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Restoration of the Mariposa Grove of Giant Sequoias

Final Environmental Impact Statement

October 2013

United States Department of the Interior

NATIONAL PARK SERVICE

Yosemite National Park
P. O. Box 577
Yosemite, California 95389

IN REPLY REFER TO:
L7617 (YOSE-PM)

OCT 2 4 2013

Dear Yosemite Friends:

On behalf of the National Park Service, I am pleased to announce the release of the *Restoration of the Mariposa Grove of Giant Sequoias Final Environmental Impact Statement (Mariposa Grove FEIS)*. The Mariposa Grove in Yosemite National Park contains about 500 mature giant sequoia trees that are among the oldest, rarest, and largest living organisms in the world. These "big trees" were so inspirational to early visitors that in 1864, in the midst of the Civil War, Congress passed landmark legislation signed by President Lincoln to permanently preserve both the Mariposa Grove and Yosemite Valley. This was the first time in American history that the government set aside public lands for the express purpose of preserving scenic and natural resources. Nearly 150 years later, the Mariposa Grove is in need of comprehensive restoration to ensure that it continues to thrive and provide inspiration and enjoyment for future generations.

The *Mariposa Grove FEIS* brings forth a plan to restore ecological processes and increase the resiliency of the Mariposa Grove while improving the overall experience for visitors. The plan describes and analyzes three action alternatives and a no action alternative. Key actions proposed in Alternative 2 (preferred alternative) include restoration of giant sequoia habitat and wetlands; removal of parking within the Grove and construction of a transit hub at the South Entrance of the park; addition of shuttle service between the South Entrance and the lower Grove area during peak use periods; and removal of the commercial tram service to improve soundscapes and allow for additional ecological restoration. The NPS would establish a new pedestrian trail between the South Entrance and the Mariposa Grove, as well as several new accessible trails.

Input from the public, our tribal partners, and other government agencies has helped to shape this plan since public scoping and consultation began in 2011. The park received 334 comments during the 60-day public review of the *Restoration of the Mariposa Grove of Giant Sequoias Draft Environmental Impact Statement* released in February of 2013. Key revisions to the preferred alternative between the draft and final EIS include refinements at the South Entrance to ensure adequate parking, provision of additional parking near the existing picnic area for periods when the shuttle is not in operation, and exploration of additional options for location(s) of the leach fields. Thank you for your involvement and participation so far.

The *Mariposa Grove FEIS* is available on the Planning, Environment, and Public Comment (PEPC) website at http://www.parkplanning.nps.gov/mariposagrove. To request printed documents or CDs, e-mail yose_planning@nps.gov or call (209) 379-1202. A minimum 30-day no-action period will follow the U.S. Environmental Protection Agency notice of availability of the *Mariposa Grove FEIS* in the Federal Register. The NPS will prepare a Record of Decision (ROD) no sooner than 30 days after release of the FEIS. After approval of the ROD by the Regional Director, the park will announce the selected plan through local and regional press and on the project website. The official responsible for project implementation is the Superintendent, Yosemite National Park.

Mail: Superintendent
Attn: Mariposa Grove/FEIS
P.O. Box 577
Yosemite National Park, CA 95389

Sincerely,

Don L. Neubacher
Superintendent

Yosemite National Park • National Park Service • U.S. Department of the Interior

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Yosemite National Park
Lead Agency: National Park Service

ABSTRACT

In 1864, the U.S. Congress passed landmark legislation preserving the Mariposa Grove of Giant Sequoias and Yosemite Valley. Nearly 150 years later, comprehensive actions are needed to ensure that the Mariposa Grove continues to thrive and provide inspiration and enjoyment for future generations. The *Mariposa Grove Final Environmental Impact Statement* (*FEIS*) brings forth a plan to restore ecological processes and increase the resiliency of the Mariposa Grove while improving the overall experience for visitors. The plan describes and analyzes three action alternatives and a no action alternative to achieve these goals.

Alternative 1, No Action, serves as a baseline against which to compare the action alternatives. This alternative represents the continuation of current park management into the future, with no changes to existing facilities, transportation systems, or services.

Alternative 2, South Entrance Hub, is the National Park Service (NPS) preferred alternative. Actions proposed in Alternative 2 would restore giant sequoia habitat and wetlands; remove parking within the Mariposa Grove and construct a transit hub at the South Entrance of the park; add shuttle service between the South Entrance and the lower Grove area during peak use periods; and remove the commercial tram service to improve soundscapes and allow for additional ecological restoration. The NPS would establish a new pedestrian trail between the South Entrance and the Grove, as well as several new accessible trails.

Alternative 3, Grizzly Giant Hub, would relocate public parking and visitor information services from the lower Grove area to a more centralized transit hub in proximity to the Grizzly Giant, outside of giant sequoia habitat. The NPS would construct a new access road around the lower Grove area to the new transit hub. The existing road, gift shop, and parking area would be removed from the Grove to allow for comprehensive restoration of giant sequoia and wetland habitat. Commercial tram operations would be eliminated.

Alternative 4, South Entrance Hub with Modified Commercial Tram Service, is similar to Alternative 2, but the commercial tram staging area would move to the South Entrance, and commercial tram operations would extend to the vicinity of the Museum in the upper Grove area.

Input from the public, tribal partners, and other government agencies has helped to shape this plan since public scoping and consultation began in 2011. The park received 334 comments during the 60-day public review of the *Restoration of the Mariposa Grove of Giant Sequoias Draft Environmental Impact Statement* released in February of 2013. Key revisions to the preferred alternative between the draft and final EIS include refinements at the South Entrance to ensure adequate parking, provision of additional parking near the existing picnic area for periods when the shuttle is not in operation, and exploration of additional options for the location(s) of leach fields.

The *Mariposa Grove FEIS* is available on the Planning, Environment, and Public Comment (PEPC) website at http://www.parkplanning.nps.gov/mariposagrove. To request printed documents or CDs, send an e-mail to (yose_planning@nps.gov) or call (209) 379-1202. A minimum 30-day no-action period will follow the U.S. Environmental Protection Agency noticing of the availability of the *Mariposa Grove FEIS* in the Federal Register. The NPS will prepare a Record of Decision (ROD) no sooner than 30 days after release of the FEIS. After approval of the ROD by the Regional Director, the park will announce the selected plan through local and regional press and on the project website. For further information, contact:

Mail: Superintendent
ATTN: Mariposa Grove/FEIS
P.O. Box 577
Yosemite National Park, CA 95389

EXECUTIVE SUMMARY

INTRODUCTION

The *Restoration of the Mariposa Grove of Giant Sequoias Final Environmental Impact Statement* (*Mariposa Grove FEIS*) presents and analyzes four alternatives to restore natural conditions and improve visitor experience and access to the Mariposa Grove of Giant Sequoias in Yosemite National Park, California (also referred to as the Mariposa Grove). This document fulfills the public review requirements of the National Environmental Policy Act as well as Section 106 of the National Historic Preservation Act and the California Environmental Quality Act.

PURPOSE OF AND NEED FOR THE PROJECT

The primary purpose of the *Mariposa Grove FEIS* is to restore the dynamic ecological processes that sustain the Mariposa Grove, increase the resiliency of the Grove to withstand emerging stressors, and improve the overall experience in the Grove for visitors. Additional project goals are to protect resources; enhance interpretation of natural and cultural resources; improve wayfinding and safety within the Grove; and meet accessibility requirements consistent with the Architectural Barriers Act of 1968, as amended, and Section 504 of the Rehabilitation Act of 1973. These requirements would improve access to comfort stations, parking areas, and on selected trails. Additionally, efficiencies in energy and water use, and reduced use of non-renewable resources would be incorporated into the action alternatives.

Comprehensive actions are needed to address the impacts of existing infrastructure, operations, and visitor use on the Mariposa Grove of Giant Sequoias and to ensure that the Grove thrives and continues to provide inspiration and enjoyment for current and future generations. Current conditions adversely affecting the ecological health of the Grove include the following:

- Roads, trails, and other infrastructure disrupt the natural hydrologic functioning of the Grove.
- Buildings and infrastructure concentrated in the lower portion of the Grove encroach on individual giant sequoias and their roots, and reduce habitat for giant sequoia propagation.
- Throughout the Grove, ongoing foot and vehicle access to trees damages giant sequoia trunks, compacts soils, and exposes shallow giant sequoia roots, potentially making the trees less resilient and more susceptible to external stressors.
- The deteriorated water distribution system through the Grove is leaking thousands of gallons of chlorinated water per day, and may be affecting shallow hydrology and local vegetation.

Current conditions diminishing the quality of the visitor experience include the following:

- Wayfinding information is insufficient to properly orient visitors upon arrival at the Grove and while on trails within the Grove.
- Poor road conditions between the South Entrance and the lower Grove area contribute to seasonal closures, limit vehicle types, and are a safety concern for visitors and park employees.
- The Grove parking lot often fills to capacity early in the day, forcing temporary closures of the lot and Mariposa Grove Road, and causing visitor frustration as they are redirected to

limited overflow parking at South Entrance or to Wawona to await a shuttle to return to the Grove.

- Long lines form at the South Entrance station kiosks and intersection as visitors attempt to get information, find parking, or turn around due to Grove parking lot and road closure.
- Shuttles from Wawona to the Grove are often full when they arrive at the South Entrance shuttle stop, limiting boarding there and increasing visitor wait times.
- Trails and facilities in and around the Grove need improvements to reduce grades and/or increase connectivity to provide better universal accessibility.
- Operation of the commercial tram within the Grove creates vehicle/pedestrian conflicts along the loop road, and intrudes on the experience of pedestrian visitors seeking to enjoy the majestic setting and natural soundscapes, particularly in the upper, more remote areas of the Grove.
- The vault toilets in the lower part of the Grove are inadequate and not fully accessible, and are the source of nuisance odors that detract from the Grove experience.
- The historic comfort station and the associated septic system and leach field in the upper Grove area need improvements to increase water-use efficiency and maintainability.
- Historic features at Wawona Point, including the masonry overlook wall, steps, and railing, are in disrepair and require repairs to meet current standards.

With the exception of Alternative 1, No Action, each of the alternatives meets the purpose and need of the plan to varying degrees and in different ways. All alternatives would retain the existing visitor use levels of a typical day in the Mariposa Grove, though visitor use would concentrate in different parts of the Grove. The daily visitor use level proposed in the *Mariposa Grove FEIS* approximates the visitor use level established for the Mariposa Grove in the 1980 GMP for Yosemite National Park (3,850 visitors per day).

OVERVIEW OF THE ALTERNATIVES

This FEIS presents a No Action Alternative (Alternative 1) and three action alternatives (Alternatives 2 through 4) to restore natural habitat within the Mariposa Grove and improve the visitor experience.

Several ecological restoration, infrastructure removal or improvement, and visitor experience actions would be common to each of the action alternatives including road/trail grading and culvert repair to improve hydrologic flows; removal of pavement and soil decompaction; repair/replacement of the leaking water distribution system and relocation of the water tank; and improvement of visitor orientation. The action alternatives also include actions to improve conformance with accessibility criteria outlined in NPS Director's Order 42 on accessibility for visitors with disabilities; the Architectural Barriers Act of 1968, as amended; and Section 504 of the Rehabilitation Act of 1973. The actions include improving ratios of accessible parking spaces and providing accessible paths of travel through giant sequoia and wetland habitats, as well as to visitor services at central transit hubs. Appropriately spaced benches, pullouts, and resting places would be added along trails, at viewpoints, and adjacent to congested paths of travel at transit hubs to improve the visitor experience for persons with limited mobility and other visitors. Rehabilitation, stabilization, protection, and/or enhanced interpretation of cultural resources at Mariposa Grove, Wawona Point, and South Entrance also would be components of all of the action alternatives. Moreover, restoration of giant sequoia habitat would preserve sequoia habitat as an integral part of the

Mariposa Grove Historic District and as an American Indian traditional cultural resource. Other components of the three action alternatives, as well as the no-action alternative, are briefly described below.

Alternative 1, No Action, serves as a baseline against which effects of the action alternatives are compared. Alternative 1 would continue the current level of maintenance and operations at the Mariposa Grove of Giant Sequoias. Under this alternative, compliance with regulatory requirements (e.g., health and safety or historic preservation) or strategies in current and future adopted plans would be implemented over time. Ongoing adverse impacts on giant sequoia, wetlands, and wildlife would continue to result from tram operations, infrastructure-related hydrologic changes, soil compaction, and soundscape disturbance. Infrastructure would remain concentrated in the lower Grove area, and commercial operation of the tram and the gift shop would continue. Access to Mariposa Grove would remain challenging during peak use periods. Some visitors arriving at the South Entrance would be redirected to Wawona to board a park shuttle bus and return to the Grove, an inefficient process that takes about an hour. Renovation, rehabilitation, or upgrading of existing buildings and infrastructure to improve functionality and accessibility would occur as emergency actions in response to system failures rather than as planned, coordinated actions. The current level of interpretation and orientation would be retained, and utilities and comfort stations would not be upgraded. Stressors on the giant sequoia trees, wildlife, special status species, and other natural and cultural resources in the Grove and at South Entrance would not be addressed.

Alternative 2, South Entrance Hub, the National Park Service's Preferred Alternative, would remove the majority of visitor parking, commercial tram staging and operations, and the concessioner-operated gift shop from Mariposa Grove to allow for comprehensive restoration of wetlands, soundscape, and giant sequoia habitat. New visitor services for the South Entrance would include visitor information and educational and other sales items. Most parking would be relocated to a South Entrance transit hub. A limited number of parking spaces could be provided in the lower Grove area as well as at the picnic area adjacent to Mariposa Grove Road when the shuttle is not in operation. Vault toilets would be renovated or replaced, and accessible trails would be established in the ecologically restored lower Grove area and at the iconic Grizzly Giant. The abandoned historic Washburn Wagon Road alignment to the Grove would be cleared of vegetation and rehabilitated as a pedestrian path from South Entrance parking lot to the Mariposa Grove Road picnic area. Where the Washburn Wagon Road ends in the vicinity of the existing picnic area, a new trail would be constructed for the remaining distance to the lower portion of the Grove, including a pedestrian bridge across Rattlesnake Creek. An accessible trail would be constructed through the lower Grove area, and an accessible overlook to the Grizzly Giant would be provided. This alternative includes options for realigning the entrance to the Grove to enhance restoration efforts and straighten the existing tight curve near the giant sequoias in the vicinity of the Three Sentinels, which would include a new drainage crossing structure to protect giant sequoias in that area from erosion and from placement of roadway embankment over sensitive root zones. At the South Entrance, the intersection of Wawona Road and Mariposa Grove Road would be realigned to the west of its current location, and a roundabout would replace the current T-intersection should traffic conditions warrant this action.

Alternative 3, Grizzly Giant Hub, would relocate public parking and visitor services from the lower Grove area to a location outside giant sequoia habitat in the vicinity of Grizzly Giant. This would include removing the lower Grove area parking lot, gift shop, and commercial tram staging area and operations to allow for comprehensive restoration of giant sequoia habitat, wetlands, and soundscapes. A new road segment with two bridges would be constructed to skirt the lower Grove. Within the lower Grove area, the existing road to Grizzly Giant would be converted into a pedestrian trail. Accessible parking would be provided at the lower Grove area, accessible trails would be

constructed in the lower and mid-Grove areas, and vault toilets would be installed at the Grizzly Giant parking area. The existing T-intersection at South Entrance would be retained.

Alternative 4, South Entrance Hub with Modified Commercial Tram Service, would maintain the commercial tram operations for visitor access and enjoyment, but tram staging would be moved to a South Entrance Hub, similar to that described for Alternative 2, and the route and hours of operation would be reduced to provide a balance between visitor access and opportunities for quiet enjoyment and solitude in the upper part of the Grove. As under Alternative 2, new visitor services would be provided for the South Entrance including visitor information and educational and other sales items. The majority of public parking would be relocated to the South Entrance, and additional off-season overflow parking would be provided near the Mariposa Grove Road picnic area. An accessible overlook to the Grizzly Giant would be provided. Similar to Alternative 2, the abandoned Washburn road alignment to the Grove would be cleared of vegetation and rehabilitated as a pedestrian path extending from the South Entrance parking lot to the picnic area. Where the abandoned Washburn road ends in the vicinity of the existing picnic area, a new trail would be constructed for the remaining distance to the lower portion of the Grove, including a pedestrian bridge across Rattlesnake Creek. The current T-intersection design at South Entrance would be modified to improve traffic flow.

