) began in 2006, and a draft document for public review is anticipated for release in Summer 2011.

Visitor Use and Floodplain Restoration in East Yosemite Valley Project. The ecological restoration program seeks to restore natural processes to ecosystems so that portions of Yosemite Valley can recover from past human development and activities. A plan is being developed for the ecological restoration of the Upper River, Lower River, North Pines, and the northwest end of Lower Pines campgrounds; Group Camp, Backpackers Camp; Housekeeping Camp within the River Protection Overlay of the Merced River; and The Ahwahnee tennis court in Yosemite Valley. As part of this project, surveys are being conducted for archeological sites; the history of human disturbance in the area is being investigated; the former distribution of meadow, wetland, and forest communities is being investigated; a restoration prescription is being developed that recognizes the retention, modification, or removal of bridges, bicycle paths, riprap, and roads; the necessity and extent of revegetation is being determined; a revegetation strategy is being developed; and monitoring of river channel morphology is being conducted.

Ecological restoration may include the following:

- Removal of imported fill material
- Removal of abandoned roads and infrastructure
- Re- establishment of natural contours on the land
- Restoration of natural surface and groundwater movement
- Replanting of native vegetation
- Removal of non- native plant and animal species
- Restoration of carbon and nitrogen cycles in degraded soils

Yosemite Institute Environmental Education Campus. For more than 35 years, the Yosemite Institute has based its environmental education programs at park facilities at Crane Flat. The YI campus at Crane Flat has served as an educational facility since 1971, and consists of dormitories, a dining hall/gathering area, and bathhouses. The campus was assembled over time from older park structures not intentionally designed for educational purposes. Most of the structures and utilities are more than 60 years old, inefficient, and in need of costly repairs and upgrades to achieve modern standards for health, safety, and accessibility. In addition, the Crane Flat campus can accommodate only a fraction of the students enrolled in the program; the remainder (a majority)

must be based elsewhere in the park in expensive commercial lodging that is secure through three- year agreements. As a result, long- term availability for student lodging is unreliable and the costs of the overall program are significantly higher because of this use of off- site lodging. The proposed action includes redevelopment of the Crane Flat

The purpose of the proposed action is to:

- Promote the development of future stewards for the environment and our national parks.
- Provide an environmental education campus location and program that better serves the combined missions of the Yosemite Institute and Yosemite National Park.
- Provide a safe and universally accessible campus facility that meets modern health and safety standards.
- Increase overall program student capacity and reduce reliance upon commercial lodging (i.e., reduce the number of students currently staying overnight in Yosemite Valley) to make the program more affordable and more accessible to all children.
- Provide a location conducive to multi- day experiential programs that complement California state educational standards and offer opportunities for research and study of the natural world.
- Provide a campus facility that meets or exceeds national Leadership in Energy and Environmental Design (LEED) standards.
- Create a campus design that better encourages responsible interaction with the environment.
- Establish an ecologically sensitive campus that protects park resources and provides exemplary environmental educational learning opportunities.

The environmental impact statement and decision document for the Yosemite Institute Environmental Education Campus were completed in 2010.

Yosemite National Park Fire Management Plan. The Yosemite National Park Fire Management Plan guides the implementation of a complex fire management program. The program includes wildland fire suppression, wildland fire used to achieve natural and cultural resource benefits, fire prevention, prescribed fire, fire ecology research, and the use of mechanical methods to reduce and thin vegetation in and around communities.

Yosemite National Vegetation Management Plan. The Yosemite National Park Vegetation Management Plan (NPS 1997a) establishes guidance for vegetation management issues. The purpose of the plan is to define objectives, techniques and strategies for managing vegetation while preserving scenic resources and providing resource and visitor protection. This plan also contains sections pertaining to manipulating roadside vegetation including providing clearance for large vehicles (e.g., snow loading equipment), hazard tree safety, road user safety, and wildlife protection.

One objective of the Vegetative Management Plan is to provide for visitor recreation, access, enjoyment, safety, and understanding of park plant communities and ecosystems (NPS 1997a). This can be accomplished by managing for and allowing only those types and levels of public, administrative, or consumptive uses that do not impair park native plant communities or threatened, endangered, candidate, or sensitive species. Ecologically sensitive areas are to be protected to prohibit impairment, with development and use directed to environments least vulnerable to degradation or where such use will not impact the viability of these areas and their scenic and scientific values (NPS 1997a).

One solution involves limitation of access to sensitive resources, which includes:

- Identify and eliminate those human activities, including management actions that cause damage and affect resource integrity.
- In non- wilderness areas, construct fences, boardwalks, hardened trails, and other structures where necessary to protect soils and vegetation from human- use impacts.
- Provide closures of areas undergoing restoration and revegetation from human activities until the rehabilitation has been fully accomplished.
- Develop and maintain signing and educational material to educate visitors and convince them of their obligation to help protect park resources.
- Roadside management: weeding by volunteers and employees who recognize certain species and use their own time to eradicate them.

Revegetation is another important objective, and may include any or all of the following steps:

- Elimination of non- native plant species;
- Application of native or non- native (sterile rice straw) mulches;
- Seeding from locally gathered native plants appropriate to the site;
- Revegetation with plants salvaged from the site prior to physical restoration or from adjacent areas when these are available;
- Planting with propagated plants that have been produced from plant materials previously collected from the site;
- Installation of temporary or permanent area closures to allow plant establishment and protection from potential human- caused disturbances.

Revegetated sites should be monitored and maintained for a number of years following replanting (NPS 1997a). Maintenance prevents the establishment of non- native plants and monitoring will help assess the effectiveness of various planting techniques and the feasibility of transplanting various plant species.

Yosemite Valley Shuttle Bus Procurement. This project consisted of the purchase of 16 new hybrid electric- diesel buses to replace an existing fleet of diesel buses.

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APPENDIX C: SPECIAL- STATUS SPECIES LIST

California Department of Fish and Game
 Natural Diversity Database
 Selected Elements by Scientific Name - Portrait

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 <i>Accipiter gentilis</i> northern goshawk	ABNKC12060			G5	S3	SC
2 <i>Actinemys marmorata</i> western pond turtle	ARAAD02030			G3G4	S3	SC
3 <i>Agrostis humilis</i> mountain bent grass	PMPOA040P0			G4	S1.3	2.3
4 <i>Anaxyrus canorus</i> Yosemite toad	AAABB01040	Candidate		G2	S2	SC
5 <i>Antrozous pallidus</i> pallid bat	AMACC10010			G5	S3	SC
6 <i>Arabis tiehmi</i> Tiehm's rock-cress	PDBRA06280			G2	S2.3	1B.3
7 <i>Botrychium crenulatum</i> scalloped moonwort	PPOPH010L0			G3	S2.2	2.2
8 <i>Bruchia bolanderi</i> Bolander's bruchia	NBMUS13010			G3	S2.2	2.2
9 <i>Camissonia sierrae ssp. alitcola</i> Mono Hot Springs evening-primrose	PDONA031H1			G3T2	S2.2	1B.2
10 <i>Carex praticola</i> northern meadow sedge	PMCYC13B20			G5	S2S3	2.2
11 <i>Cinna bolanderi</i> Bolander's woodreed	PMPOA1H040			G1	S1.2	1B.2
12 <i>Claytonia megarhiza</i> fell-fields Claytonia	PDPOR030A0			G4G5	S2S3	2.3
13 <i>Corynorhinus townsendii</i> Townsend's big-eared bat	AMACC08010			G4	S2S3	SC
14 <i>Empidonax traillii</i> willow flycatcher	ABPAE33040		Endangered	G5	S1S2	
15 <i>Eriogonum howellii</i> subalpine fireweed	PDONA06180			G4	S4	4.3
16 <i>Eriophyllum nudigenum</i> Yosemite woolly sunflower	PDAST3N0A0			G2	S2.3	1B.3
17 <i>Euderma maculatum</i> spotted bat	AMACC07010			G4	S2S3	SC
18 <i>Eumops perotis californicus</i> western mastiff bat	AMACD02011			G5T4	S3?	SC
19 <i>Festuca minuta</i> small-flowered fescue	PMPOA2V1M0			G5	S1.3	2.3
20 <i>Gulo gulo</i> California wolverine	AMAJF03010		Threatened	G4	S2	
21 <i>Hulsea brevifolia</i> short-leaved hulsea	PDAST4Z020			G3	S3.2	1B.2
22 <i>Hydromantes platycephalus</i> Mount Lyell salamander	AAAAD09020			G3	S3	SC
23 <i>Ivesia unguiculata</i> Yosemite Ivesia	PDROS0X0N0			G3	S3.2	4.2