Summary Comparison of No-Action and Action Alternatives

	Alternative 1: No Action	Alternative 2: South Entrance Hub	Alternative 3: Grizzly Giant Hub	Alternative 4: South Entrance Hub with Modified Commercial Tram Service
Existing Conditions				
Existing impervious (asphalt) surface in project area	3.21 acres	N/A	N/A	N/A
Existing road through the Grove	8.4 acres	N/A	N/A	N/A
Existing trails within the Grove	3.5 acres	N/A	N/A	N/A
Restoration				
Restoration of giant sequoia habitat through reduction of impervious surfaces in lower Grove	N/A	Removal of 1.44 acres, a 50% reduction of impervious surfaces	Removal of 2.38 acres, an 82% reduction of impervious surfaces	Removal of 1.59 acres, a 55% reduction of impervious surfaces
Restoration of giant sequoia habitat through removal of trails	N/A	0.43 acre	0.58 acre	0.02 acre
Restoration of giant sequoia habitat resulting from narrowing of Mariposa Grove Road, conversion of road segments to trails, or trail removal	N/A	Removal of 2.11 acres of existing paved road in the Grove, a 25% reduction of road	Removal of 2.79 acres of existing paved road in the Grove, a 33% reduction of road	Removal of 0.23 acres of existing paved road in the Grove, a 3% reduction of road
Giant sequoia habitat restoration within the Grove (total)	N/A	3.98 acres removal of built footprint within the Grove (27% reduction)	5.75 acres removal of built footprint within the Grove (39% reduction)	1.84 acres removal of built footprint within the Grove (12% reduction)
Net, project-wide change in development, excluding areas for leach fields	N/A	0.74 acre *addition* developed area (comprised of 3.98 acre net reduction of developed area within the Grove plus 4.72 acres new development at the South Entrance)	0.50 acre *addition* of developed area (comprised of 5.75 acre net reduction of developed area within the Grove plus 6.25 acres new development at Grizzly Giant and new Grove bypass road)	2.88 acre *addition* of developed area (comprised of 1.84 acre net reduction of developed area within the Grove plus 4.72 acres new development at the South Entrance)
Infrastructure Redesign and Relocation				
Accessible parking spaces	2 at lower Grove area	8 at South Entrance; 6 at lower Grove area; 3 at picnic area; 8 at Grizzly Giant	7 at Grizzly Giant; 10 at lower Grove area	8 at South Entrance; 6 at lower Grove area; 3 at picnic area, 4 at Grizzly Giant; 4 at upper Grove area
Standard vehicle parking spaces	20 at South Entrance, 115 seasonal at lower Grove area. Over 100 spaces at Wawona are used for overflow parking.	248 regular, 30 oversize at South Entrance, 25-50 seasonal at lower Grove area, 25-50 seasonal at picnic area	20 seasonal at South Entrance, 189 regular, 27-32 oversize at Grizzly Giant	248 regular, 30 oversize at South Entrance, 25-50 seasonal at lower Grove area, 25-50 seasonal at picnic area
South Entrance area build out (net footprint after construction)	N/A	4.72 acres of non-giant sequoia forest	N/A	Same as Alternative 2

	Alternative 1: No Action	Alternative 2: South Entrance Hub	Alternative 3: Grizzly Giant Hub	Alternative 4: South Entrance Hub with Modified Commercial Tram Service
Grizzly Giant area build out (net new footprint after construction)	N/A	0.06 acre of non-giant sequoia forest (includes 0 acres impervious surfaces)	3.13 acres of non-giant sequoia forest (includes 2.92 acres impervious surfaces)	0.06 acre of non-giant sequoia forest (includes 0 acres impervious surfaces)
New bypass road build out (net footprint after construction)	N/A	N/A	2.20 acres, primarily through non-giant sequoia forest	N/A
Primary visitor contact	At lower Grove staging area	At South Entrance Hub	At Grizzly Giant Hub	At South Entrance Hub
Trail from South Entrance to picnic area using abandoned Washburn Road to picnic area and construction of a new trail extending from picnic area to lower Grove	N/A	0.66 acre of development	N/A	Same as Alternative 2

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with NPS *Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making* and Council on Environmental Quality requirements, the NPS is required to identify the environmentally preferred alternative in all environmental documents, including EISs. Generally, the environmentally preferred alternative is the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources.

Alternative 2 (the preferred alternative) on balance best achieves these following national environmental policy goals:

(1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

All of the action alternatives would, to varying degrees, reduce development footprints within the Mariposa Grove, restore hydrologic and ecological systems to more natural conditions, and stabilize and/or rehabilitate cultural resources at South Entrance, the Grove, and Wawona Point. Alternative 2 best meets this objective because it would result in a net reduction of developed areas, would reduce developed area within sequoia habitat, better protect Pacific fishers from road fatalities, and restores the soundscape in the upper Grove area.

(2) Assure for all visitors safe, healthful, productive, and aesthetically and culturally pleasing surroundings.

All of the action alternatives would meet this goal. Alternative 2 best removes much of the transportation infrastructure from within the Grove and provides the highest quality universal access experience in the lower Grove area and at the Grizzly Giant. The alternative enhances the sense of solitude and natural soundscape in the upper Grove area through elimination of commercial tram operation.

(3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.

Alternative 2 would attain the widest range of beneficial uses of the environment while minimizing further degradation of the sensitive giant sequoia environment, manages risks to visitor health and safety concerns by eliminating vehicle/pedestrian conflicts within the Grove, reduces traffic/parking safety hazards.

(4) Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, access, and a variety of options for experiencing the Grove.

Alternative 2 would best restore and preserve the giant sequoias of the Mariposa Grove. Alternatives 2 and 3 would provide a better opportunity for solitude in the upper Grove with the removal of the tram and private vehicles. All of the action alternatives would avoid and/or minimize adverse effects to historic and traditional cultural aspects of the Grove and South Entrance.

(5) Achieve a balance between population and resource use, which will permit high standards of living and a wide sharing of life's amenities.

Alternative 2 would reduce in-Grove infrastructure and best conserves energy by significantly restricting private vehicle access to the Grove and eliminating commercial tram operations within the Grove. Alternative 2 offers the best opportunity for expanding the range of visitor experiences by expanding accessible trail opportunities in diverse areas in the lower Grove area and at Grizzly Giant.

(6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative 2 represents the most efficient management of depletable fossil fuels both by eliminating in-Grove tram operations, limiting most private vehicle access during peak visitor season, and by concentrating visitor and employee parking near a park entrance and implementing efficient shuttle service using buses that operate on alternative fuels.

On balance, Alternative 2 (the preferred alternative) best achieves these national environmental policy goals, and therefore is identified as the environmentally preferred alternative.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Alternative 1: No Action Alternative

The No Action Alternative would have long-term, moderate adverse impacts on natural and sociocultural resources at the Mariposa Grove of Giant Sequoias, including wildlife, special status species, wetlands, hydrology and water quality, soils, soundscapes, archeological and traditional cultural resources, and energy use and sustainability. Under Alternative 1, vegetation would be subject to continued long-term major adverse impacts as a result of ongoing soil compaction and erosion, root disturbance, bark and bole damage from commercial tram impact, and modified hydrologic flow and processes. Under Alternative 1 visitor experience would be subject to continued long-term, moderate to major, adverse impacts as a result of in some areas insufficient resource interpretation and orientation; soundscape disturbances from vehicles and the in-Grove commercial tram; inadequate and poorly functioning restrooms and vault toilets; and lack of accessible facilities and trails. The inconvenience associated with periodic closure of the Mariposa Grove Road as the Grove parking lot fills to capacity, redirection to Wawona for shuttle service, and waits at poorly designed shuttle stops would continue to negatively affect visitor experience. The concessioner-operated gift shop and tram would continue to operate in the Grove. Visitors with limited mobility could access the mid- and upper Grove areas via the fee-for-service tram, or those with appropriate accessible parking placards could follow the tram in a personal vehicle to the Grizzly Giant and along the loop road in the upper Grove area.

Deterioration of the historic road and built features at Wawona Point would continue under Alternative 1. Degradation of archeological resources also would continue as a result of the current location of infrastructure on sensitive archeological resources, which in turn could affect traditional cultural use of the Grove. Although the estimated construction costs would be negligible compared to the action alternatives, deferred maintenance costs under Alternative 1 would exceed the estimated operating costs for the action alternatives.

Alternative 2: South Entrance Hub (Preferred Alternative)

Actions under Alternative 2 would result in long-term, major, beneficial impacts on vegetation, wildlife, special status species, and wetlands. Implementation of Alternative 2 would result in a reduction in paved area within Mariposa Grove; drainage improvements along trails and roads; and actions to restore hydrologic flow and processes, reduce soil erosion, and reduce soil compaction near giant sequoias and wetlands. Removal of the commercial tram and tram staging area and

relocation of visitor parking, museum functions, and other services to the South Entrance would reduce noise and enhance soundscapes throughout the Grove, and reduce traffic/wildlife conflicts along the Mariposa Grove Road, which would benefit wildlife. Visitor use and experience would also incur long-term, major, beneficial impacts as a result of improved traffic flow and orientation, enhanced accessibility of trails and visitor facilities, improved soundscapes due to removal of the commercial tram and incompatible elements in the lower Grove area, improved signage and interpretation, and construction of a larger parking lot, visitor services, and shuttle stop at South Entrance. Removal of the commercial tram, consolidation of infrastructure at the South Entrance, repair of the Grove water system, and use of water- and energy-efficient sustainable design in new and renovated facilities would result in long-term, major beneficial impacts on park operations and energy use and sustainability. Historic preservation goals would be advanced through improved interpretation of cultural resources; rehabilitation of segments of historic trails/road, Wawona Point overlook features, and other cultural landscape elements; and removal of infrastructure from and revegetation of sensitive archeological sites. Adverse effects on historic structures, features, and cultural landscapes and archeology are likely under Alternative 2, primarily due to proposed road alignment shifts, conversion of some roadway to trail, and narrowing of historic roads within the Mariposa Grove Historic District. However, ecological restoration of the Grove would also serve to protect the iconic giant sequoias that are character-defining components of the Mariposa Grove Historic District.

Overall, Alternative 2 would result in a 0.74 acre addition of developed areas project-wide, which would be comprised of 3.98 acre net reduction of developed area within the Grove plus 4.72 acres of new development at the South Entrance. Preliminary cost estimates indicate that construction costs for Alternative 2 would be slightly less than the other action alternatives, but operating costs would be slightly higher than other action alternatives. If the optional new bridge/box culvert across the Rattlesnake Creek drainage in the vicinity of the Three Sentinels were constructed under this alternative, it would add an additional major capital cost.

Alternative 3: Grizzly Giant Hub

Actions under Alternative 3 would result in long-term, major, beneficial impacts on vegetation, wildlife, special status species, and wetlands within giant sequoia habitat at Mariposa Grove. These actions include reduction in paved area, drainage improvements along trails and roads, and repairs to restore hydrologic flow and processes, reduce soil erosion, and reduce soil compaction near giant sequoias and wetlands in the lower Grove area. Removal of the commercial tram and tram staging area and relocation of visitor parking, museum functions, and other services outside of giant sequoia habitat in the vicinity of the Grizzly Giant would have a major, long-term beneficial impact on soundscapes in the upper and lower parts of the Grove, but would have moderate long-term, adverse impacts on soundscapes in the mid-Grove area of the Grizzly Giant. However, wildlife, vegetation, and special status species outside of giant sequoia habitat would be subject to moderate to major, long-term adverse impacts as construction of new road and the Grizzly Giant Hub facilities, and the resulting increase in private vehicle trips, would remove habitat and increase the potential for wildlife/vehicle conflicts along the Mariposa Grove Road and the new extension to the hub. The new bypass road would affect Pacific fisher denning habitat in a previously undisturbed area.

Visitor use and experience would incur long-term, major, beneficial impacts as a result of improved traffic flow and orientation, removal of the concessioner-operated tram and other incompatible elements from the lower area of the Grove, improved signage and interpretation, elimination of reliance on the park shuttle service to reach the Grove, and construction of a parking lot outside the bounds of giant sequoia habitat, in the vicinity of the Grizzly Giant. Removal of tram operations, consolidation of infrastructure near the Grizzly Giant, repair of the Grove water system, and use of water- and energy-efficient sustainable design in facilities would result in long-term major beneficial

impacts on park operations and energy use and sustainability. Historic preservation goals would be advanced through rehabilitation of historic road and trail segments, and Wawona Point overlook features. However, introduction of a new parking lot near the iconic Grizzly Giant, and modification of segments of the Mariposa Grove Road would result in indirect and direct adverse effects, respectively, on these contributing historic cultural landscape features. Construction of the new access road also would adversely affect sensitive cultural resources. However, restoration of the Grove would also protect the cultural landscape, in which the giant sequoias are considered a cultural resource.

Overall, Alternative 3 would result in a net addition of 0.5 acre of developed area project-wide, which would be comprised of 5.75 acre net reduction of developed area within the Grove plus 6.25 acres of new development at the Grizzly Giant arrival area and new bypass road. Alternative 3 would have the highest cost relative to Alternatives 1, 2, and 4.

Alternative 4: South Entrance Hub with Modified Commercial Tram Service

Actions under Alternative 4 would result in long-term, major beneficial impacts on vegetation, wildlife, special status species, and wetlands within the Mariposa Grove of Giant Sequoias. Similar to Alternative 2, implementation of Alternative 4 would result in a reduction in paved area in the Grove, drainage improvements along trails and roads, and utility repairs to restore hydrologic flow and processes, reduce soil erosion, and reduce soil compaction near giant sequoias and wetlands. Relocation of visitor parking, tram staging, and other services to South Entrance would reduce traffic/wildlife conflicts along the Mariposa Grove Road. Visitor use and experience would also incur long-term, major, beneficial impacts as a result of improved traffic flow at a modified T-intersection at South Entrance, removal of incompatible elements from the lower Grove area, improved signage and interpretation, and construction of a larger parking lot at South Entrance. Beneficial impacts on soundscapes would be less than those under Alternative 2 because commercial tram service would continue, albeit at a reduced frequency and along a shortened in-Grove route. Consolidation of infrastructure at South Entrance, repair of the Grove water system, and use of water- and energy-efficient sustainable design in facilities would result in long-term moderate beneficial impacts on park operations and energy use and sustainability. Historic preservation goals would be advanced through rehabilitation of historic road and trail segments and Wawona Point overlook features. However, removal of infrastructure and modifications to sections of Mariposa Grove Road would result in adverse effects on cultural resources.

Overall, Alternative 4 would result in a net addition of 2.88 acres of developed area project-wide, which would be comprised of 1.84 acre net reduction of developed area within the Grove plus 4.72 acres of new development at the South Entrance. Alternative 4 construction cost would be greater than that of Alternatives 1and 2, and possibly less than Alternative 3. If the optional new bridge/box culvert across the Rattlesnake Creek drainage in the vicinity of the Three Sentinels were constructed under this alternative, it would add an additional major capital cost.

Considerations for All Action Alternatives

The potential long-term benefits of the action alternatives would be realized only if routine and proposed site-specific management actions are implemented consistently in the future. If maintenance or other actions are deferred, long-term benefits may be marginal. Future funding and prioritization of management actions at Mariposa Grove are essential to maintaining the proposed ecological restoration embodied in the action alternatives.

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LIST OF ACRONYMS AND ABBREVIATIONS

ABAAS	Architectural Barriers Act Accessibility Standards
ACHP	Advisory Council on Historic Preservation
APE	area of potential effect
Army Corps	U.S. Army Corps of Engineer
BMP	Best Management Practice
Caltrans	California Department of Transportation
CBA	Choosing by Advantages
CDFW	California Department of Fish and Wildlife
CDN	Communications Data Network
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIP	Comprehensive Interpretive Plan
CSC	California Species of Special Concern
dB	decibel
EIS	Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
FC	Federal Candidate for Listing
FEIS	Final Environmental Impact Statement
FRID	Fire Return Interval Departure
GHG	greenhouse gas
GMP	General Management Plan
LEED®	Leadership in Energy and Environmental Design
LRIP	Long-range Interpretive Plan
MOA	Memorandum of Agreement
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
PEPC	Planning, Environment and Public Comment
PM_{10}	particulate matter greater than 10 microns in diameter
$PM_{2.5}$	particulate matter greater than 2.5 microns in diameter
POV	privately owned vehicle
RAWS	Remote Access Weather Station
ROG	reactive organic compound
RWQCB	Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SITES	Sustainable Sites Initiative
SWRCB	State Water Resources Control Board
USFWS	United States Fish and Wildlife Service
YARTS	Yosemite Area Regional Transportation System



Chapter 1: Purpose and Need

CHAPTER 1: PURPOSE AND NEED

INTRODUCTION

The *Restoration of the Mariposa Grove of Giant Sequoias Final Environmental Impact Statement* (*Mariposa Grove FEIS*) presents and analyzes four alternatives to restore natural conditions, protect natural and cultural resources, and improve visitor experience and access to the Mariposa Grove of Giant Sequoias in Yosemite National Park, California (also referred to as the Mariposa Grove). A National Park Service (NPS) interdisciplinary team developed the *Mariposa Grove FEIS* in conjunction with park staff and leadership; American Indian tribes and groups; federal, state and local agencies; and substantial input and participation from park partners and the public. This plan addresses the required elements of the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act (NHPA), and other legal mandates that govern decision-making and planning in the NPS. This FEIS also fulfills the public review requirements of the California Environmental Quality Act. This FEIS presents a "no-action" alternative and three comprehensive alternatives for meeting the goals of the plan. The action alternatives are consistent with overall direction for the Mariposa Grove established in the *General Management Plan* (GMP) (NPS 1980a) for Yosemite National Park. The NPS expects this plan to have a lifespan of at least 20 years.