Appendix C

California Department of Fish and Game
 Natural Diversity Database
 Selected Elements by Scientific Name - Portrait

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
24 <i>Lasionycteris noctivagans</i> silver-haired bat	AMACC02010			G5	S3S4	
25 <i>Lasurus blossevillii</i> western red bat	AMACC05060			G5	S3?	SC
26 <i>Lasurus cinereus</i> hoary bat	AMACC05030			G5	S4?	
27 <i>Lepus townsendii townsendii</i> western white-tailed jackrabbit	AMAEB03041			G5T5	S3?	SC
28 <i>Lewisia disepala</i> Yosemite lewisia	PDPOR04060			G2	S2.2	IB.2
29 <i>Lupinus gracilentus</i> slender lupine	PDFA82B1R0			G3	S3	IB.3
30 <i>Martes americana sierrae</i> Sierra marten	AMAJF01014			G5T3T4	S3S4	
31 <i>Martes pennanti (pacificus) DPS</i> Pacific fisher	AMAJF01021	Candidate	unknown code...	G5	S2S3	SC
32 <i>Mimulus pulchellus</i> yellow-lip pansy monkeyflower	PDSCR1B280			G2G3	S2S3.2	IB.2
33 <i>Monadenia yosemitensis</i> Yosemite Mariposa sideband	IMGASZ3010			G1	S1	
34 <i>Myotis ciliolabrum</i> western small-footed myotis	AMACC01140			G5	S2S3	
35 <i>Myotis evotis</i> long-eared myotis	AMACC01070			G5	S4?	
36 <i>Myotis thysanodes</i> fringed myotis	AMACC01090			G4G5	S4	
37 <i>Myotis volans</i> long-legged myotis	AMACC01110			G5	S4?	
38 <i>Myotis yumanensis</i> Yuma myotis	AMACC01020			G5	S4?	
39 <i>Ochotona princeps muri</i> Yosemite pika	AMAEA0102J			G5T2T4	S2S4	
40 <i>Oncorhynchus clarkii seleniris</i> Paiute cutthroat trout	AFCHA02089	Threatened		G4T1T2	S1S2	
41 <i>Plagiotrochus torreyi var. torreyi</i> Yosemite popcorn-flower	PDBOR0V152			G4T2O	S2.2	IB.2
42 <i>Rana sierrae</i> Sierra Nevada yellow-legged frog	AAABH01340	Candidate		G1	S1	SC
43 <i>Rhynchospora alba</i> white beaked-rush	PMCYPO0N010			G5	S2	2.2
44 <i>Salix brachycarpa</i> ssp. <i>brachycarpa</i> short-fruited willow	PDSAL020H5			G5T5	S1.3?	2.3
45 <i>Salix nivalis</i> snow willow	PDSAL024K0			G5	S1.3	2.3
46 <i>Sporex lyelli</i> Mount Lyell shrew	AMABA01020			G2G3	S2S3	SC

California Department of Fish and Game
 Natural Diversity Database
 Selected Elements by Scientific Name - Portrait

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
47 <i>Strix nebulosa</i> great gray owl	ABNSB12040		Endangered	G5	S1	
48 <i>Taxidea taxus</i> American badger	AMAJF04010			G5	S4	SC
49 <i>Tritallium bolanderi</i> Bolander's clover	PDFAB400G0			G3	S3.2	1B.2
50 <i>Vulpes vulpes necator</i> Sierra Nevada red fox	AMAJA03012		Threatened	G5T3	S1	

Sacramento Fish & Wildlife Office Species List

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825



February 4, 2010

Document Number: 100204042210

Ann Roberts
Yosemite National Park
5083 Foresta Rd
El Portal, CA 95318

Subject: Species List for Tenaya Lake Plan EA

Dear: Ms. Roberts

We are sending this official species list in response to your February 4, 2010 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be May 05, 2010.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division



http://www.fws.gov/sacramento/es/spp_lists/auto_letter.cfm

2/4/2010

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office
Federal Endangered and Threatened Species that Occur in
or may be Affected by Projects in the Counties and/or
U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 100204042210

Database Last Updated: December 1, 2009

Quad Lists

Listed Species

Fish

Hypomesus transpacificus
delta smelt (T)
Oncorhynchus mykiss
Central Valley steelhead (T) (NMFS)

Candidate Species

Amphibians

Bufo canorus
Yosemite toad (C)
Rana muscosa
mountain yellow-legged frog (C)

Mammals

Martes pennanti
fisher (C)

Quads Containing Listed, Proposed or Candidate Species:

TENAYA LAKE (454C)

County Lists

Listed Species

Invertebrates

Branchinecta conservatio
Critical habitat, Conservancy fairy shrimp (X)

Branchinecta lynchi
Critical habitat, vernal pool fairy shrimp (X)
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
valley elderberry longhorn beetle (T)

Lepidurus packardi
Critical habitat, vernal pool tadpole shrimp (X)

http://www.fws.gov/sacramento/es/spp_lists/auto_list.cfm

2/4/2010

Fish

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana aurora draytonii

California red-legged frog (T)

Plants

Calyptidium pulchellum

Mariposa pussy paws (T)

Castilleja campesiris ssp. succulenta

Critical habitat, succulent (=fleshy) owl's clover (X)

succulent (=fleshy) owl's-clover (T)

Neostapfia colusana

Critical habitat, Colusa grass (X)

Orcuttia inaequalis

Critical habitat, San Joaquin Valley Orcutt grass (X)

Orcuttia pilosa

Critical habitat, hairy Orcutt grass (X)

Tuctoria greenei

Critical habitat, Greene's tuctoria (=Orcutt grass) (X)

Candidate Species

Amphibians

Bufo canorus

Yosemite toad (C)

Rana muscosa

mountain yellow-legged frog (C)

Mammals

Martes pennanti

fisher (C)

Key:

- (E) *Endangered* - Listed as being in danger of extinction.
- (T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
- (P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat* - Area essential to the conservation of a species.
- (PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
- (C) *Candidate* - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) *Critical Habitat* designated for this species

Important Information About Your Species List**How We Make Species Lists**

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue,

hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. [More info](#)

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be May 05, 2010.