BACKGROUND

In 1864, the U.S. Congress passed landmark legislation granting the Yosemite Valley and the Mariposa Grove of Big Trees to the State of California (Act of June 30, 1864, 13 Stat., 325). Signed by President Lincoln, the statute decreed both Yosemite Valley and the Mariposa Grove of Big Trees to be set aside "… for public use, resort, and recreation; shall be inalienable for all time." This was the first time Congress set aside public lands for the express purpose of preserving scenic and natural values. Protection of the Mariposa Grove was crucial at that time, as logging was ongoing in other giant sequoia groves in California.

The natural distribution of the giant sequoia (*Sequoiadendron giganteum*) is limited to about 75 isolated groves on the west slope of the Sierra Nevada of California. These groves are relicts of extensive forests that existed thousands of years ago (figure 1-1). These impressive trees are known for their massive size and longevity, with life spans that may reach 3,200 years (York 2011).

The Mariposa Grove of Giant Sequoias supports about 500 mature giant sequoia trees. It is the largest of three giant sequoia groves within Yosemite National Park, containing 86 percent of the park's mapped adult giant sequoias (figure 1-2), and is estimated to receive more than one million visitors annually.



***The Great Trees Mariposa Grove California*, by Albert Bierstadt, 1876**

Source: Albert Bierstadt, 1876



Figure 1-1 – Distribution of Giant Sequoia Groves in California

Distribution of the giant sequoia trees is influenced by several factors, including surface and ground water (typically supplied by melting snow), topography, elevation, aspect, soil type, relative humidity, and temperature. Giant sequoias have extensive shallow lateral root systems that can radiate up to 200 feet from the base of the tree.

Fire plays an important role in giant sequoia ecology, creating canopy openings and releasing soil nutrients needed for seedling establishment. Fire scars on the trees within Mariposa Grove indicate that fires occurred at intervals of approximately 3 to 15 years within the Grove until the late 19th century (NPS 2011b).

The Mariposa Grove ecosystem provides important habitat for wildlife and plants, including special status species such as the Pacific fisher (*Martes pennanti*), a federal candidate for listing under the Endangered Species Act; California spotted owl (*Strix occidentalis occidentalis*); and numerous rare herbaceous plants, including Bolander's woodreed (*Cinna bolanderi*), and Coleman's piperia (*Piperia colemanii*).

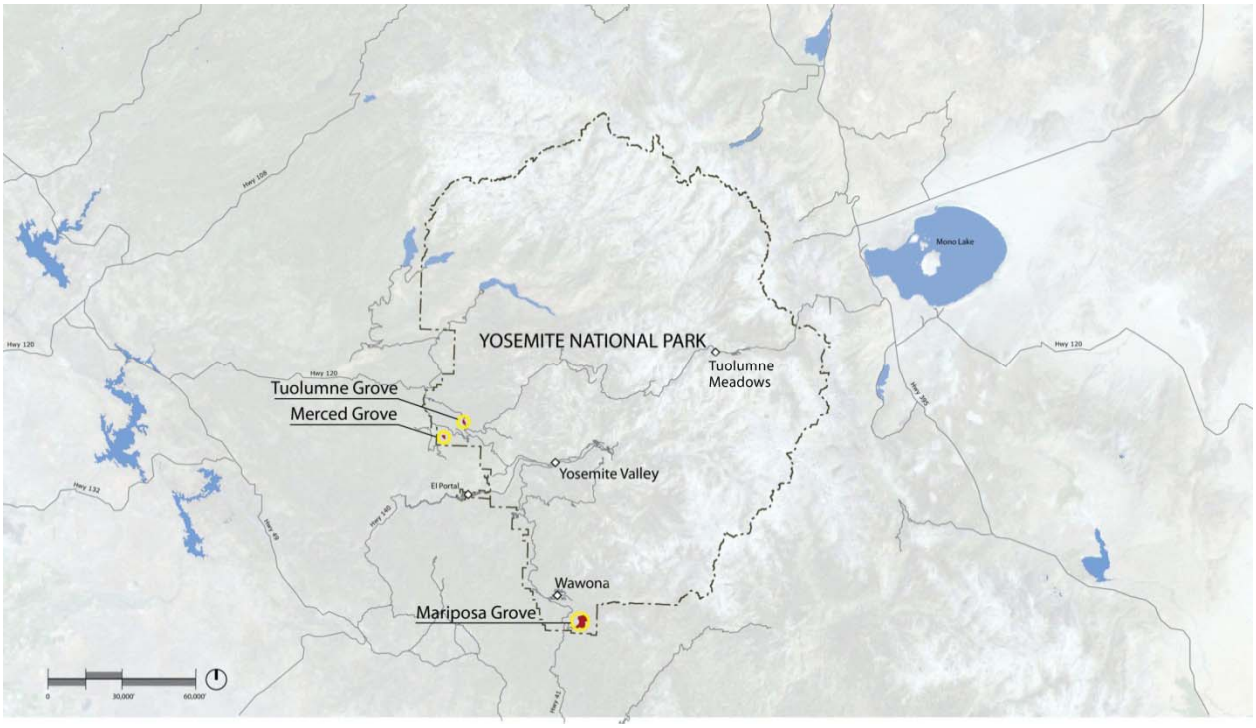


Figure 1-2 – Giant Sequoia Groves in Yosemite National Park

There is a rich cultural history in the Mariposa Grove area. Cultural resources in the area include pre-contact and historic-era archeological resources, several historic properties either listed or eligible for listing on the National Register of Historic Places, and American Indian traditional cultural resources. The Mariposa Grove Historic District includes all of the Mariposa Grove Road from the South Entrance to Wawona Point, several pedestrian and bridle trails, the Wawona Point overlook, and a comfort station, drinking fountains, and the Mariposa Grove Museum in the upper part of the Grove. The museum building was constructed circa 1930 near the former site of a cabin originally constructed in 1864 by Galen Clark, the first government-appointed guardian of the Mariposa Grove of Big Trees (figure 1-3). The South Entrance Historic District includes a comfort station, the ranger residence/garage, and the park entrance checking station.

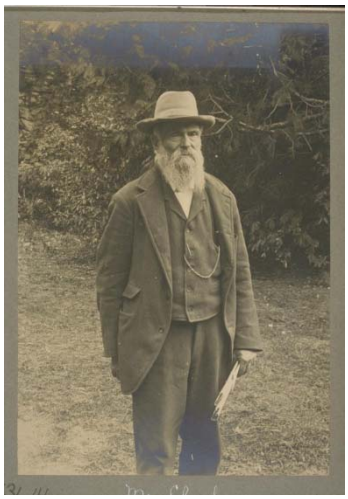


Figure 1-3 – Galen Clark

The Mariposa Grove Archeological District includes several discrete prehistoric and historic sites located within and near Mariposa Grove of Giant Sequoias. Archeological sites are fragile, non-renewable resources with important potential for containing information about past life ways, and represent tangible heritage resources for traditionally associated American Indian tribes and groups, as well as the visiting public. Other National Register-eligible archeological sites are present near South Entrance. The Mariposa Grove of Giant Sequoia and its varied flora and fauna and natural topographic prominences (e.g., Wawona Point), along with certain of the archeological sites, also represent traditional cultural resources of importance to American Indian tribes and associated groups.

Figure 1-4 displays the project area, which encompasses the Mariposa Grove, South Entrance, and the surrounding area.

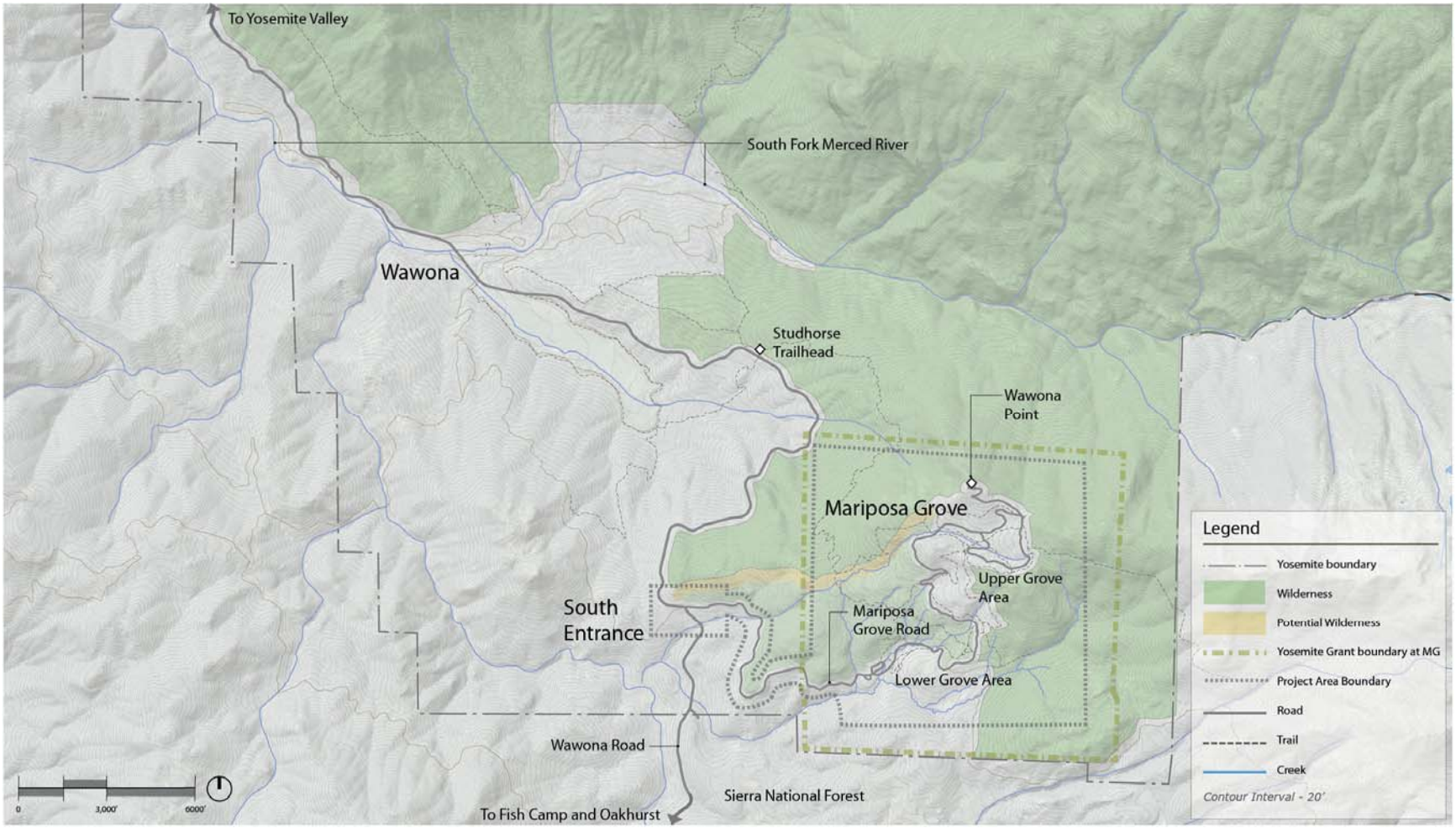


Figure 1-4 – Mariposa Grove Restoration Project Area and Vicinity

The State of California and private entrepreneurs built trails and facilities in and near the Mariposa Grove as early as the 1860s. In the early to mid-20th century, the NPS developed more visitor facilities including parking lots, comfort stations, a lodge, and a campground. During this time, park managers attempted to protect the Grove from fire in various ways such as installing fire hydrants, removing surface fuels and downed trees, and extinguishing wildfires. Following this development period which extended into the 1970s, management practices evolved as understanding of the biology and ecology of giant sequoias improved. Subsequently in 1971, after nearly a century of fire suppression, prescribed fire was reintroduced to the Grove as resource managers recognized that vegetation composition and forest structure had changed, and that heavy fuel accumulation could threaten the long-term survival of giant sequoias.

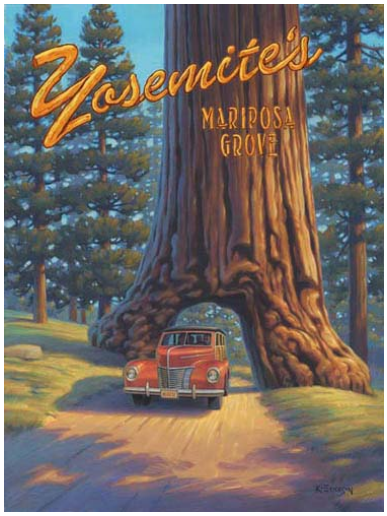


Figure 1-5 – Vintage promotional poster of Wawona Tunnel Tree

Growing concerns about traffic congestion and visitation impacts also eventually led to the decision in 1970 to prohibit private vehicles in the upper Mariposa Grove area and at Wawona Point. By 1980, when the Yosemite GMP (NPS 1980a) was issued, the NPS recognized the need to mitigate traffic congestion at South Entrance, reduce infrastructure and traffic within the Grove, control the intensity of visitor use, and reestablish a more natural fire regime in this rare ecosystem. Today, buildings and infrastructure present in Mariposa Grove include tour bus and visitor parking areas; a shuttle stop; a concessioner-operated gift shop; a commercial tram; the Mariposa Grove Museum; comfort stations and an associated septic system/leach field in the upper Grove area; several pedestrian/hiking trails; paved roadways; drainage control structures such as road-side ditches and culverts; a water storage, treatment, and distribution system that serves both Mariposa Grove and South Entrance; and communications equipment at Wawona Point.

The GMP (NPS 1980a) for Yosemite National Park outlines goals and actions to protect and restore Mariposa Grove and to improve conditions at the nearby South Entrance. A few actions have been implemented, such as removal of the campground and lodge from the Grove, and more recently, removal of the commercial tram fueling station. However, several major actions have yet to be undertaken, including removing the parking lot and gift shop from the lower part of the Grove, improving visitor facilities, upgrading utilities, and improving access to the park and to Mariposa Grove through the South Entrance.

PURPOSE OF AND NEED FOR THE PROJECT

The primary purpose of the *Mariposa Grove FEIS* is to restore the dynamic ecological processes that sustain the Mariposa Grove, increase the resiliency of the Grove to withstand emerging stressors, and improve the overall experience in the Grove for visitors. Comprehensive action is needed to ensure that the Mariposa Grove of Giant Sequoias thrives and continues to provide inspiration and enjoyment for current and future generations. The NPS has completed studies to assess the potential impacts of infrastructure, operations, and visitor use on the condition and health of the ecosystem. Studies also assessed the condition of cultural resources, the condition of existing facilities and infrastructure, visitor access and use patterns, and traffic flow at South Entrance. Based on these studies, actions are needed to ensure the long-term ecological health of the Mariposa Grove and address the following issues:

- Water availability is important for giant sequoia survival and regeneration. Roads, trails, and other infrastructure disrupt the natural hydrologic functioning of the Grove, reducing the infiltration of water into soils, and in some instances diverting water outside the Grove watershed.
- Infrastructure concentrated in the lower portion of the Grove encroaches on individual giant sequoias and their roots, and reduces habitat for giant sequoia propagation. This infrastructure includes a paved roadway, a 115-space parking lot, a commercial tram staging area and tram ticket booth, generators, a comfort station, and a gift shop.
- Ongoing pedestrian and vehicle traffic throughout the Grove damages giant sequoia bark and trunks, leads to soil compaction, and exposes shallow giant sequoia roots, stressing the trees and potentially making them less resilient and more susceptible to external threats such as disease, wildfire, and climate change.
- A deteriorated water treatment, storage, and distribution system in the upper part of the Grove is leaking thousands of gallons of chlorinated water per day, and may be affecting shallow hydrology and local vegetation.