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APPENDIX D: REPRESENTATIVE PHOTO DOCUMENTATION



Photo D- 1. Sunrise Trailhead Parking Area



Photo D- 2. Sunrise Trailhead Tenaya Lake Outlet Stepping Stone Crossing



Photo D- 3. Old Campground Parking Loop/NPS Stock Staging Area



Photo D- 4. View to the East from the West Shore of Tenaya Lake



Photo D- 5. Undesignated Parking on Tioga Road West of Murphy Creek



Photo D- 6. Murphy Creek West Parking Area



Photo D- 7. Murphy Creek and West Shore of Tenaya Lake



Photo D- 8. Murphy Creek Culverts under Tioga Road



Photo D- 9. Murphy Creek East Day Use Area



Photo D- 10. Murphy Creek East Parking Area



Photo D- ii. Southwest View of Tioga Road Roadside Parking Southwest of East Beach



Photo D- 12. Bus/shuttle Pull- out on Tioga Road near East Beach



Photo D- 13. Westbound Tioga Road Windshield View of East Beach Parking Area



Photo D- 14. East Beach Parking Area, Vault Toilet Facility, Trailhead



Photo D- 15. East Beach Trail through Wetland

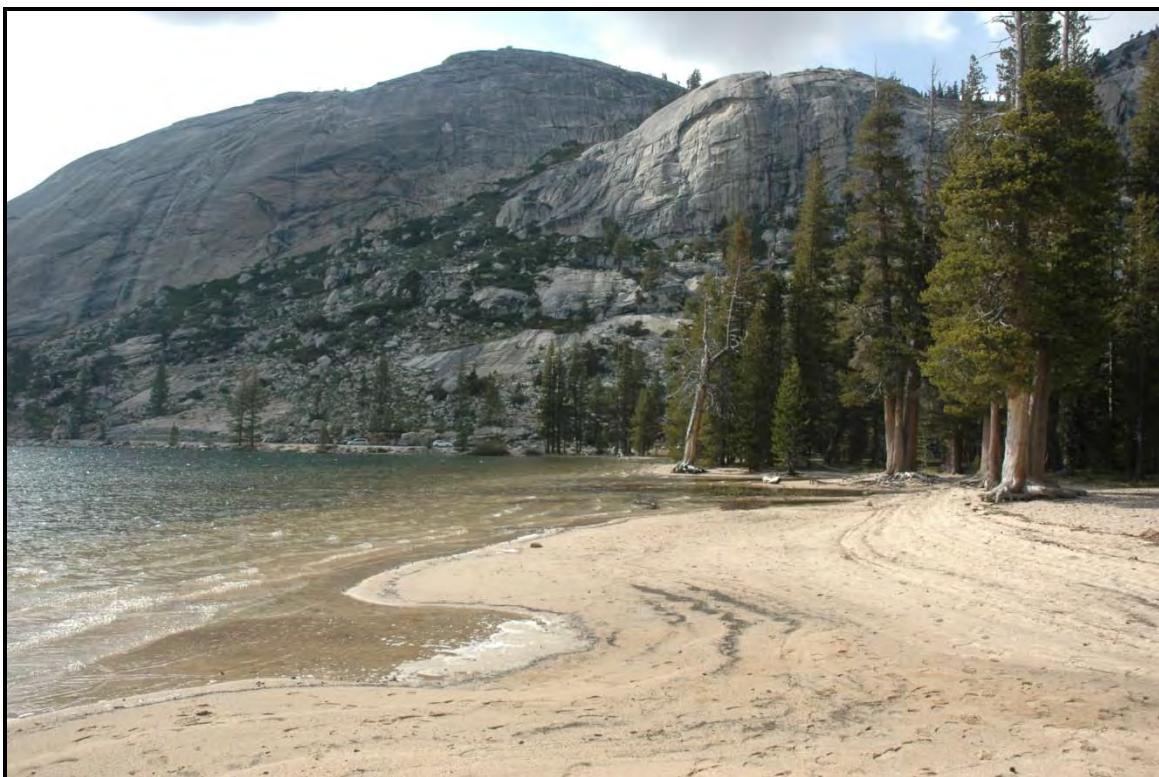


Photo D- 16. Northwest View from East Beach toward Tioga Road



Photo D- 17. East Beach Area, Tenaya Lake Inlet Rustic Log Crossing



Photo D- 18. Southwest View from East Beach

APPENDIX E: AIR QUALITY BACKGROUND INFORMATION

This appendix provides background information on air quality to support the air quality analysis in Chapter 3 of the EA.

ATTAINMENT/ NON- ATTAINMENT DESIGNATIONS

The U.S. Environmental Protection Agency and the California Air Resources Board designate whether counties in California are in attainment of federal and state (respectively) ambient air quality standards for criteria air pollutants. Table D- 1 shows the current attainment status of Mariposa County. As shown in Table D- 1, portions of Mariposa County located within Yosemite National Park are designated non- attainment for national and state ozone standards, and the state particulate matter (PM10) standard.

Mariposa County is designated either attainment or unclassified for the remaining national and state standards. While air quality in a given air basin is usually determined by emission sources within the basin, it also can be affected by pollutants transported from upwind air basins by prevailing winds. For descriptive purposes, emissions sources are typically categorized as stationary, mobile, or area. Generally, stationary sources refer to emissions sources associated with industrial or commercial processes; mobile sources refer to on- road and off- road motor vehicles; and area sources refer to a wide range of sources that are individually minor but are more substantial in the aggregate. Consumer use of paints and pesticides is an example of an area source. Another category of emissions sources is referred as a “fugitive” source. Fugitive sources refer to those sources that emit pollutants to the atmosphere through some means other than through a smokestack or tailpipe. A vehicle traveling over an unpaved road is an example of a fugitive source of dust.

Table D-1. Mariposa County Attainment/Non-attainment Designations

Pollutant	National	State
Mariposa County		
Ozone	Non-attainment	Non-attainment
Particulate Matter (PM10)	Unclassified	Non-attainment*
Fine Particulate Matter (PM2.5)	Attainment/Unclassified	Unclassified
Carbon Monoxide	Attainment/Unclassified	Unclassified
Nitrogen Dioxide	Attainment/Unclassified	Attainment
Sulfur Dioxide	Unclassified	Attainment
Lead (Particulate)	No Designation	Attainment

* Designation applies to portion of Mariposa County that lies within Yosemite National Park

Source: CARB 2008

AIR QUALITY MONITORING DATA

Federal, state, and local agencies operate a network of monitoring stations throughout California to provide data on ambient concentrations of air pollutants. Table D- 2 summarizes recent monitoring data from monitoring stations at Turtleback Dome and Yosemite Village. Ozone levels are measured at the Turtleback Dome monitoring station, and PM₁₀ measurements are taken at the Yosemite Village monitoring station in Yosemite Valley. As shown in Table D- 2, exceedances of state and national standards for ozone and state standards for PM₁₀ have been recorded on occasion within the last five years of available data (i.e., 2002- 2006). In addition, the ozone standard has recently been lowered to .075 ppm that may lead to more exceedances in the future.

Table D- 2 indicates that ozone concentrations in the park exceed the state standard on an average of four to eleven days per year. Elevated ozone concentrations are a summertime phenomenon, with most of the exceedances of the state standard in July, August, and September and only occasional exceedances in June and October. Ozone concentrations in Yosemite National Park are largely a function of pollutant transport from the San Joaquin Valley, Sacramento, and to a lesser extent, the San Francisco Bay Area.

Table D- 3 shows that exceedances of the state 24- hour average PM₁₀ standard occurred during all five years for which data is available (2002- 2006) in Yosemite Village. No exceedances of the less stringent national 24- hour standard of 150 micrograms per cubic meter were either measured or estimated to occur during the last five years of available data. Measured annual concentrations also exceeded the state's annual PM₁₀ standard of 20 micrograms per cubic meter during the years 2002 and 2003. Annual data for the remaining years (2004- 2006) is currently unavailable.

Table D-2. Recent Ozone Concentration Data for Yosemite National Park

Pollutant	National Standard	State Standard	Monitoring Data By Year*						
			2004	2005	2006	2007	2008		
Ozone Monitoring Data									
Station: Yosemite National Park-Turtleback Dome									
Highest 1-hour average, ppm	NA	0.09	0.137	0.105	0.100	0.100	0.108		
Days over state standard*			6	6	4	3	11		
Highest 8-hour average, ppm	0.08	0.07	0.124	0.096	0.094	0.096	0.102		
Days over national standard			37	16	30	25	33		

* "Days over standard" refers to the number of days in a given year during which the ozone concentration over at least one hour exceeded the hourly state or national standard.

NA = Not applicable; ppm = parts per million. Values shown in **bold** type exceed the applicable standard.

Source: CARB 2008

Table D-3. Recent PM10 Concentration Data for Yosemite National Park

Pollutant	National Standard	State Standard	Monitoring Data By Year*						
			2002	2003	2004	2005	2006		
<u>Particulate Matter (PM10) Monitoring Data</u>									
Station: Yosemite Village–Visitor Center									
Highest 24-hour average, $\mu\text{g}/\text{m}^3$ (national/state)**	150	50	76/ 72	66/ 58	133/ 124	78/ 73	104/ 97		
Days over state standard (measured/estimated)***			3/18	1/5.8	2/ND	2/ND	2/ND		
Days over national standard (measured/estimated)			0/0	0/0	0/0	0/0	0/0		
Annual geometric mean, $\mu\text{g}/\text{m}^3$ (national/state)**	NA	20	26	21	ND	ND	ND		

* "Days over standard" refers to the number of days in a given year during which the ozone concentration over at least one hour exceeded the hourly state or national standard.

**State and national statistics may differ due to variations in sampling equipment, locations, references, and equivalent methods.

***PM10 is usually measured every sixth day (rather than continuously like other pollutants). Measured days are based on days that a measurement was greater than the standard. Estimated days mathematically estimates how many days concentrations would have been greater than the level of the standard had each day been monitored.

ND = No data available; ppm = parts per million; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter. Values shown in **bold** type exceed the applicable standard.

Source: CARB 2008

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APPENDIX F: DRAFT IMPAIRMENT DETERMINATION

This impairment determination is included in this document for public review to comply with the Interim Guidance for Impairment Determinations in NPS NEPA Documents issued July 6, 2010. This determination is required for the Preferred Alternative.

PREFERRED ALTERNATIVE

Alternative 2 (Tenaya Confluence)

Alternative 2 (Tenaya Confluence), the preferred alternative, would provide a diverse range of visitor experiences within the Tenaya Lake area, including an accessible trail along the western edge of the lake between East Beach and Murphy Creek and within the East Beach and Sunrise Trailhead areas. Interpretive materials and improved connections to the South Trail and Sunrise and Murphy Creek trailheads would facilitate wayfinding and minimize visitor confusion. The realigned trail systems around the lake and north of Tioga Road would avoid sensitive natural and cultural resources, and use of pedestrian bridges and boardwalks over waterways and wetland habitat would restore hydrological function of major waterways. Removal of the culverts and construction of a box culvert at the Tioga Road/Murphy Creek crossing would allow Murphy Creek to flow unimpeded under the roadway and into the lake. Visitor parking capacity would total 215 spaces, including 195 spaces within designated lots south of Tioga Road, 5 designated roadside spaces south of Tioga Road between Sunrise Trailhead and Murphy Creek, and 15 undesignated spaces on the northern side of Tioga Road near East Beach.

The Environmental Assessment included an analysis of the following resource topics:

Natural Resources:

- Geology, Geologic Hazards, and Soils
- Hydrology, Floodplains, and Water Quality
- Wetlands
- Vegetation
- Wildlife
- Rare, Threatened, and Endangered Species
- Night Sky
- Scenic Resources
- Air Quality
- Soundscape
- Wilderness

Socio-cultural Resources:

- Historic Properties
 - Archeology
 - Historic Structures, Buildings, and Cultural Landscapes
 - American Indian Traditional Cultural Properties
- American Indian Traditional Cultural Practices
- Visitor Experience and Recreation
- Park Operations

- Transportation
- Land Use
- Socioeconomics

Impairment Analysis

Impairment findings are not necessary for visitor experience and recreation, socioeconomics, land use, or park operations because impairment findings relate back to park resources and values, and these impact areas are not generally considered to be park resources or values according to the Organic Act, and cannot be impaired the same way that an action can impair park resources and values. The discussion below includes impairment analysis of applicable resources assessed in the EA, specific to the preferred alternative, Alternative 2 Tenaya Confluence.

As stated in the 1980 *General Management Plan*, there are two purposes for Yosemite National Park. The first is preservation of the resources that contribute to Yosemite's uniqueness and attractiveness - its exquisite scenic beauty; outstanding wilderness values; a nearly full diversity of Sierra Nevada environments, including the very special sequoia groves; the awesome domes, valleys, polished granites, and other evidences of the geologic processes that formed the Sierra Nevada; historic resources, especially those relating to the beginnings of a national conservation ethic; and evidences of the Indians that lived on the land. The second purpose is to make the varied resources of Yosemite available to people for the individual enjoyment, education, and recreation, now and in the future.

Geology, Geologic Hazards, and Soils

Tenaya Lake is located in the central portion of Yosemite National Park in a narrow valley that was created by the Tenaya Branch of the Tuolumne Glacier, and is currently surrounded by glacier- polished rock that extends to the edge of the lake. Soil resources are a key natural resource component within the park. Current conditions in the project area are causing erosion and vegetation trampling within wetland features, along creek banks, and along trails and parking areas surrounding the lake.

Alternative 2 would result in localized, short- term, moderate impacts to soils. These effects would be mitigated by the implementation of standard BMPs. The long- term effect would be beneficial, because existing conditions would be improved. Alternative 2 would not adversely affect unique geologic features (a resource specific to the park's purpose). In addition, there would be no change to the natural integrity of the park, nor effect to this resource value highlighted in the 1980 GMP; therefore, Alternative 2 would not impair park geological or soil resources.

Hydrology, Floodplains, and Water Quality

The project area is located within the Tenaya Lake Basin. Hydrological features include Tenaya Lake, Cathedral Creek, Tenaya Creek, Murphy Creek, and unnamed drainages. Tenaya Lake and the surrounding project area are part of a 100- year floodplain. Executive Order 11988 requires federal agencies to take action to minimize flood hazard potential and to establish flood prevention measures.

Across the entire site, no evidence was found to indicate that increased stormwater flows resulting from unnatural impervious surfaces such as roadways and parking lots are creating a significant hydrologic burden on Murphy Creek, Tenaya Creek, or Tenaya Lake (Sherwood 2010). There are significant water quality impacts from development including: erosive flows from concentrated stormwater runoff at culvert outlets; denuded soil in areas of uncontrolled pedestrian access; pollutant loading from roadway and parking lot stormwater runoff; and pollutant loading from an overflowing vault toilet. In addition, natural hydrologic flow patterns are interrupted in certain places by elevated roadway, parking, and pathway surfaces. A network of culverts exists to convey flows across those physical flow barriers; there is some visual evidence that certain culverts do not have adequate hydraulic capacity to convey design flows, and concentrated discharges from culvert outlets create erosive forces during storm events. The NPS Freshwater Resource Management Guidelines (found in NPS- 77) require the NPS to “maintain, rehabilitate, and perpetuate the inherent integrity of water resources and aquatic ecosystems.”