Current factors affecting the quality of the visitor experience include the following:

- Wayfinding information is insufficient to orient visitors upon arrival at the Grove and on trails within the Grove.
- Poor road conditions between the South Entrance and the lower Grove area contribute to seasonal closures, limit vehicle types, and are a safety concern for visitors and park employees.
- The Grove parking lot often fills early in the day, forcing temporary closures of the lot and Mariposa Grove Road, and causing visitor frustration as visitors are redirected to limited overflow parking at South Entrance or to Wawona to await a shuttle to return to the Grove.
- Long lines form at the South Entrance station kiosks and intersection as visitors attempt to get information, find parking, or turn around due to Grove parking lot and road closure.
- Shuttles from Wawona to the Grove are often already full when they arrive at the South Entrance shuttle stop, limiting boarding and increasing visitor wait times.
- Trails and facilities in and around the Grove need improvements to reduce grades and/or increase connectivity to provide better universal accessibility.
- Operation of the commercial tram within the Grove creates vehicle/pedestrian conflicts along the loop road, and intrudes on the experience of pedestrian visitors seeking to enjoy the majestic setting and natural soundscapes, particularly in the upper, more remote areas of the Grove.
- The vault toilets in the lower part of the Grove are inadequate and not fully accessible, and are the source of nuisance odors that detract from the Grove experience.
- The historic comfort station and the associated septic system and leach field in the upper Grove area should address accessibility, water-use efficiency, and maintainability goals.
- Historic features at Wawona Point, including the masonry overlook wall, steps, and railing, are in disrepair and require repair to meet current standards.

With the exception of Alternative 1, No Action, each of the alternatives meets the project purpose and need of the plan to varying degrees and in different ways. All alternatives would retain the

existing visitor use levels of a typical day in the Mariposa Grove, though visitor use would concentrate in different areas. The daily visitor use level proposed in the *Mariposa Grove FEIS* approximates the visitor use levels established for the Mariposa Grove in the 1980 GMP for Yosemite National Park (3,850 visitors per day).

GOALS PRESCRIBED IN THE *GENERAL MANAGEMENT PLAN FOR YOSEMITE*

Specific direction in the *GMP* for management of the Grove is outlined in Appendix A. The management goals identified in the GMP (NPS 1980a) for the Mariposa Grove of Giant Sequoias include the following:

- Retain the Grove as the primary park location for visitor enjoyment and interpretation of giant sequoias
- Provide only those visitor facilities consistent with preservation of the giant sequoia ecosystem, and remove all other facilities not necessary for visitor enjoyment of the resource
- Upgrade facilities to eliminate resource impacts and meet current standards

PROJECT-SPECIFIC GOALS

Additional project-specific goals for the protection, restoration, and enjoyment of Mariposa Grove are summarized as follows:

Natural Resources

- Protect and restore giant sequoia habitat and associated wetlands
- Protect special status wildlife and plant species
- Protect air and water quality and natural soundscapes

Cultural Resources

- Protect and maintain historic buildings, structures, and cultural landscapes, including the giant sequoia trees
- Protect and stabilize prehistoric and historic archeological sites
- Sustain and interpret traditional cultural resources

Sustainability, Durability, and Efficiency

- Incorporate sustainable practices
- Improve efficiency and maintainability of park infrastructure
- Optimize constructability

Visitor Experience

- Improve visitor education
- Improve orientation and wayfinding within the Grove
- Provide options for quality visitor access to the Grove
- Upgrade visitor facilities

Public and Employee Health, Safety, and Welfare

- Enhance universal access and design
- Improve visitor and park/concessioner staff safety

ECOLOGICAL RESTORATION GOALS AND OBJECTIVES

The long-term preservation of giant sequoias depends on mitigating and minimizing the adverse influences of human activities. In the past 40 years, managers across the Sierra Nevada have sought to remove infrastructure (such as the large restoration project in Giant Forest of Sequoia National Park) and to restore natural fire regimes and hydrologic connectivity within giant sequoia groves. This ecosystem approach centers on three key management goals (Piirto and Rogers 1999):

- Protect naturally occurring groves from human impacts (e.g., infrastructure, logging) and disturbances outside the natural range of variability (e.g., stand-replacing fire)
- Preserve the groves by promoting natural ecosystem processes and allowing them to prevail
- Actively restore altered ecosystem functions, particularly fire and hydrology

The overarching goals of ecological restoration in the Mariposa Grove are to promote giant sequoia germination and establishment and ensure the persistence and longevity of the giant sequoia population. To achieve these goals, a combination of restoration actions would provide the best means of achieving the following ecological restoration objectives:

- Protect, maintain, and enhance environmental conditions and ecosystem function required to sustain the population of giant sequoias
    - Ensure germination and recruitment through frequent surface fires
    - Create and maintain canopy gaps to facilitate giant sequoia germination and recruitment
    - Conduct prescribed burning outside of the Mariposa Grove to reduce the risk of a catastrophic fire originating outside of the Grove
    - Protect individual trees and seedling habitat from structural damage caused by roads, trails, utilities, and visitor trampling
- Protect, maintain, and restore natural hydrologic functions in the Mariposa Grove of Giant Sequoias
    - Remove or modify infrastructure that impacts sheet flow hydrology
    - Where roads and trails remain, remove inside ditches, outslope cutbank areas, and repair, replace, or install culverts to facilitate surface flow
    - Protect and restore wetlands
- Restore areas impacted by the removal, alteration, or relocation of buildings or infrastructure to natural conditions
- Maintain and manage structure and composition of native vegetation within the range of natural variability so that the vegetation functions dynamically over a long-term time frame (50-100 years)
    - Continue prescribed burning and modify as needed to reach target forest conditions
    - Retain large snags for wildlife habitat
    - Continue invasive plant removal in and around the Grove

By removing non-essential buildings and infrastructure; protecting the roots of giant sequoias from impacts of roads, trails, and foot traffic; removing impediments to natural surface and subsurface water flow; and restoring a more natural fire regime (augmented by prescribed fire as necessary), the NPS can effectively preserve, protect, and restore the rare ecosystem of the Mariposa Grove.

POLICY AND PLANNING CONTEXT

The NPS developed the alternatives considered in the *Mariposa Grove FEIS* in accordance with public laws, treaties, proclamations, executive orders, regulations, and directives of the Secretary of the Interior and the Assistant Secretary for Fish and Wildlife and Parks. The NPS Organic Act, passed by the U.S. Congress in 1916, provides fundamental management direction for all units of the National Park System. The Organic Act requires that the NPS "shall promote and regulate the use of …national parks…by such means and measures as conform to the fundamental purpose of the said parks….which purpose is to conserve the scenery and natural and historic objects and the wildlife 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." Fragile ecosystems such as that of the giant sequoia warrant special care if the groves are to survive and thrive.

Congress amended the Organic Act with the 1970 General Authorities Act, which affirms that all of the nation's parks—whether they include natural, cultural or historic resources—are united under the mission, purpose and protection of the Organic Act. The 1978 Redwood National Park Expansion Act also amended the Organic Act, re-affirming the mandate and directing the NPS to manage park lands in a manner that would not degrade park values. In addition, federal management decisions must be consistent with national laws, including NEPA, NHPA, the Endangered Species Act, and the Clean Water Act. The following laws and policies are most relevant to this planning process.

Federal Statutes and Executive Orders

- National Park Service Organic Act (1916)
- National Park Service General Authorities Act (1970)
- National Environmental Policy Act (1969)
- National Historic Preservation Act (1966), as amended
- Clean Water Act (1972)
- Clean Air Act (1970), as amended
- Endangered Species Act (1973)
- Migratory Bird Treaty Act (1918)
- Wild and Scenic Rivers Act (1968), as amended
- Archaeological Resources Protection Act (1979)
- Native American Graves Protection and Repatriation Act (1990)
- American Indian Religious Freedom Act (1978)
- Rehabilitation Act (Section 504) (1973)
- Architectural Barriers Act (1968), as amended
- Executive Order 11593: Protection and Enhancement of the Cultural Environment
- Executive Order 13007: Indian Sacred Sites
- Executive Order 13514: Federal Leadership in Environmental, Energy, and Economic Performance
- *Architectural Barriers Act Accessibility Standards for Federal Facilities* (GSA 2006)
- *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 1995)

National Park Service Policies, Guidance, and Directors Orders

- *Management Policies 2006* (NPS 2006)
- *Guiding Principles of Sustainable Design* (NPS 1993)
- Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS 2001)
- Director's Order 28: *Cultural Resource Management* (NPS 1998)
- Director's Order 42: *Accessibility for Visitors with Disabilities in National Park Service Programs and Services* (NPS 2000a)
- Director's Order 77-1: *Wetland Protection* (NPS 2002)

Yosemite National Park Plans

- *General Management Plan* (NPS 1980a)
- *Fire Management Plan* (NPS 2004a)
- *Scenic Vista Management Plan* (NPS 2011)
- *A Sense of Place: Design Guidelines for Yosemite National Park* (NPS 2012)
- *Cultural Landscapes Inventory, Mariposa Grove* (NPS 2004b)
- *Cultural Landscapes Inventory, South Entrance Station* (NPS 2004c)
- *Self Evaluation and Transition Plan, Yosemite National Park Accessibility Program* (NPS 2010a)

Laws, policies, and plans that relate to specific resources or impact topics (e.g., vegetation) are identified in the respective sections in Chapter 3: Affected Environment and Environmental Consequences.

INTERRELATIONSHIPS WITH OTHER PLANS AND PROJECTS

In addition to the complex legal framework of the *Mariposa Grove FEIS*, the following Yosemite-specific plans play a strong role in the planning framework.

Concession Services Plan (1992). This plan supplements the 1980 *General Management Plan for Yosemite National Park*. Revisions to certain concession services action items of the General Management Plan are described, and the environmental consequences of those items are evaluated. The final plan reduced overall lodging, replaced lodging at Yosemite Lodge with economy cabins and cottages rather than motel units, retained 150 tent cabins at Curry Village (rather than 100), and increased food service seats, among other actions.

***Fire Management Plan* (2004)**. This plan guides a complex fire management program, which oversees 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. Actions prescribed in the *Fire Management Plan* will help achieve natural resource goals of the *Mariposa Grove/FEIS*.

General Management Plan for Yosemite (1980). The GMP, as amended by the 1992 *Concession Services Plan*, is the overall management document for Yosemite National Park. The GMP directs the NPS to "Retain [the Mariposa Grove] as the primary location within the park for visitor enjoyment and interpretation of the giant sequoia. Provide only visitor facilities consistent with

preservation of the unique ecosystem; remove all other facilities not necessary for visitor enjoyment of the resource." The *Mariposa Grove Plan FEIS* is consistent with this overall GMP direction for the Mariposa Grove area.

The GMP directs a number of specific actions for the Mariposa Grove. The *Mariposa Grove FEIS* is consistent with most of these specific actions and it would amend several specific actions. Actions that are consistent with the GMP include: accommodate the physically disabled, repair and reconstruct trails, remove the 150-car parking lot, convert the existing bus parking area to shuttle turn-around and off-season parking for the Grove, remove the gift shop, and upgrade physical facilities (toilets). Actions that amend the GMP are described in Appendix A.

***Draft Merced Wild and Scenic River Comprehensive Management Plan* (*Merced River Plan*) (in progress).** The *Merced River Plan* proposes transportation and transportation facility actions in Wawona. It also proposes public transit opportunities for visitors traveling from Fresno, California to Wawona and beyond. The options proposed in the *Merced River Plan* are integrated into planning for the *Mariposa Grove FEIS*. For example, facility and shuttle operations are being designed to accommodate anticipated public transit operations outlined in the *Merced River Plan*.

***Invasive Plant Management Plan Update* (2011).** This plan updates the *2008 Invasive Plant Management Plan* to create a more comprehensive and adaptive plan for protecting Yosemite's natural and cultural resources from non-native, invasive plants.

Appendix B: Cumulative Actions describes additional plans related to the *Merced River Plan/DEIS*.

ISSUES AND CONCERNS IDENTIFIED IN SCOPING

The NPS sought to understand and consider input from the public, NPS staff, subject-matter experts, American Indian tribes and groups, and other federal, state, and local agencies, as part of the planning process for the *Mariposa Grove FEIS*. The NPS conducted an open process, referred to as "scoping," to identify and determine the scope of issues to be addressed in the environmental analysis. The public scoping period for the *Mariposa Grove /EIS* was conducted from August 31, 2011, through February 3, 2012. During the public scoping period, the NPS collected written comments and conducted public open houses (see Chapter 4, Consultation and Coordination). Internal scoping, including consultation with traditionally associated American Indian tribes and groups, other public agencies, and park staff, continued throughout the planning process.

During the public scoping period, the park received 43 letters from 41 individuals and 2 organizations. Analysis of these letters identified 126 discrete substantive comments, from which the following 15 issue statements were generated:

- Concern #1: Existing visitor amenities at the Grove are adversely affecting the giant sequoia trees.
- Concern #2: Continue prescribed fire; it is vital to maintaining the health of the Grove.
- Concern #3: Long-term sustainability of the health of the Grove ecosystem is important and should be considered in the management of the Grove.
- Concern #4: The Grove parking lot often fills to capacity, forcing temporary closures of the parking lot and road.

- Concern #5: The Grove parking lot and its associated noise and traffic diminish the visitor experience.
- Concern #6: Information and signage are inadequate to properly orient visitors when traveling to the Grove, upon arrival at the Grove, and within the Grove.
- Concern #7: Vehicle operation on Grove roads adversely impacts the visitor experience.
- Concern #8: Grove accessibility should be improved for visitors with disabilities.
- Concern #9: Additional recreation opportunities should be provided at the Grove.
- Concern #10: Protect the Grove by limiting/managing visitation.
- Concern #11: Road configuration, pedestrian crossings, and access at South Entrance are unsafe for visitors and staff.
- Concern #12: Inadequate parking at the Grove contributes to long shuttle rides and traffic congestion at South Entrance.
- Concern #13: Noise from vehicle traffic and commercial tram audio presentations is adversely affecting the Grove's soundscape.
- Concern #14: The bathroom facilities are inadequate.
- Concern #15: The Mariposa Grove planning process is not integrated with other park planning efforts.

The NPS used the public and internal scoping comments to identify issues and concerns, develop and refine alternatives, and evaluate potential environmental impacts.

DOCUMENT ORGANIZATION

The *Mariposa Grove FEIS* is organized as follows:

Chapter 1, Purpose and Need – The first chapter includes a discussion of the significance of the Mariposa Grove of Giant Sequoias, the purpose of and need for the proposed action, the relationship to laws and other plans, input from the consultation and public involvement process, and issues used to inform the plan.

Chapter 2, Alternatives – This chapter presents the four alternatives proposed in the *Mariposa Grove FEIS*: three action alternatives and one No-Action Alternative. It also discusses alternatives considered but dismissed.

Chapter 3, Affected Environment and Environmental Consequences – This chapter describes the existing environment that could be affected by implementation of the alternatives. It also analyzes the potential impacts that could result from implementation of each alternative.

Chapter 4, Consultation, Coordination, and Preparers – This chapter summarizes the consultations undertaken in the preparation and review of this document, including public involvement, and lists the names and qualifications of the individuals who have contributed to this document.

Chapter 5, Bibliography – This chapter lists the references cited in this document.

Appendices – The appendices are as follows:

Appendix A: Amendments to the General Management Plan
Appendix B: Cumulative Actions
Appendix C: Public Comments and Responses
Appendix D: Restoration Plan
Appendix E: Mitigation Measures
Appendix F: Draft Statement of Findings for Protection of Wetlands
Appendix G: Draft Memorandum of Agreement



Chapter 2: Alternatives

CHAPTER 2: ALTERNATIVES

INTRODUCTION

This chapter presents the four alternatives (including a preferred alternative) proposed in the *Restoration of the Mariposa Grove of Giant Sequoias/Final Environmental Impact Statement* (*Mariposa Grove FEIS*). These alternatives represent a range of management approaches, each of which would achieve the goals of the project, as required by the National Environmental Policy Act (NEPA). Each of the action alternatives is a comprehensive proposal to meet the goals of restoring degraded giant sequoia habitat and the natural processes critical to the long-term health of the Grove, and to improve the overall experience for visitors (see Chapter 1: Purpose and Need). The No Action Alternative represents a continuation of current management practices and provides a basis to compare differences among the alternatives.

This chapter includes the following:

- A description of the Choosing by Advantages process which guided alternative development (pages 2-2 to 2-4)
- A description of each alternative (pages 2-5 to 2-30)
- Alternatives considered but dismissed from further analysis (pages 2-31 to 2-33)
- The environmentally preferred alternative (pages 2-33 to 2-35)
- Cost estimates associated with implementing the alternatives (page 2-36)
- A summary comparison of the alternatives (Table 2-2)
- A summary of potential impact and restoration footprint areas (Table 2-3)

CHANGES BETWEEN THE DRAFT AND FINAL ENVIRONMENTAL IMPACT STATEMENT (EIS)

The National Park Service (NPS) issued the *Restoration of the Mariposa Grove of Giant Sequoias/Draft Environmental Impact Statement* (*Draft EIS*) to the public in February 2013. In response to the comments received on the *Draft EIS* and new technical information, the NPS revised Alternative 2 (the agency-preferred alternative) and Alternative 4 of the *Mariposa Grove Final EIS*. Alternatives 1 and 3 remain the same as in the *Draft EIS*. The process of comment analysis is described in Chapter 4 (Consultation, Coordination, and Preparers). Written responses to public concerns are located in Appendix C, Public Comments and Responses. The following revisions to the Draft EIS are integrated into the *Mariposa Grove Final EIS*:

1. Reconfigure facilities at the South Entrance hub to accommodate 26 additional parking spaces (from 269 in the *Draft EIS* to 295 in the final plan), including flex-spaces to accommodate oversize vehicles. **Rationale for change:** The increased capacity of the parking lot would ensure that the proposed facility accommodates existing levels of visitation.
2. Provide an off-season overflow parking lot along the Mariposa Grove Road near the picnic area. New analysis showed that the 50-car lot proposed in the *Draft EIS* would not be sufficient to accommodate use when the shuttle is not in operation. **Rationale for change:**

Parking near the picnic area would provide additional parking in close proximity to the Mariposa Grove when the shuttle would not be operating.

3. Increase the size of the buried water tank at the South Entrance. **Rationale for change:** The increased size of the water tank would better accommodate anticipated water needs for consolidation of visitor services at the South Entrance.
4. Explore additional options for the location of the septic system and leach field at the South Entrance. **Rationale for change:** New geotechnical data indicated that soil conditions might not be conducive for the layout and size of the leach fields identified in the *Draft EIS*. Final locations for the septic system and leach fields will be based on continuing geotechnical investigations and soil surveys. The range of options in the Final EIS includes flush toilets, vault toilets, options for leach field sites, and an option to install a sewer line from the lower Grove area to the South Entrance, all within the project area identified in the plan.

In addition to these changes, the Final EIS was edited to improve clarity and add detail in response to public comments, primarily in Chapters 2 and 3.

ALTERNATIVES

The *Mariposa Grove FEIS* describes and analyzes four alternatives: a No Action alternative that represents the continuation of existing conditions and management, and three action alternatives. All the action alternatives propose ecological restoration activities, selected utility repairs or upgrades, and rehabilitation of historic features at Wawona Point, although the alternatives differ in the buildings and infrastructure proposed for removal and relocation. Initial design concepts for the restoration of the Grove were formulated during three design charettes that were held in January, March, and May of 2012. NPS and regional staff representing various technical disciplines, as well as the contracted designer and compliance staff, participated in the charettes. Resource issues and concerns were identified based on research and baseline data documenting the existing conditions within the Grove. Park staff, assisted by the designers, identified numerous potential solutions. These concepts were iteratively assessed and improved, resulting in five preliminary alternatives. A Choosing by Advantages (CBA) workshop, including a value analysis component, was held in June 2012 and resulted in the selection of the alternatives for detailed analysis in this EIS. These sessions were augmented by a separate value analysis for design alternatives to reconfigure the intersection of Wawona Road (State Route 41) and the Mariposa Grove Road that was held in July 2012.

CHOOSING BY ADVANTAGES/VALUE ANALYSIS WORKSHOPS

Three design charettes were conducted in January, March, and May of 2012 with the project team, which included Yosemite National Park staff and management, NPS Pacific West Region staff, and contractors. A wide variety of concepts for restoring the ecology of the Mariposa Grove of Giant Sequoias and improving the visitor experience were considered. A CBA workshop was held in El Portal on June 5-6, 2012. The CBA process is a ranking process that is based on the relative advantages and costs of each alternative in accomplishing servicewide goals and objectives. Through the CBA process, alternatives for the Mariposa Grove restoration effort were evaluated to determine which should be carried through the EIS-level of analysis. The alternatives considered during the CBA process included Alternative A (No Action) and five action alternatives that emerged from the design charettes, as follows:

- Alternative B: South Entrance Hub
- Alternative C: Grizzly Giant Hub

- Alternative D: Lower Grove Hub
- Alternative E: South Entrance Hub II (included removal of commercial tram, communications tower, and road within the Grove)
- Alternative F: South Entrance Hub III (included limited commercial tram access)

Following the CBA workshop, the NPS recommended refinement of Alternatives B, E, and F, in addition to the no-action Alternative A, for analysis in the EIS. During the park's reconsideration phase, these three action alternatives were further developed and refined. With the public comment received during an open house in June 2012 and further staff analysis and discussion, the NPS concluded that Alternative E, without removal of the commercial tram road too closely resembled Alternative B, and that Alternative C provided different approaches to meeting the purpose and need and should be fully assessed in the Draft EIS. Alternative D did not adequately meet the project purpose and need. Alternatives B, C, and F are evaluated in this EIS as Alternatives 2 (South Entrance Hub), 3 (Grizzly Giant Hub), and 4 (South Entrance Hub with Modified Commercial Tram Service), respectively.



Figure 2-1 – Choosing by Advantages Workshop

A separate value analysis workshop was held on July 19, 2012, to identify and rank possible designs for an improved Wawona Road/Mariposa Grove Road intersection at South Entrance. The workshop objective was to ensure consideration of a range of proposals, and to ensure that the project satisfied the park's needs with the lowest impact on resources in the context of criteria that relate directly to NPS service-wide goals and objectives.

The highest ranked option to address issues at the Wawona and Grove roads intersection was the planned kiosk expansion, as represented in the No Action alternative. If vehicular back-ups continue at the intersection after the kiosk improvements, and extend to the kiosks over a sustained period, the park could implement the roundabout option, which was the second highest ranked intersection option. An optimized roundabout is proposed as an option in Alternative 2: South Entrance Hub. This option has several advantages over the current T-intersection design in terms of traffic capacity and safety but is associated with additional costs. A modified T-intersection is incorporated into Alternative 4: South Entrance Hub with Modified Commercial Tram Service. This option had the lowest score and lowest benefit-to-cost ratio.

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ALTERNATIVE 1: NO ACTION

Under Alternative 1, No Action, the lower Mariposa Grove area would continue to serve as the primary arrival and departure point and contact area for visitors to the Grove. Existing buildings and infrastructure in the Grove and at South Entrance would remain. These include the Grove parking lot, the paved commercial tram loop road, tram staging, the concessioner-operated gift shop, Wawona Point overlook features and communications equipment, comfort stations, the Mariposa Grove Museum, and utilities infrastructure (figures 2-2 through 2-4). Under this alternative, compliance with regulatory requirements (e.g., health and safety or historic preservation) or strategies in current and future adopted plans would be implemented over time.

Individual giant sequoia trees as well as sequoia habitat would continue to be impacted by buildings, roads, utilities, and other infrastructure that are adversely impacting tree roots and regeneration, soils, and hydrologic flow. Paved roads, in-sloped trails, and damaged and insufficient culverts would continue to impede sheet flow and divert water from the Grove, and denuded and compacted soils would continue to limit water infiltration and giant sequoia seedling germination. Plugged culverts would be cleaned as part of routine maintenance; however, additional and/or larger culverts would not be installed. The deteriorating water supply system would continue to leak, and the water storage tank and chlorination unit would remain along the upper Grove loop road (figure 2-2), and continue to require maintenance vehicle access. The gift shop, its diesel-powered generator, and the visitor parking lot would remain in place, and the poorly functioning vault toilets would remain at the entrance to the Grove. Park and concessioner operations and overall management of Mariposa Grove would continue as is, including commercial tram staging and operation in and around sensitive natural resources. Facilities and trails would have limited accessibility.

Currently, there is limited parking at South Entrance (~20 spaces) and the Grove (115 spaces, of which 2 are designated for accessible use, as shown in figures 2-2 and 2-4). When the Grove parking lot capacity is reached and the Mariposa Grove Road closes (most commonly during peak season from Memorial Day to Labor Day), visitors attempting to access the Grove are directed to Wawona (over 100 spaces during peak use) by staff at South Entrance. At Wawona, visitors can park and take a free shuttle bus to the Grove. The headways for the park's shuttle service from Wawona average about 15 minutes with stops at South Entrance and Mariposa Grove. This process results in backtracking and considerable visitor frustration; some visitors may decide against visiting the Grove given the time and effort required to reach that destination.

Under Alternative 1, staff would continue to redirect potential Grove visitors to Wawona to take the shuttle when parking areas are full. At present, Wawona is a staging area for the Grove when the Grove and South Entrance parking areas are full. At Wawona, personal vehicles and commercial buses park along the road and in the parking lot for the market and the Pioneer Yosemite History Center to catch shuttles for visitors wanting to go to the Grove. Concessioner staff would continue to provide traffic control at the Mariposa Grove Road gate and the Grove parking lot. While the separate project to relocate the South Entrance kiosks is in-progress, and is expected to alleviate some traffic congestion and confusion in the area, Mariposa Grove visitors may continue to experience occasional backups from the kiosk to the park boundary (figure 2-3).

Accessibility

Under the no-action alternative, visitors with limited mobility can experience the giant sequoias and other remarkable natural and cultural resources in the Mariposa Grove by taking a commercial tram tour, or by following the tram tours in a placarded vehicle (i.e., a vehicle displaying a state-issued license plate, a state-issued accessible parking permit, or a temporary Yosemite-issued parking permit). The other universally accessible facilities in the lower Grove area include two parking spaces and eight vault toilets. In the upper Grove area, the museum is accessible for vehicles parked in the immediate vicinity. Within the Grove, the existing bus drop-off area, parking, and trails do not meet current accessibility standards.

Actions Common to All Action Alternatives

A set of the proposed actions to address the purpose and need for this effort are common to all action alternatives (Alternatives 2, 3, and 4). This section describes these common actions to avoid redundancy in the sections that follow.

Remove Existing Parking from the Lower Grove Area and Restore Habitat – All action alternatives call for the removal of the existing Grove parking lot and the restoration of giant sequoia habitat in the lower Grove area. This would entail removing asphalt, decompacting soils, and revegetating with understory plants through propagules and seeding. The restoration plan for Mariposa Grove is included as Appendix D.

Improve Orientation and Way Finding – Comments received during public scoping and from park staff indicated that orientation and way-finding signage at the entrance and within the Grove could be improved. All action alternatives would include additional signage where needed to provide clearer orientation, interpretation, and direction to visitors upon arrival at the South Entrance to the park and at Mariposa Grove.

Rehabilitation of Wawona Point – All action alternatives call for rehabilitation of historic features at Wawona Point. Wawona Point provides a scenic vista of the western edge of the park and the South Fork Merced River valley, stretching toward the Sierra Nevada foothills and the Central Valley beyond. Historic rehabilitation would include repair of rock work, steps, paths and railings, and removal of remnant asphalt pavement in what was historically a parking area at the summit. Ecological restoration activities would include revegetation of denuded areas and where pavement is removed.

Engineered Hydrology and Road Improvements – All action alternatives include the repair or replacement of drainage culverts and the grading/outsloping of roads and trails within the Grove to promote unimpeded sheet flow and infiltration of snowmelt and rainwater. The improvements would reduce channelization and erosion, and would correct flow barriers that currently divert water both within the Grove and from the Grove watershed entirely. Routine inspection and maintenance would be required to keep culverts clear of debris and sediment.

Removal of Gift Shop from Lower Grove Area – Under all action alternates, the existing concessioner-operated gift shop and the associated diesel-powered generator would be removed from the lower part of the Grove. The gift shop building is an intrusion on the natural setting and the generator is a source of noise and air emissions.

Repair of Water Supply Pipeline – All action alternatives would include relocation of the water treatment and storage units in the upper Grove area, and repair or replacement of the associated

leaking water distribution piping. The distribution system conveys spring water from Biledo Meadow, located east of Mariposa Grove on U.S. Forest Service land, through the upper Grove area, and to Mariposa Grove and South Entrance facilities. The pipeline is leaking chlorinated water, and may be affecting local hydrology and vegetation. The NPS would conduct a Wilderness Minimum Analysis Requirement for all actions within Wilderness.

Structural and Utility Sustainability Improvements – All action alternatives would relocate facilities and functions that do not contribute to the historic significance of the Grove to areas outside of sensitive giant sequoia habitat and wetlands.

For relocated facilities, actions would be undertaken in accordance with the National Park Service *Guiding Principles of Sustainable Design* (1993) and *A Sense of Place – Design Guidelines for Yosemite National Park* (2012). These principles include the orientation of buildings to optimize seasonal solar exposures and to minimize the effects of prevailing winds, design that incorporates the use of natural ventilation, energy-efficient lighting, and the installation of energy- and water-efficient fixtures and utilities.

Commercial Bus Tours – In the future, the NPS may need to institute a permit reservation system for commercial tour buses, if demand exceeds the capacity of the septic system or commercial bus parking spaces.

Grove Vicinity Fire Management – All action alternatives would include continued mechanical thinning and prescribed fire as prescribed in the *Fire Management Plan* (NPS 2004a). Though fire management activities such as these have been occurring within the Grove since the early 1970s, heavy buildup of surface fuels and dense understories are widespread in forested areas around the Mariposa Grove. Planned fire management activities under the current *Fire Management Plan* (NPS 2004a) include mechanical thinning of trees smaller than 20 inches in diameter at breast height (excluding sequoias and black oaks) and prescribed fire in units to the south, east, and west of the Grove. Implementation of planned fire management activities south and west of the Grove to the park's boundary with the Sierra National Forest would help mitigate the risk of a catastrophic crown fire reaching the Grove, as these areas are upwind of the Grove (i.e. the prevailing winds are southwesterly).

Universal Accessibility – Each of the action alternatives would extend opportunities for universal access and enjoyment of resources within the Mariposa Grove. The action alternatives would include construction of universally accessible transportation hubs and comfort stations in accordance with applicable policies and guidance. Each would also include a universally accessible trail through the lower portion of the Grove, which would greatly enhance natural quiet and opportunities for solitude and quiet contemplation away from roads. Facilities and trails would be designed to assure that paths of travel, viewpoints, benches and interpretive signage offer all visitors a quality and meaningful experience while in the Grove.

Universally accessible facilities would comply with Architectural Barriers Act Accessibility Standards (ABAAS) and NPS *Director's Order 42: Accessibility for Visitors with Disabilities in National Park Service Programs and Services.* The design of universally accessible trails is guided by the Accessibility Guidelines for Outdoor Developed Areas.

Convert Southern Portion of the Upper Grove Loop Road to a Pedestrian Trail – All action alternatives would allow for the conversion of the southern portion of the currently paved historic loop road to a pedestrian trail. This portion of the loop has a remarkable density of giant sequoias and would be an exceptional pedestrian pathway.

Convert the Mariposa Grove Road from the Intersection with the Loop Road (near the Museum) to Wawona Point into a Hardened Pedestrian Trail – The segment of the Mariposa Grove Road extending from the intersection with the loop road in the vicinity of the Museum to Wawona Point would be converted into a hardened trail but would allow for occasional use by service vehicles, including those needing access to the telecommunications equipment located at Wawona Point.

Extend Footbridge – An existing non-historic pedestrian bridge in the vicinity of the Fallen Monarch would be removed and replaced with an extended footbridge to reduce impacts on stream flow.

Museum Building – The museum building would remain, however, its use as a primary interpretive facility would be moved to the new hub location under each action alternative. The museum building may be repurposed as a group hiker's shelter, meeting room, or other compatible use.

Improve Visitor Education and Interpretation – Interpretive signage in the Grove was updated in 2009. All action alternatives would implement further measures to better educate Mariposa Grove visitors with additional interpretive waysides, orientation, and informational exhibits and a visitor contact station. All action alternatives would include interpretation of historic and cultural uses in the Grove including American Indian traditional cultural resources and practices.

Monitor Project Success – Develop a monitoring plan prior to project implementation to define the target forest condition and metrics for evaluating the success of restoration efforts as well as defining targeted conditions for the visitor experience.