Alternative 2 would result in localized, short- term, moderate, adverse impacts to hydrology. These effects can be mitigated by the implementation of standard BMPs. The long- term effect would be beneficial, because existing hydrologic conditions would be improved as a result in trail redevelopment, drainage improvements, installation of biofiltration, and ecological restoration. Because this resource, which is specific to the park’s purpose, would not be affected beyond the current condition, and there would be no change to the natural integrity of the park, nor result in an effect to this resource value highlighted in the 1980 GMP, Alternative 2 would not impair park hydrological resources.

Wetlands

A total of 37 wetlands (40.44 acres) and 18 streams (8.56 acres) occur within the project area, totaling 49 acres (Herrera Environmental Consultants 2009).

The wetland protection statutes that guide the NPS include Executive Order 11990, Protection of Wetlands; Director’s Order 77- 1, Wetland Protection, and its accompanying Procedural Manual 77- 1; the Clean Water Act Sections 10 and 404; and the “no net loss” goal outlined by the White House Office on Environmental Policy in 1993. NPS’s Director’s Order 77- 1 and Procedural Manual 77- 1 provide specific procedures for carrying out Executive Order 11990. Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act authorize the U.S. Army Corps of Engineers to grant permits for construction and disposal of dredged material in waters of the United States. In addition, according to Executive Order 11990, federal agencies are required to avoid, mitigate, and follow preservation procedures with public input before proposing new construction in wetlands.

Observed impacts on wetlands include vegetation trampling and soil compaction due to volunteer trails and use of beach areas. An existing trail from the East Beach parking lot to the beach bisects a wetland and diverts water from the wetland, interrupting the natural hydrology.

Alternative 2 would result in localized, short- term, moderate, adverse changes from current conditions; however, the long- term effects would be beneficial. Wetland areas currently affected would be restored, and the trail system and interpretive materials would facilitate protection of wetland habitat. Because this resource, which contributes to the park’s purpose, would not be affected beyond the current condition, and there would be no change to the natural integrity of

the park, nor result in an effect to this resource value highlighted in the 1980 GMP, Alternative 2 would not impair park wetland resources.

Vegetation

Tenaya Lake is located within the sub-alpine vegetation zone. Five distinct vegetation/habitat types are dominant within the project area: Sierra lodgepole pine forest, urban/developed, wetlands, montane shrub, and seasonally flooded meadow. Observed impacts on this resource include vegetation trampling as a result of ongoing establishment and use of undesignated trails.

Alternative 2 would result in localized, short-term, adverse changes from current conditions. The long-term effects of re-structured trail systems and facility areas, and restoration activities would be beneficial for vegetation. There would be no adverse change to the natural integrity of the park, or discernable effects to resource values highlighted in the 1980 GMP. Therefore, Alternative 2 would not impair park vegetation.

Wildlife

The project area supports high elevation species including squirrels, bears, mule deer, and several avian species such as Cassin's finch, pine grosbeak, red crossbills, chickaree, blue grouse, hawks, owls, great horned owl, and the northern goshawk. Wetlands and other seasonally flooded habitats provide breeding habitat for amphibians, such as western toads and Pacific tree frogs.

Observed impacts to wildlife and their habitat include loss of vegetation due to trampling, presence of humans (including food and trash, noise, and visual disturbance), and removal of hazardous trees. The majority of wildlife that occur in close proximity to Tenaya Lake are likely at least somewhat habituated to human disturbance, and some species may be attracted to the area to forage on food waste and trash. Some wildlife mortality also results from vehicle travel and parking along Tioga Pass Road.

Alternatives 2 would result in localized, short-term, adverse changes from current conditions. The long-term effects would be beneficial. Because no resources specific to the park's purpose would be discernibly affected, and there would be no change to the natural integrity of the park, nor effects to resource values highlighted in the 1980 GMP, Alternatives 2 would not impair park wildlife.

Rare, Threatened, and Endangered Species

The project site supports one special status plant species, slender lupine (*Lupinus gracilentus*). The area supports suitable habitat for the following six special-status animal species: Sierra Nevada yellow-legged frog (*Rana sierrae*), Yosemite toad (*Bufo canorus*), northern goshawk (*Accipiter gentilis*), western mastiff bat (*Eumops perotis californicus*), Sierra marten (*Martes americana sierrae*), and pacific fisher (*Ochotona princeps muiri*).

Observed impacts to special-status plants and wildlife include impacts to vegetation resulting from human use of trails in the vicinity of the lake, removal of hazard trees, availability of human food and trash, and noise and visual disturbance associated with human activities and vehicles. These impacts reduce the amount and quality of areas available to special-status plant species that require undisturbed substrate and special-status wildlife species that require undisturbed

habitat for essential activities such as nesting, roosting/resting, and foraging. Some special- status wildlife mortality also likely results from vehicle travel and parking along Tioga Road.

Alternative 2 would result in localized, short- term, adverse changes from current conditions. The long- term effects would be beneficial, due to habitat enhancement. Because no resources specific to the park's purpose would be discernibly affected, and there would be no change to the natural integrity of the park, nor effects to resource values highlighted in the 1980 GMP, Alternative 2 would not impair rare, threatened, or endangered species.

Night Sky

The night sky at Tenaya Lake is generally unaffected by artificial light sources, due minimal development in the area. Sources of lighting include vehicles traveling at night along Tioga Road, but there are no light poles or beacons along this roadway, nor are there lights in parking lots or visitor use areas to illuminate the roads, signs, access paths and trails, or parking areas.

The NPS *Management Policies* (2006) direct the NPS to conserve natural lightscapes, and the policy also includes a Dark Sky Policy that promotes the “preservation and protection of the nighttime environment and dark sky heritage through quality outdoor lighting.”

Alternative 2 would not have a significant impact on Tenaya Lake night sky viewing, because no permanent sources of light are proposed. Long- term effects to night sky would be negligible. Because this resource would not be affected beyond the current condition, and there would be no change to the natural or cultural integrity of the park, Alternative 2 would not impair park night sky.

Scenic Resources

Tenaya Lake is a park destination location that receives intense visitation because of high scenic quality and natural resource values. The lake is surrounded by granite domes, lodgepole forests, and Yosemite's vast wilderness. A section of Tioga Road is located adjacent to the northern edge of the lake. Existing development include parking areas, vault toilets, rustic trails, picnic tables, and numerous directive signs. Uncontrolled parking is located along the extent of Tioga Road, which obstructs “drive by” views of the lake. The lake is located within the scenic viewshed of Olmsted Point.

As mandated under the Organic Act (16 U.S.C. 1), all visual resources and scenic quality within National Parks are to be conserved and managed in an unimpaired condition for the enjoyment of future generations.

This alternative would have a local, long- term, minor, beneficial impact on scenic resources or visual quality at Tenaya Lake. Proposed elements would not interfere with or obstruct scenic views of Tenaya Lake and surrounding geology, or distant views of the Tenaya Lake Basin as seen from Olmsted Point and Wilderness areas. Because this resource, which is specific to the park's purpose, would not be affected beyond the current condition, and there would be no change to the natural or cultural integrity of the park, nor result in an effect to this resource value highlighted in the 1980 GMP, Alternative 2 would not impair park scenic resources.

Air Quality

In general, air quality at Tenaya Lake is good. Generally, sources of air pollution include private and public vehicles, busses, and shuttles on Tioga Road, use of fire/barbeque grills at the lake, and drifting smoke and particulate matter from forest fires and camp fires in the park. Pursuant to bus permit requirements, busses are not allowed to idle longer than five minutes.

Yosemite National Park is classified as a mandatory Class I area under the federal Clean Air Act (42 USC 7401 et seq.). This air quality classification is aimed at protecting parks and designated Wilderness areas from air quality degradation. The federal Clean Air Act gives federal land managers the responsibility for protecting air quality and related values from adverse air pollution impacts, including visibility, plants, animals, soils, water quality, visitor health, and cultural and historic structures and objects.