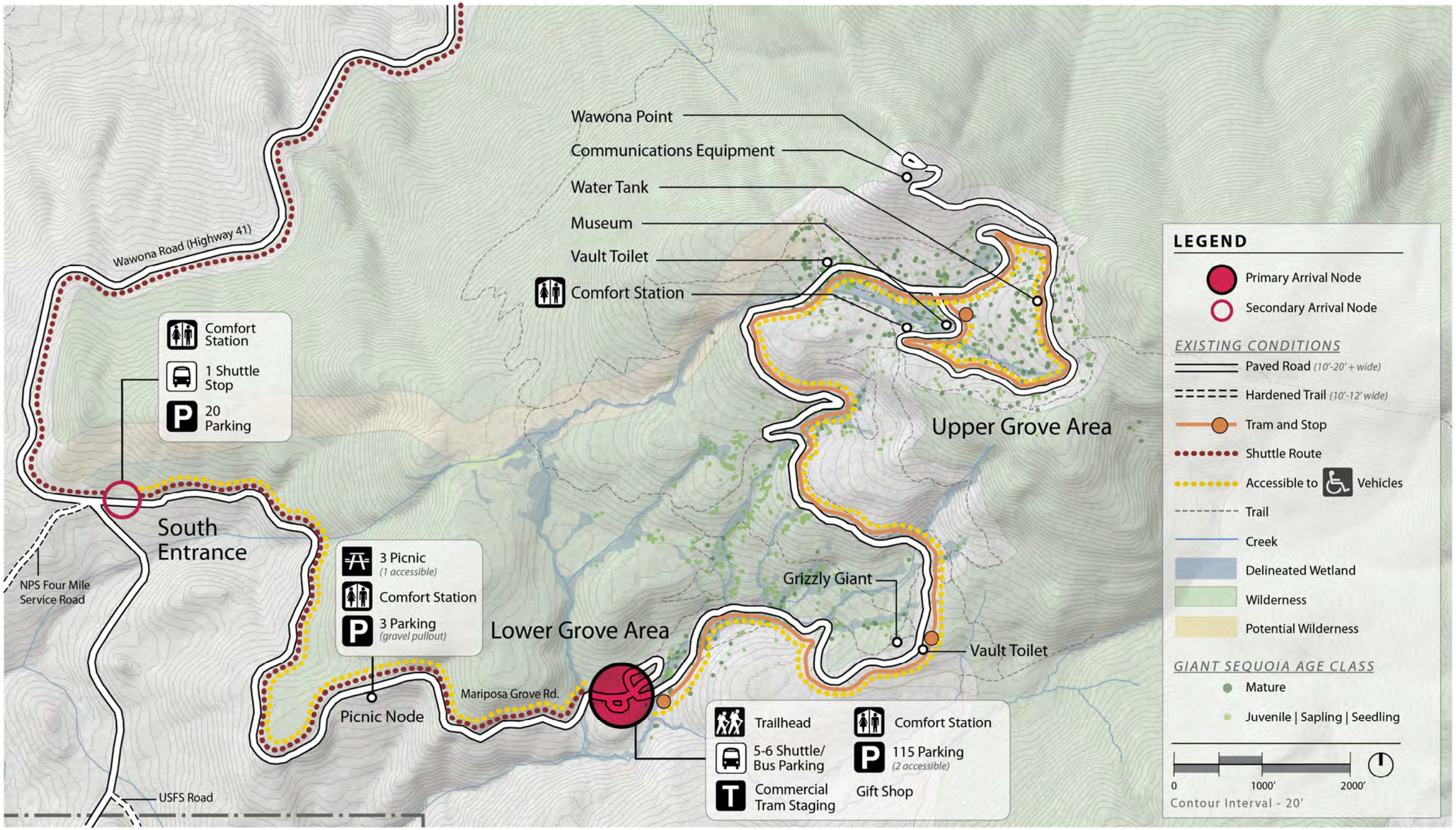


Figure 2-2 – Alternative 1: No Action

Source: Mithun 2013

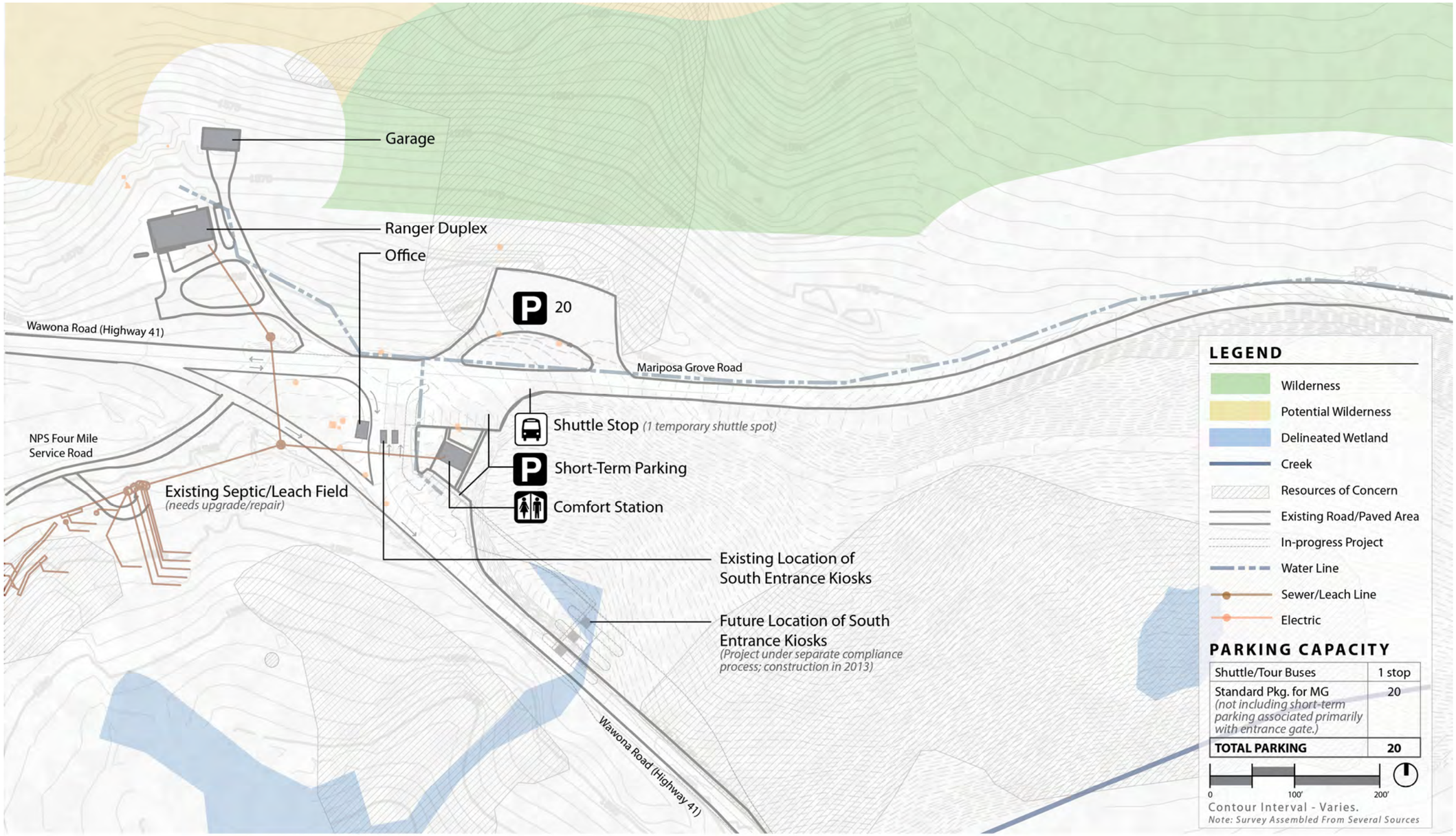


Figure 2-3 – Alternative 1: No Action – South Entrance Detail

Source: Mithun 2013

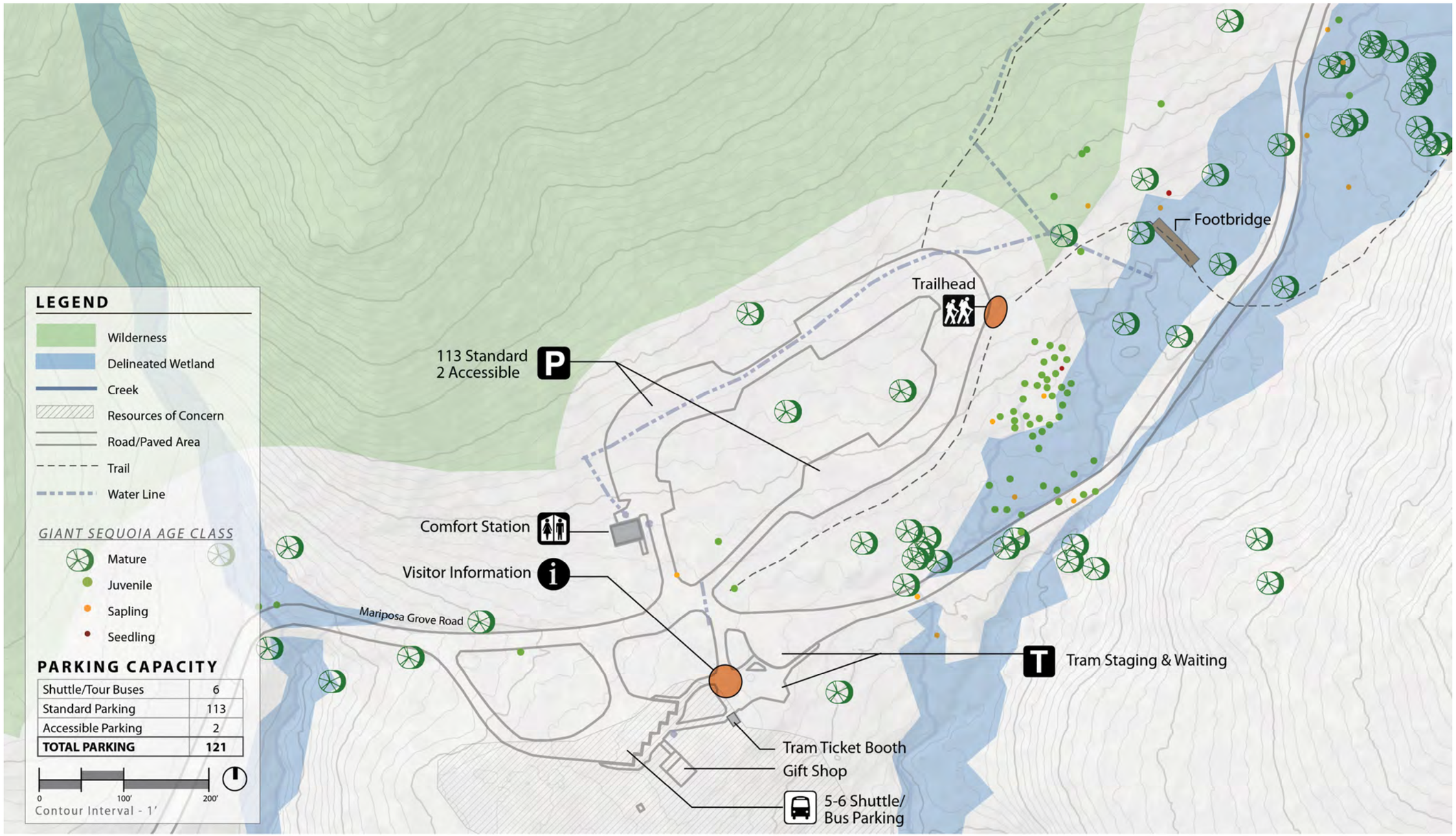


Figure 2-4 – Alternative 1: No Action – Lower Grove Area Detail

Source: Mithun 2013

ALTERNATIVE 2: SOUTH ENTRANCE HUB (PREFERRED ALTERNATIVE)

Alternative 2, South Entrance Hub, is the park's preferred alternative. Under this alternative, most public parking, the gift shop, and the concessioner-operated commercial tram staging area and tram operations would be removed from Mariposa Grove. Impervious surfaces within the Grove would be minimized, and all areas from which buildings or pavement would be removed and that are not slated for reuse would be ecologically restored natural habitat. Following removal activities, ecological restoration measures would include soil preparation (e.g., decompaction), surface contouring to match local topography, and planting the site with appropriate native vegetation. Visitor parking would be relocated to the park's South Entrance, which would serve as the primary transit hub and contact area for Grove visitors. New visitor services would be provided including visitor information and educational and other sales items. Removal of infrastructure from the lower Grove area, selective tree clearing, and development of accessible trails would allow for restoration of wetlands, soundscapes, and giant sequoia habitat, and would greatly enhance the importance of the lower Grove area and Grizzly Giant as a primary destination point for experiencing the sequoias within the Grove. An overview of the principal components of Alternative 2 is shown in figure 2-5, and details are depicted in figures 2-6 through 2-8.

The South Entrance area would be reconfigured as a hub with the main parking area for Mariposa Grove and a visitor contact area, as shown in figure 2-6. Parking at the South Entrance would be expanded from 20 spaces to a total of 295 standard, oversize, accessible, and shuttle/bus parking spaces. The size of the parking lot at South Entrance considers the proposed removal of 115 parking spaces from the lower Grove area as well as the relocation of shuttle parking in the vicinity of the Wawona store (over 100 vehicles during peak use periods). Parking capacity estimates for all of the action alternatives would accommodate the existing level of visitation at the Grove on high-use days.

A retaining wall may be constructed on the uphill side of the current South Entrance parking area to accommodate additional parking and allow for revegetation of the cut slope. A shuttle bus boarding and tour bus transfer area would facilitate visitor use of the park shuttle service to travel to the lower Grove area.

Commercial buses would stop at the South Entrance for visitor orientation, use of restrooms, and transfer to shuttles. Depending on facility capacity and shuttle operations, buses less than 40 feet long may drop off passengers in lower Grove area and park at South Entrance. To provide pedestrian access from the South Entrance to the lower Grove area, the segment of the abandoned Washburn Road alignment from the South Entrance to the Mariposa Grove Road picnic area would be cleared of vegetation and rehabilitated as a pedestrian trail. At least two trail bridges would be needed to cross streams, one in the vicinity of the parking area at South Entrance and one near the entrance to the Grove. Where the Washburn Road ends near the existing picnic area, a new trail would be constructed south of the Mariposa Grove Road from the picnic area to the lower Grove area (shown on figure 2-5). The total trail length between the South Entrance and the lower Grove area would be about 2 miles.

The shuttle service to the Grove would continue to operate between the South Entrance and the lower Grove area. A separate, limited schedule shuttle would connect visitors staying at Wawona, including the hotel and campground, with the South Entrance area where they would be able to catch a shuttle to the Grove. Outside of normal shuttle hours and during the shoulder seasons, when the shuttles are not running, visitors would be provided vehicular access to the lower Grove area where parking for 50-80 vehicles would be available in either the transit turn-around area or the picnic area along Mariposa Grove Road. The potential for early morning as well as late-day use of the spaces would be contingent upon the hours of shuttle operation. Only placarded or service

vehicles would be provided access to the Grizzly Giant. Traffic control related to the closure of the Mariposa Grove Road and lower Grove parking lot during periods of heavy visitation in the shoulder/winter season (typically weekends and on holidays) would continue. During these periods, visitors who are turned away when the lot is full in the Grove would be able to park at the South Entrance and walk into the Grove. When the lot is full, visitors would be directed to other areas of the park. Road closures because of snow conditions in the winter would continue.

The current tram ticketing and turn-around area in the lower Grove would be repurposed as part of a transit node which would also accommodate shuttle and school bus loading and unloading, and accessible parking for placarded private vehicles; these facilities would be located in the vicinity of the current development footprint (see figure 2-7). An accessible trail would be developed in the ecologically restored lower Grove area, and would require some vegetation clearing, grading, and surface hardening. Designated accessible parking spaces would be provided at both the lower Grove area and in the vicinity of the Grizzly Giant, but away from the existing giant sequoias. An accessible trail would be constructed connecting the Grizzly Giant with the proposed nearby accessible parking area (figure 2-8). Other trails would provide opportunities to experience the solitude of the giant sequoias in the upper Grove area.

The NPS is also exploring options for realigning the entrance to the Grove to enhance restoration efforts and straighten the existing tight curve near the giant sequoias in the vicinity of the Three Sentinels. This work would likely be completed in conjunction with the resurfacing of the Mariposa Grove Road between South Entrance and the Grove. **The** potential road realignment is shown on figure 2-7. The crossing over the creek (e.g., box culvert or bridge) would be relocated to improve safety, control erosion of the drainage channel, and avoid giant sequoias. Crossing design and construction would minimize impacts on nearby giant sequoias and wetlands.