Alternative 2 would result in a local, long- term, negligible, adverse impact due to continued use of the lake and improved visitor facilities and experience opportunities. The alternative does not include any elements that would result in the degradation of air quality. Because this resource, which is specific to the park's purpose, would not be affected beyond the current condition, and there would be no change to the natural or cultural integrity of the park, nor result in an effect to this resource value highlighted in the 1980 GMP, Alternative 2 would not impair park air quality.

Soundscape

Sources of noise at Tenaya Lake includes traffic on Tioga Road, which runs adjacent to the project area, and several day use areas and parking lots located on the eastern, northern, and western boundaries of the project area. High visitor use at the lake generates human- made sounds, including portable music and voices. Noise levels are primarily affected by the number of vehicles on the roadway, and visitors to the area.

In accordance with NPS *Management Policies* (2001) and Director's Order 47 (NPS 2000), *Sound Preservation and Noise Management*, an important part of the NPS mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human- caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials.

Construction- related impacts would have a local, short- term, moderate, adverse impact on the soundscape. Operation- related impacts would include local, long- term, minor adverse impact, due to continued use of the area and use of rumble strips within the roadway. Overall, the effects to soundscape would be improved by locating vehicles, busses, and shuttles within or adjacent to designated parking areas under Alternative 2. Because this resource, which is specific to the park's purpose, would not be affected beyond the current condition, and there would be no change to the natural or cultural integrity of the park, nor result in an effect this resource value highlighted in the 1980 GMP, Alternative 2 would not impair the natural soundscape of the park.

Wilderness

The Tenaya Lake area is surrounded by designated Wilderness to the south, east, west, and north of Tioga Road. Wilderness extends 200 feet from the centerline of paved roads, including Tioga Road. Several trailheads including the Sunrise Trailhead and Murphy Creek trails lead into Wilderness areas. The Sunrise Trailhead traverses the Tenaya Creek outlet, which is seasonally flooded. Facilities within the Tenaya Lake area, which serve Wilderness/backcountry-bound visitors, include parking areas, vault toilets, and bins.

Actions within Wilderness would include realignment of a portion of the Murphy Creek trail. Alternative 2 would result in short-term and long-term, negligible, adverse impacts to Wilderness from construction and trail maintenance. Reduced parking capacity may affect visitors during maximum peak periods. Because this resource specific to the park's purpose would not be affected beyond the current condition, and there would be no change to the natural and cultural integrity of the park, nor result in an effect to this resource value highlighted in the 1980 GMP, Wilderness would not be impaired.

Archeology

The areas surrounding the lake contain numerous archeological sites. Most archeological sites feature abundant representation of obsidian tools and flake debris, rock mortar cups and slicks, and rock shelter habitation. Many of these sites have been partially damaged through looting, erosion, and infrastructural development including trails and parking areas. Documented disturbances include inadvertent collection of historic material mistaken for trash during a park-wide litter removal project. Prehistoric archeological sites have likely also been affected by historical development.

Potential adverse effects associated with Alternative 2 are expected to be mitigated by design and applicable mitigation measures in accordance with the 1999 Programmatic Agreement. Standard mitigation measures (SMM) detailed in the 1999 PA Stipulation VIII(A) include: 1) recordation; 2) salvage; 3) interpretation; 4) National Register reevaluation. Stipulation VIII(B) requires consultation to take place if the mitigation measure may affect a national historic landmark (NHL), historic properties of national significance, a human burial, a traditional cultural property, or generates significant controversy among the public or consulting entities. There would be no change to the cultural integrity of the park, nor an effect to this resource value highlighted in the 1980 GMP; therefore, this alternative would not impair the park's archeological resources for future generations.

Historic Structures, Buildings, and Cultural Landscapes

The historical record of Tenaya Lake documents Murphy's cabin, additional cabins, privies, a ranger station, informal campsites, and historical debris. No evidence of cabins or the ranger station was observed. The Great Wagon Road and Tioga Road are linear historic properties representing at least three eras of trans-Sierra travel. The lake and surrounding glacial rock geography may be worth considering as a cultural landscape to be preserved for visual, aesthetic, and recreational use and enjoyment by various categories of people.

Under Alternative 2 there would be no adverse effect on historic structures, buildings and cultural landscapes. There would be no change to the cultural integrity of the park, nor an effect to this

resource value highlighted in the 1980 GMP; therefore, this alternative would not impair the park's archeological resources for future generations.

American Indian Traditional Cultural Properties

Tenaya Lake and its surrounding environs achieves religious and cultural significance to the collective American Indian community comprised of tribes from all directions around park lands for the role it had in their ancestral life- ways, and the connection it is today to their ancestors and ancestral values. The lake water is considered sacred, having powerful healing properties, and water of the early spring runoff is especially highly coveted. To many culturally associated American Indian people, Tenaya Lake has a strong spiritual nature.

The Tenaya Lake landscape would likely be a historic site within the boundary of the proposed trail system historic district. The preliminary boundaries of the proposed Tenaya Lake historic site within the larger trail system TCP historic district would encompass the view shed from Olmsted Point, Murphy Creek, back to Olmsted Point, and the portion of the trail system that the Mariposa Battalion followed in 1851 in pursuit of Chief Tenaya's Yosemite Band of Indians. Tangible features would include, but not be limited to, the lake water, the trail around the lake, the Mono Trail, the archeological sites, Pywiack Dome, and Tenaya Peak, and the trail leading from Yosemite Valley.

Under Alternative 2, the Tenaya Lake TCP would remain intact. Proposed actions would not adversely affect areas and resources used during Native American gatherings, walks, and individual use. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternatives 2, traditional cultural properties would not be impaired.

American Indian Traditional Cultural Practices

Traditional cultural practices at Tenaya Lake include a stop- over and gathering during the annual Trans- Sierra Walk, which follows the Mono Trail across the Sierra from Mono Lake to Yosemite Valley. The Walk is a reenactment of traditional Native American lifeways in honor their ancestor's and ancestral values, and remembrance of the capture of 35 members of Chief Tenaya's Yosemite Band of Indians. The Yosemite National Park supports the annual trek, permitting camping at the Tenaya Lake stop- over, and providing bear- proof food storage containers. The camping at Tenaya Lake is staged at the closed Sunrise Trailhead Campground parking lot, and traditional cultural activities radiate from there in all directions.

The American Indians gather at Tenaya Lake during this stop- over to conduct traditional cultural and religious activities such as hand game, exchange stories and traditional oral history, and perform ceremonies. These traditional cultural activities are essential to the survival and perpetuation of their cultural heritage as an authentic connection with their ancestors, for this generation and future generations. Tribal elders of the Indian people associated with park lands have admonished their descendants that traditional cultural and religious practices and ceremonies must be conducted to heal the land and keep the culture alive. The ceremonies they perform are for the healing of the land and the healing of the people. Even though this practice at Tenaya Lake has existed for 20 years, the practices and ceremonies are of ancient origin.

Under Alternative 2, the park would continue to support traditional cultural practices at Tenaya Lake. Proposed actions would not adversely affect these traditional practices. Because there

would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 2, traditional cultural practices would not be impaired.

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APPENDIX G:
FLOODPLAIN STATEMENT OF FINDINGS FOR THE
TENAYA LAKE AREA PLAN

Recommended: _____ Date: _____
Superintendent, Yosemite National Park

Concurred: _____ Date: _____
Chief, Water Resources Division

Concurred: _____ Date: _____
Regional Safety Officer

Approved: _____ Date: _____
Pacific West Regional Director

FLOODPLAIN STATEMENT OF FINDINGS FOR THE TENAYA LAKE AREA PLAN

This Floodplain Statement of Findings is included in this document for public review to meet the obligations of Executive Order 11988 (Floodplain Management) and the NPS Floodplain Management Guideline 1993.

Introduction

Tenaya Lake is a magnificent High Sierra lake surrounded by granite domes, lodgepole forests, and Yosemite's vast wilderness. It is the largest natural lake in Yosemite. Because of its remarkable scenic qualities, its inviting blue water, and its proximity to Tioga Road, Tenaya Lake is one of the most popular destinations for summer visitors in Yosemite. Yosemite National Park has developed the Tenaya Lake Area Plan, which includes conceptual designs for parking areas, trails, access improvements, visitor facilities, shuttle stops, and restoration areas. The purpose of the Tenaya Lake Area Plan is to guide management actions by the National Park Service in order to protect resources and provide opportunities for a range of quality visitor experiences at Tenaya Lake. The following goals were identified based on an assessment of the purpose and need for the project:

Improve Visitor Enjoyment and Increase Safety by:

- Providing great visitor use areas at the lake that retain the existing rustic and natural character that is so highly valued by the public;
- Providing safe, appropriate parking for visitor amenity areas;
- Clarifying to visitors where different amenities are located to decrease confusion;
- Decreasing traffic congestion along Tioga Road; and,
- Providing accessibility to day use areas for visitors with disabilities.

Provide a Framework for Restoring and Protecting Natural Systems In and Around Tenaya Lake by:

- Restoring impacted areas;
- Protecting water quality of Tenaya Lake;
- Better delineation of visitor use areas to protect plant communities and cultural resources;
- Providing well-sited bear-proof food storage lockers and appropriate garbage/recycling facilities; and,
- Preserving significant view opportunities from adjacent vistas.

Prescribe Appropriate User Capacity by:

- Evaluating existing use;
- Addressing appropriate parking needs for cars, motorcycles, RVs, tour buses and shuttle buses; and,
- Addressing needs for accessible parking spaces.

The purpose of this Floodplain Statement of Findings is to review the Tenaya Lake Area Plan in sufficient detail to:

- Provide an accurate and complete description of the flood hazard assumed by implementation of the proposed action (without mitigation)
- Provide an analysis of the comparative flood risk among alternative sites
- Describe the effects on floodplain values associated with the proposed action
- Provide a thorough description and evaluation of mitigation measures developed to achieve compliance with Executive Order 11988 (Floodplain Management) and the NPS Floodplain Management Guideline 1993

Floodplain Extent

Tenaya Lake and the surrounding project area are part of a 100- year floodplain (Federal Emergency Management Agency [FEMA] 1990). Executive Order 11988 requires federal agencies to take action to minimize flood hazard potential and to establish flood prevention measures. The ordinary high water mark was mapped by NPS resource staff in May 2009, just following the peak lake level for the year (NPS 2009a). Based on the results of the study, the peak water level for the year occurred on May 18, 2009. Peak water levels correspond with region- wide snowpack melting, and based on the study, corresponded closely to a 2- year flood.

The Proposed Action

The Tenaya Lake Area Plan is designed to provide for visitor experience and opportunities while protecting resources. Trail systems located within seasonally- flooded areas would be rerouted and designed to minimize hydrologic interference and soil compaction. Pedestrian bridges and boardwalks are proposed to provide access across creeks, drainages, and seasonally flooded areas, while allowing for free flow of water. Parking areas and restrooms would be located outside of the floodplain.

Proposed structures within the floodplain would be designed to reduce the potential for damage from flood events.

Existing Structures in the Floodplain

The NPS Floodplain Management Guideline 1993 divides actions into the following three groups:

- Class I Actions – include administrative, residential, warehouse and maintenance buildings, and nonexempted (overnight) parking lots
- Class II Actions – those that would create “an added disastrous dimension to the flood event.” Class II actions include schools clinics, emergency services, fuel storage facilities, large sewage treatment plants, and structures such as museums that store irreplaceable records and artifacts.

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- Class III Actions – Class I or Class II Actions that are located in high hazard areas such as those subject to flash flooding.

All of the actions proposed under the Tenaya Lake Area Plan are considered Class I actions. The regulatory floodplain for Class I actions is the 100- year floodplain.

Proposed Actions

Under the Proposed Alternative in the Tenaya Lake Area Plan, actions within the floodplain would include trail development (accessible and rustic), boardwalks, picnic areas, and ecological restoration. An existing restroom within the Murphy Creek area is located within the floodplain; this restroom would be removed, and a new restroom facility would be constructed outside of seasonally flooded areas. Existing trails within the Sunrise and East Beach areas have created hydrological barriers within the floodplain; these trails would be removed and restored to facilitate natural flow of runoff and floodwaters.

General Characteristics of Flooding in the Area

Tenaya Lake is located within the Merced River Basin, which is part of the San Joaquin River Hydrologic Area. The basin's headwaters begin in the high elevations of the Sierra Nevadan Range and join several tributaries as they drain westward through the Yosemite and Central Valleys before joining the San Joaquin River. The main tributary is the Merced River, and several smaller streams, lakes, and ponds are present throughout the basin. In regions above 5,000 feet, precipitation generally falls as snow between the months of November and April. Peak stream flows, as a result of snowmelt, occur in May and June. Minimum river flow is observed in September and October. The basin is divided into three hydrologic segments, the upper Merced River, Yosemite Valley, and the Merced River gorge. The project area is located in the Upper Merced River Watershed, which encompasses approximately 114,840 acres above Happy Isles in Upper Yosemite Valley (NPS 2004).

Floods on the Merced River are of two general types: those that occur during the late fall and winter (November through March) primarily as the result of intense rainfall, and those that occur during the spring and early summer resulting from snowmelt. At the beginning of the wet season the ground is extremely dry, and about 3 to 5 inches of precipitation is required to satisfy the retention storage capacity of the soil before any significant runoff occurs. Later in the season, when the ground may be very wet and there may be a moderate snow cover at the higher elevations, heavy rainfall over the basin causes large flood runoff. An intense storm with a high freezing level may result in flood runoff from almost the entire basin, with as much as 2 inches of snowmelt augmenting the rainfall. Most of the runoff from the Merced River basin occurs from November through July.

Across the entire site, no evidence was found to indicate that increased stormwater flows resulting from unnatural impervious surfaces such as roadways and parking areas are creating a significant hydrologic burden on Murphy Creek, Tenaya Creek, or Tenaya Lake (Sherwood 2010). Hydrologic conditions due to snowmelt and runoff within each key area are discussed below. The tributary watershed on the north side of the lake is comprised largely of steep, barren rock face, which overwhelms any stormwater runoff contribution from paved surfaces.

Natural hydrologic flow patterns are interrupted in certain places by elevated roadway, parking and pathway surfaces. A network of culverts exists to convey flows across those physical flow barriers; there is some visual evidence that certain culverts do not have adequate hydraulic capacity to convey design flows, and concentrated discharges from culvert outlets create erosive forces during storm events.