Within the Mariposa Grove, the paved road between the Grizzly Giant and Wawona Point would be narrowed and maintained as a hardened trail for pedestrian use and limited service vehicle access. Service access is needed beyond the Grizzly Giant to maintain communications equipment at Wawona Point, and the comfort stations and leach field in the upper Grove area. The short section of road between the lower Grove area and the Grizzly Giant would be signed to encourage visitors to use the pedestrian trail instead of the road. This would help separate the pedestrians from the vehicles with accessible parking placards driving to the Grizzly Giant. The portion of the hardened trail to Wawona Point would undergo drainage improvements, including repair or replacement of existing culverts and minor grading to establish outsloping to improve surface sheet flow and reduce channelization and diversion of water outside the Grove watershed. To the maximum extent practicable, historic road prisms and materials would be retained.

The water supply treatment unit and storage tank currently located along the loop road would be relocated to in the vicinity of the intersection of the loop road and the road to Wawona Point to eliminate the need for maintenance vehicle access along that segment of the loop road. The loop road surfacing would be removed and a hiking trail constructed that would be between 4 and 8 feet wide (figure 2-5).

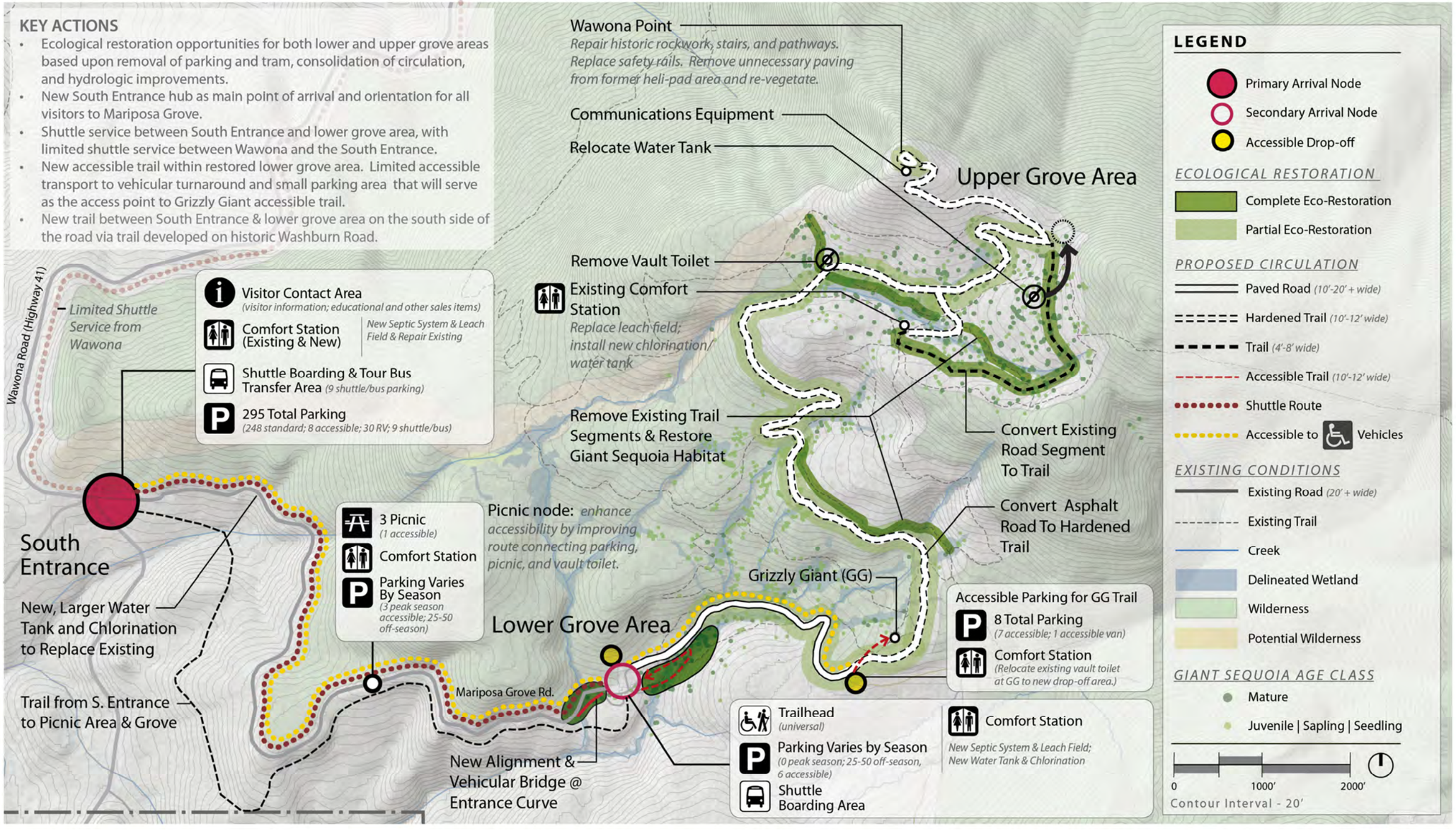


Figure 2-5 – Alternative 2: South Entrance Hub (Preferred Alternative)

Source: Mithun 2013

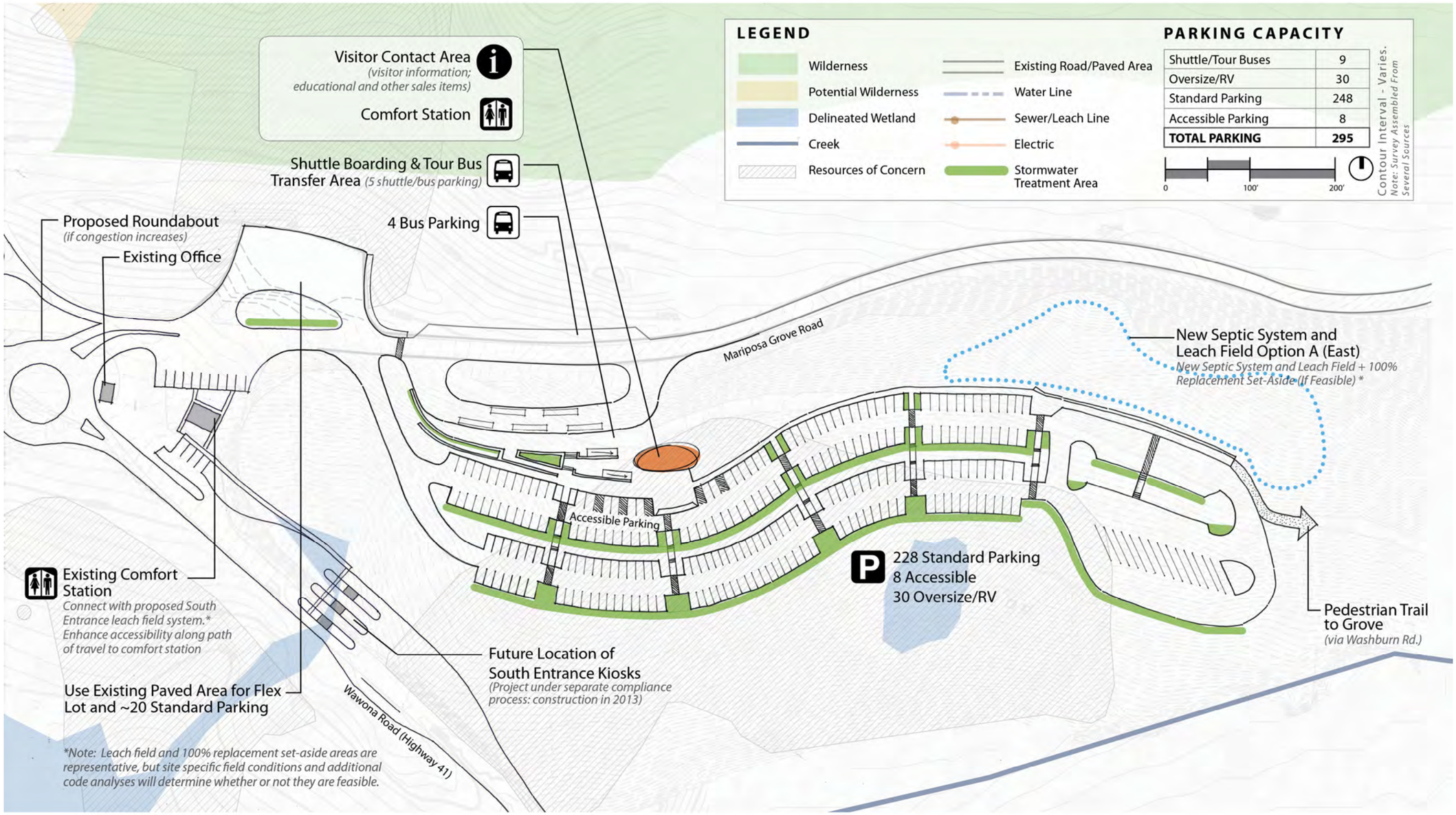


Figure 2-6 – Alternative 2: South Entrance Hub (Preferred Alternative) – South Entrance Detail

Source: Mithun 2013

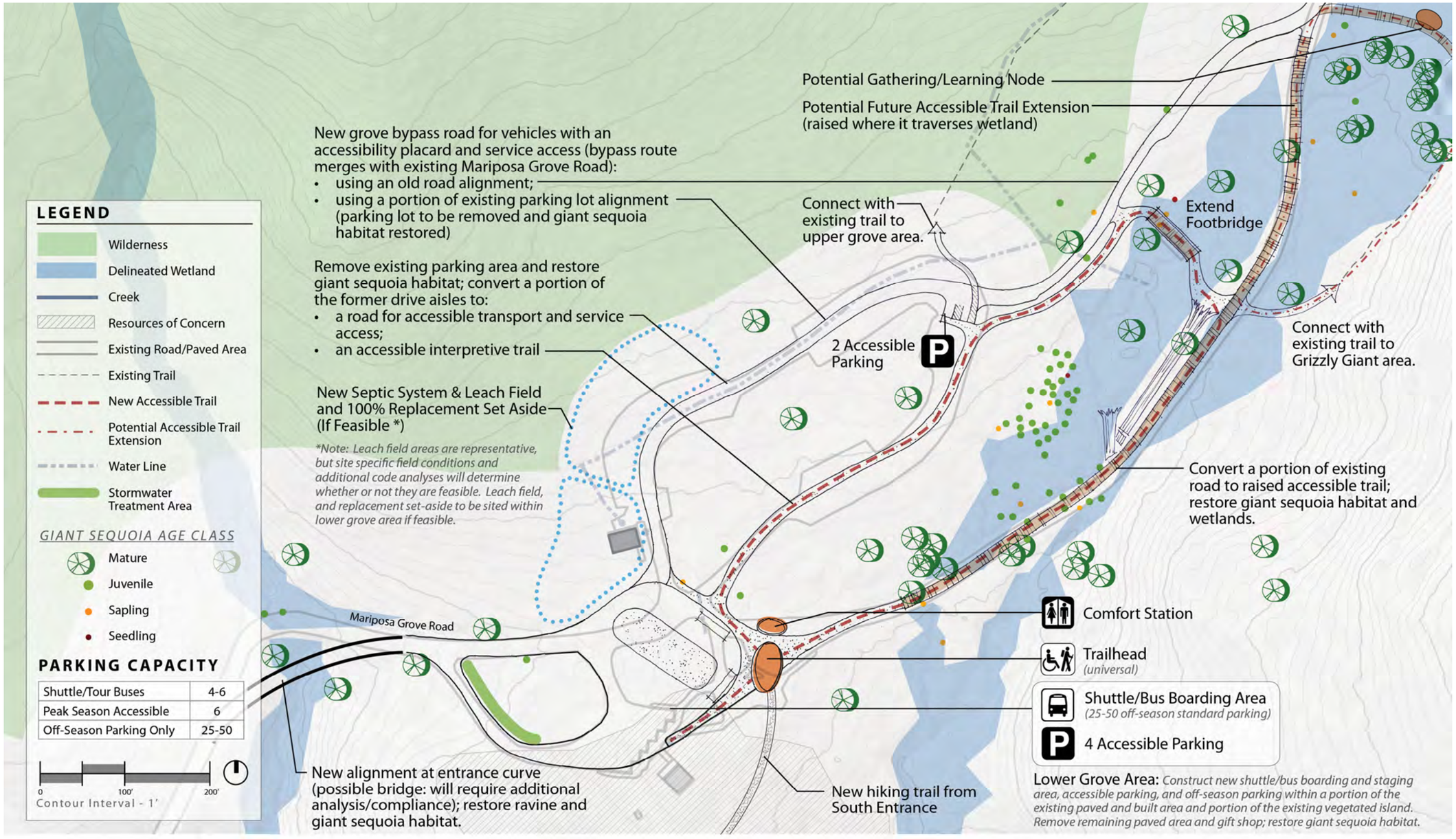


Figure 2-7 – Alternative 2: South Entrance Hub (Preferred Alternative) – Lower Grove Area Detail

Source: Mithun 2013

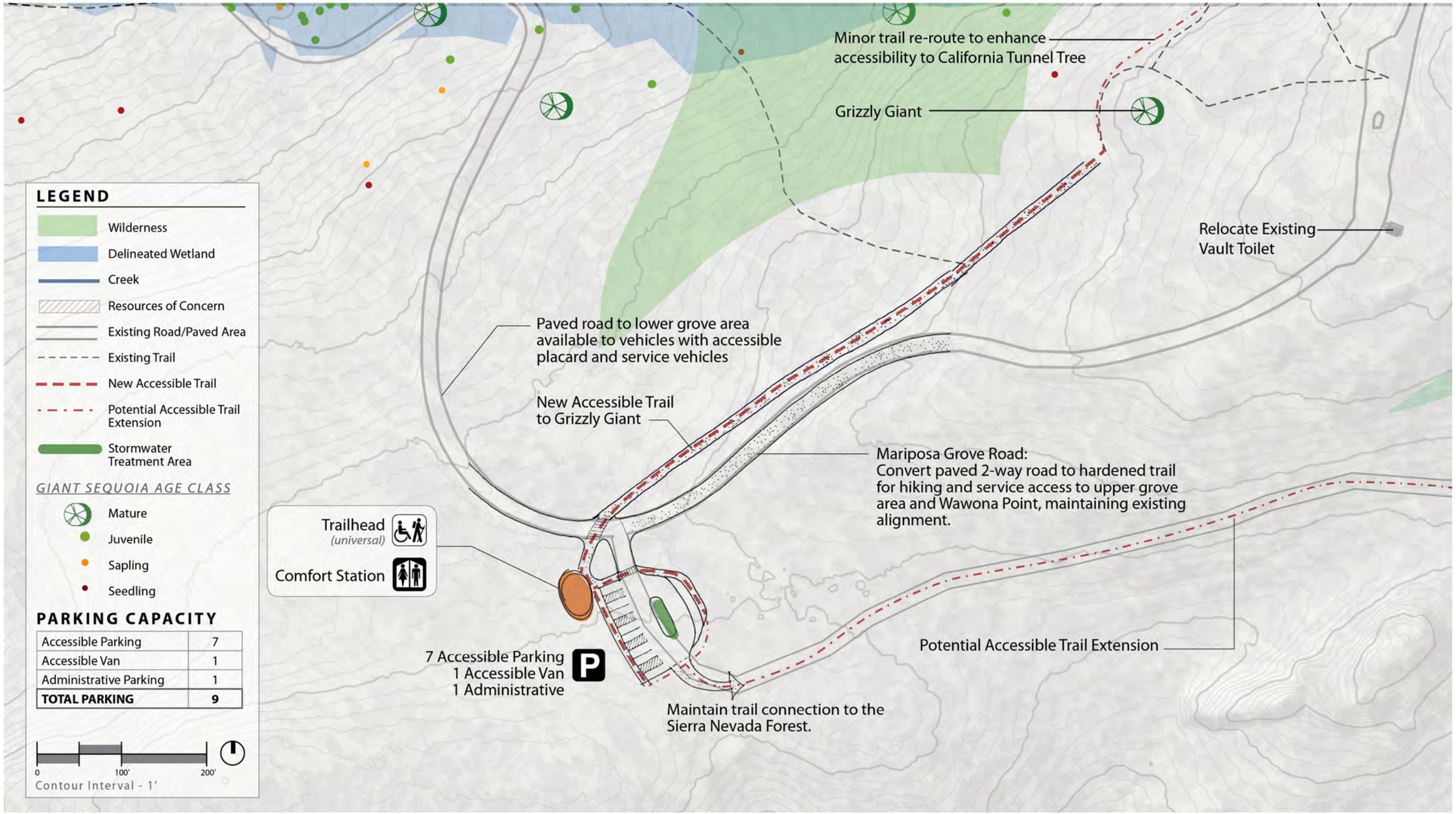


Figure 2-8 – Alternative 2: South Entrance Hub
Grizzly Giant Accessible Parking Area Detail

Source: Mithun 2013

Pending geotechnical assessments, new septic systems and leach fields would be installed at both the South Entrance and the lower Grove area to accommodate flush toilets to the extent practicable. The final locations of the new leach fields would be determined based on further analysis of resource and topographic constraints. The installation of a septic system in the lower Grove area would be contingent upon additional soil surveys; an additional option is installation of a sewer line between the Grove and the South Entrance that would be located within the Mariposa Grove road right-of-way. Each leach field option would require the allocation of a 100% replacement area to be set aside for future use at the time the constructed leach field reaches the end of its life cycle. The leach field would require between 2.16 and 3.54 acres, including the 100% replacement area set-aside. Replacement areas would not need to be constructed at the same time as the designated leach fields, but must be set aside for future use. Options for the leach field locations are identified on the figures, however final locations are contingent upon additional geotechnical investigation and would be identified based on feasibility related to soil conditions and to avoid or minimize impacts on sensitive resources including archeological sites. The final determination of flush or vault fixtures would be contingent on the feasibility of the septic system and leach field based on the continuing investigation of site-specific conditions.