Tioga Road. Site drainage flows southerly from pockets of mountainside tributary areas along the full length of Tioga Road. Stormwater flow is constricted at culvert inlets on the north side of Tioga Road, which serve as control points and discharge concentrated flows on the south side of Tioga Road. West Tioga Road forms a causeway between Sunrise and Murphy Creek, capable of storing large volumes of backwater north of the roadway during heavy storm events, and culverts along this stretch discharge to informal drainage ways in naturalized areas that slope down to the lake. East Tioga Road interrupts sheetflow cascading down Polly Dome, and stormwater is captured in a shallow, informal ditch at the base of the dome and is then conveyed across Tioga Road by periodic culverts that discharge into the rip- rap embankment between the road and the lake. It is currently unknown whether culverts along Tioga Road have adequate capacity to convey flows from the design storm. Concentrated outflows from the culverts are a source of minor, periodic erosion in the informal drainage ways conveying stormwater into Tenaya Lake.

Sunrise and Old Campground. Site drainage flows southeasterly from a relatively small mountainside tributary area of ten acres through a series of culverts across Tioga Road, across the site, and into Tenaya Lake or its outlet creek. Stormwater flow is constricted at culvert inlets on the north side of Tioga Road, which serve as control points and discharge concentrated flows on the south side of Tioga Road. Those concentrated outflows are a source of minor, periodic erosion in the informal drainage ways conveying stormwater into Tenaya Lake. The outlet creek of Tenaya Lake flows southwesterly along the southeast edge of the Sunrise site. Flow in this creek is not inhibited by any constructed features, and the water course is in a natural, healthy state.

Murphy Creek. Site drainage flows southerly across the lake. Murphy Creek facilitates upper elevation stormwater and snowmelt flow towards Tenaya Lake. The Murphy Creek area is a braided alluvial fan centered around the main channel of Murphy Creek, which is conveyed under Tioga Road by a series of four culverts before traversing the fan and discharging into Tenaya Lake. The culverts provide control points for the main channel, stabilizing the flow course and restricting its ability to shift during high flow events. Preliminary analysis indicates, however, that the hydraulic capacity of those four culverts is only adequate to convey stormwater and snowmelt flows equal to the two- year storm without creating backwater conditions. It should be stressed at this time that the hydraulic capacity analysis of the Murphy Creek culverts is cursory and needs to be further informed by specific engineering details and a more in- depth analysis incorporating backwater effects. For very large storms, it appears possible that backwater could overtop Tioga Road, threatening to wash out that section of the causeway, as happened in recent years, and unleash severe erosive potential onto broader areas of Murphy's fan.

Several auxiliary culverts relay stormwater flows across Tioga Road at the east and west ends of the fan, and those culverts may provide supplemental hydraulic capacity for the main channel during severe backwater conditions. Concentrated flows discharging from the auxiliary culverts into informal drainage channels are a source of minor, periodic erosion into Tenaya Lake.

East Beach. Site drainage flows southerly from almost 100 acres of Polly Dome through a series of five culverts across Tioga Road, where it is intercepted by a system of wetlands and the Tenaya Lake inlet creek which flow westerly into Tenaya Lake. Stormwater flow is constricted at culvert inlets on the north side of Tioga Road, which serve as control points for the concentrated flows discharging on the south side of Tioga Road. Those concentrated outflows are a source of minor, periodic erosion at the culvert outlets.

The inlet creek of Tenaya Lake flows southwesterly along the southeast edge of the East Beach site. The main creek channel was not historically mapped in its current location, and the succession of upgradient floodplain from meadow to pine forest both indicate that the current channel may have been excavated in the early to mid 1900's in order to expedite drainage from the upgradient wetland system. Creek flow is uninhibited by any constructed features, and the channel appears stable and in a healthy state (Sherwood 2010).

South Trail. Site drainage flows northwesterly from hundreds of acres of mountainside area southeast of the lake, across South Trail through a series of periodic culverts, and then discharges onto the southeast banks of Tenaya Lake. Stormwater flow is constricted at culvert inlets on the south side of South Trail, and backwater conditions lead to frequent overtopping and significant erosion of the pathway around those culverts. Concentrated flows discharging onto the southern banks of the lake are a source of minor, periodic erosion at the culvert outlets. There are no jurisdictional or notable creeks along the South Trail.

Justification for Use of the Floodplain

Tenaya Lake is a popular visitor use area within Yosemite National Park. The lake itself provides a stunning visual setting and opportunities for a variety of visitor opportunities. The intent of the plan is to redevelop existing opportunities, including trail systems, to address safety issues and protect cultural and natural resources. Proposed uses within the floodplain would be limited to trail development (accessible and rustic), boardwalks, picnic areas, and ecological restoration

Proposed bridge structures and boardwalks would be designed to minimize the potential for damage to these facilities from flood events. Proposed drainage facilities and infrastructure would include installation of new culverts as a part of parking area, trail, and roadside improvements. Strategies such as using vegetation and strategic boulder cluster placement to dissipate hydrologic energy will be employed to improve existing culvert performance where erosion patterns and other related issues occur. Culvert outlets would be retrofitted with energy dissipation strategies that will disperse concentrated flows and mitigate erosion at those points.

Description of Site- Specific Flood Risk

Areas surrounding Tenaya Lake are seasonally flooded following snowmelt. Runoff flows into Tenaya Lake at the inlet at East Beach, Murphy Creek, and smaller unnamed drainages. Visitors are exposed to high water conditions, which results in obstacles to trail access. No permanent facilities would be located within the floodplain.

Ordinary high water mark was estimated by NPS by using the peak lake level derived from a water level datalogger installed at the lake and intersecting this elevation with the LiDAR (Light Detection and Ranging) data. The peak Tenaya Lake water level for the year occurred on May 18th, the same date as the annual peak flow at the USGS Happy Isles Gage on the Merced River in

Yosemite Valley. The peak flow at Happy Isles corresponded very closely to a 2- year flood peak. Peak flow at Happy Isles for water year 2009 was 2,710 cubic feet per second (cfs) at 14:15 Pacific Daylight Time (PDT) on May 18th. The 2- year flood for this site is 2,688 cfs (95% confidence limits - 2,463 to 2,930 cfs) for the period of record (1916- 2009) as calculated by fitting annual peak flows to a log- Pearson III distribution (Haan, 2002, ACOE 2008). The peak flow for the Merced River at Happy Isles in 2009 approximated the 2- year flood. Because the peak lake level occurred the same day as that at Happy Isles and both peaks were driven by region- wide snowpack melting, it is expected that the high water level observed on May 18th, 2009 at Tenaya Lake corresponded closely to a 2- year peak as well.

Design or Modifications to Minimize Harm to Floodplain Values or Risks to Life and Property

General Mitigation

The design of all new structures would incorporate methods for minimizing flood damage, as contained in the National Flood Insurance Program “Floodplain Management Criteria for Flood- Prone Areas” (CFR 44, 60.3) and in accordance with any local, county, or state requirements for flood- prone areas. In particular, the proposed bridge structures would be designed to minimize the potential for flood damage.

Impacts on Tenaya Lake area’s natural and cultural resources will be minimized and mitigated.

Conclusion

The Preferred Alternative would not include permanent structures with the floodplain. Raised boardwalks, accessible and rustic trails, and ecological restoration would not interfere with seasonal flood events. The removal of an existing raised and paved trail would facilitate historical hydrological flow in Sunrise area, and Tenaya Lake outlet.

The National Park Service concludes that the Preferred Alternative would not create a potentially hazardous condition associated with flooding at Tenaya Lake. Mitigation and compliance with regulations and policies to prevent impacts to water quality, floodplain values, and loss of property or human life would be strictly adhered to during and after the construction. Individual permits with other federal and cooperating state and local agencies would be obtained prior to construction activities. No long- term adverse impacts would occur from the proposed actions. Therefore, the National Park Service finds the Preferred Alternative to be acceptable under Executive Order 11988 for the protection of floodplains.

Appendix G

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Yosemite National Park

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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public land and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is on the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

October 2010

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