At the upper Grove area comfort station, the leach field would be replaced in an area outside of sequoia habitat. The water supply pipeline would be repaired or replaced.

Two non-historic trail segments would be removed under Alternative 2: a section just above the Grizzly Giant that parallels the Mariposa Grove Road and a segment that extends from the southern end of the upper Grove loop road northwestward to a point below and west of Wawona Point. As noted above, a 2/3 mile long segment of the historic loop road in the upper Grove would be converted to a pedestrian trail 4 to 8 feet wide. Existing equestrian trails would not be impacted by the project.

Wawona Road/Mariposa Grove Road Intersection

Under Alternative 2, the park would reconstruct and possibly realign the intersection of Wawona Road and Mariposa Grove Road (figure 2-6) if traffic conditions warrant. This would affect up to 1,100 feet of road beginning on Wawona Road approximately 200 feet south of its intersection with Mariposa Grove Road, and ending approximately 400 feet west on Wawona Road and 200 feet east on Mariposa Grove Road beyond the existing comfort station parking. A roundabout would be explored if the proposed kiosk improvements at the South Entrance (to be implemented in 2013) do not adequately address congestion for visitors coming into the South Entrance from Fish Camp. A proposed roundabout would be optimally located for the site conditions and roadway requirements and would have a 120-foot outside diameter to accommodate the existing type and volume of traffic using the intersection. There would be one lane of traffic in a counter-clockwise direction with an inner concrete paved circle with a mountable curb. The center of the roundabout could be revegetated. Realignment of the intersection is intended to reduce risk of collisions, better accommodate larger vehicles, increase the intersection's vehicle traffic capacity, improve clarity of way finding and travel directions for visitors, reduce traffic congestion at the intersection, and improve working conditions for NPS staff.

Accessibility

Under Alternative 2, integrated, universally accessible (ABAAS compliant) transportation hubs/nodes, parking spaces, comfort stations, interpretive signs and displays, and trails at the South Entrance Station and lower portion of the Grove would allow park visitors with a greater range of physical abilities to experience and enjoy the Mariposa Grove. Visitors with vehicles displaying accessible parking placards or NPS service vehicles would drive through the lower Grove area to the

Grizzly Giant. Several pullouts would be installed to allow these visitors to stop and view individual sequoias or groups of sequoias such as the Bachelor and Three Graces. Accessible parking spaces would be available at the lower Grove area and Grizzly Giant for visitors with accessible parking placards, and the existing vault toilet would be relocated to the Grizzly Giant parking area. The shuttle originating at the South Entrance would continue to be available to visitors with limited mobility.

Accessibility improvements (consistent with ABAAS) would be made to the approach to the existing South Entrance comfort station, which is a contributing feature to the South Entrance historic district. Any alterations would be designed to meet the Secretary of the Interior's rehabilitation treatment standard for historic properties. Historic materials would be salvaged and reintegrated, and character-defining stonework would be retained. Thresholds would be affected only to the extent necessary to allow for universal access, and modifications would be implemented per Secretary of the Interior's *Standards for the Treatment of Historic Properties*.

Additional accessible trails are proposed in the lower Grove area that would allow visitors of all abilities the opportunity to enjoy the beauty and tranquility of Yosemite's giant sequoia forest in a less crowded, more peaceful setting than is available under current conditions. Under Alternative 2, an accessible trail would be created in the ecologically restored lower portion of the Grove that would include boardwalks, benches and viewing areas outside of paths of travel (see figure 2-7). The loop trails would enable all visitors, including those in wheelchairs or with otherwise limited mobility, to move beyond the activity of the parking and shuttle boarding area and into the Grove. Visitors could experience the beauty of the giant sequoias, including the Fallen Monarch, wetlands, streams, and wildlife at their own pace and in a more natural setting. Specific accessible trail alignments will be refined based on site conditions and to maximize use of previously disturbed areas.

A similarly accessible, approximately 2,000-foot-long trail would be built and would include portions of a previously abandoned trail and existing trails to the Grizzly Giant (see figure 2-8). This trail would extend beyond the Grizzly Giant for approximately 400 feet to the California Tunnel Tree, and then beyond for just over 300 feet to an open overlook on a small ridge between two streams. The overlook would offer visitors a glimpse of the landscape context of the Grove; the hillslopes, forest, wetlands and streams that comprise the habitat of the giant sequoias. A trail leading to the adjacent Sierra National Forest is also located at the Grizzly Giant trailhead where the new accessible parking spaces would be located. A potential accessible trail extension could start here, and would wind through forest, past a massive granite outcrop, to a small wetland within the park boundary (see figure 2-8).

ALTERNATIVE 3: GRIZZLY GIANT HUB

Alternative 3, Grizzly Giant Hub, would include removal of the Mariposa Grove parking lot, gift shop, and commercial tram staging area and operations to allow for comprehensive restoration of wetlands, soundscapes, and giant sequoia habitat. Under Alternative 3, a new Grove bypass road, including two bridges, would be routed south of the current Grove access road to a new parking lot southwest of the Grizzly Giant, and outside of giant sequoia habitat (figures 2-9 through 2-11). The new parking area at Grizzly Giant would serve as the primary departure point for visitors wishing to enter the Grove and would be open to all private vehicles (including recreational vehicles and trailers) and buses. At the Grizzly Giant Hub, vault toilets would be used due to the infeasibility and high cost of delivering water to, and disposing of wastewater at, this location.

The roadway between the Grizzly Giant and Wawona Point area would be converted to a hardened trail between 10 to 12 feet wide. Service vehicles would still use the hardened trail for access to the telecommunications facilities at Wawona Point and other facilities in the upper Grove area. The existing road from the lower Grove area to the Grizzly Giant area would be converted to a trail that is between 4 and 8 feet wide. The remaining road would undergo drainage improvements, including cleaning of existing culverts and installation of new culverts to improve water infiltration and prevent diversion of water outside the Grove. Vault toilets along the road within the Grove would be removed. Similar to Alternative 2, a 2/3 mile long segment of the loop road above the Mariposa Grove Museum would be converted into a 4- to 8-foot-wide pedestrian trail.

The current parking lot in the lower Grove area would be removed. Transit service to the Grove from the South Entrance would be discontinued, and the commercial tram would no longer operate. A significantly smaller parking lot providing up to ten ABAAS-compliant accessible parking spaces, trailhead, and loop trail at the lower Grove area, and a new accessible trail at the Grizzly Giant would serve visitors with disabilities. Other visitors could choose to explore the lower Grove area using existing trails near the Grizzly Giant.

Two non-historic trail segments would be removed under Alternative 3: a section just above the Grizzly Giant that parallels the Mariposa Grove Road, and a segment that extends from the southern end of the upper Grove loop road northwestward to a point below and west of Wawona Point. Other trails within the Grove with connections to Wawona and south and east to Sierra National Forest land would remain.

The new bypass road build-out footprint would be 2.20 acres, primarily through non-giant sequoia forest. Approximately 0.33 acre would be in identified giant sequoia forest, and 0.10 acre would be raised crossings over wetlands. Under Alternative 3, the current Wawona Road/Mariposa Grove Road T-intersection would be retained, and would be the same as described for Alternative 1 (No Action).

Accessibility

Under Alternative 3, ten ABAAS-compliant parking spaces, trailhead, and loop trail would be developed at the lower Grove area. An additional seven accessible parking spaces would be provided at the main hub at Grizzly Giant, as well as a new accessible trail to the Grizzly Giant.

Alternatives 2 and 3 both provide accessible trails from the lower Grove area and Grizzly Giant, but Alternative 3 would not provide for additional potential accessible trail development at these locations. Under Alternative 3, accessible facilities would remain unchanged at the South Entrance and the shuttle that accommodated visitors with limited mobility would no longer operate.

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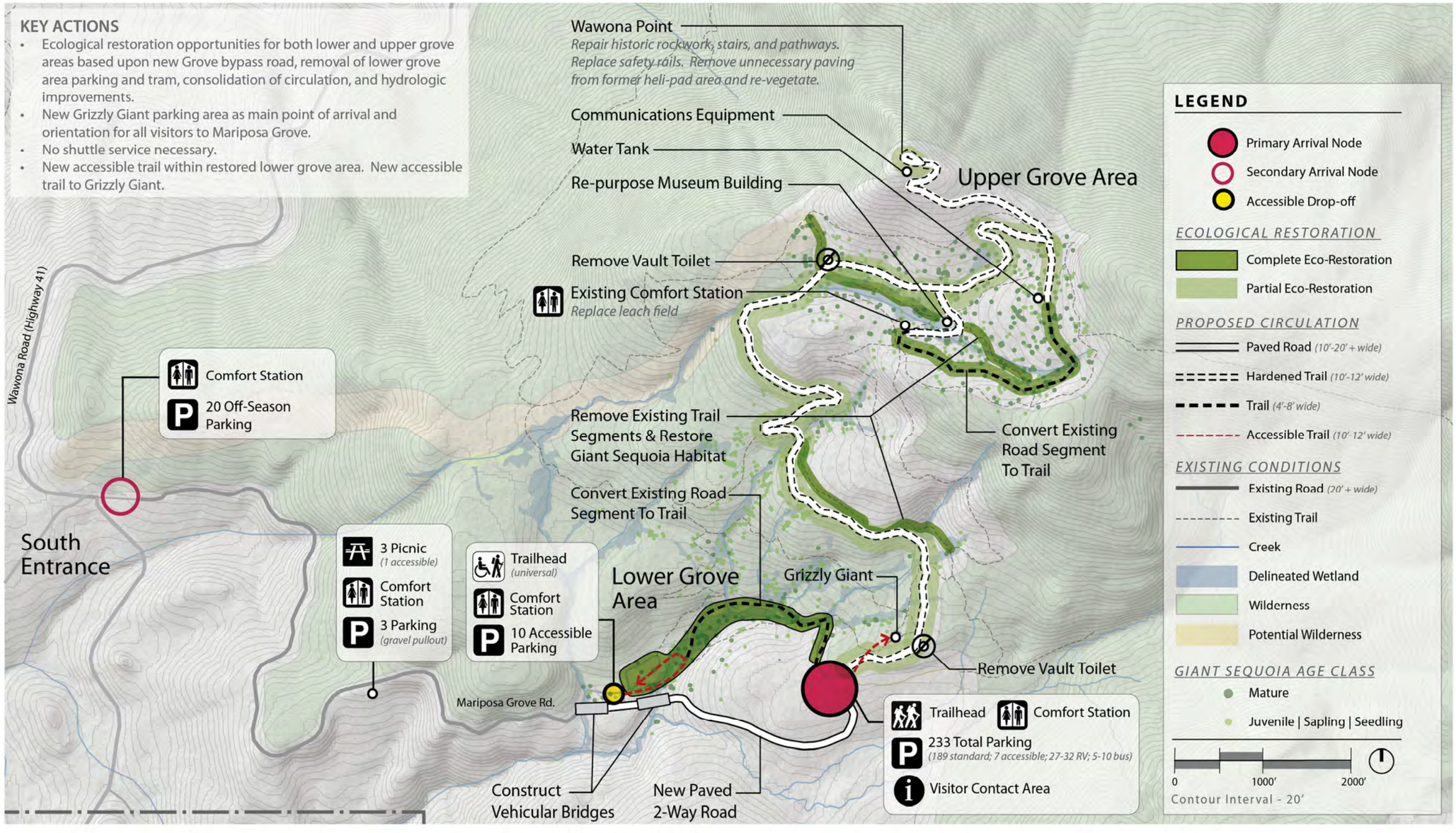


Figure 2-9 – Alternative 3: Grizzly Giant Hub

Source: Mithun 2013

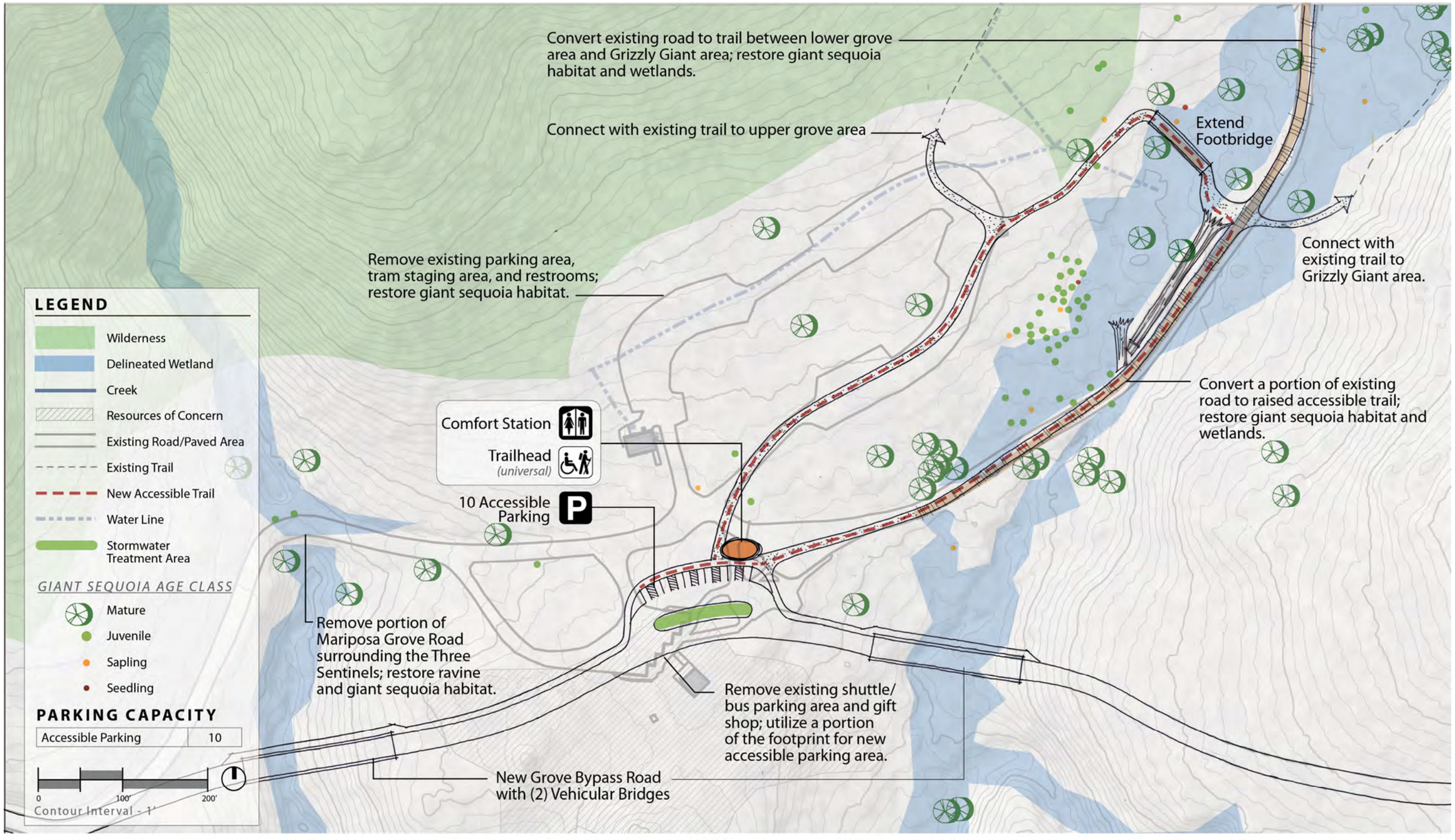


Figure 2-10 – Alternative 3: Grizzly Giant Hub – Lower Grove Area Detail

Source: Mithun 2013

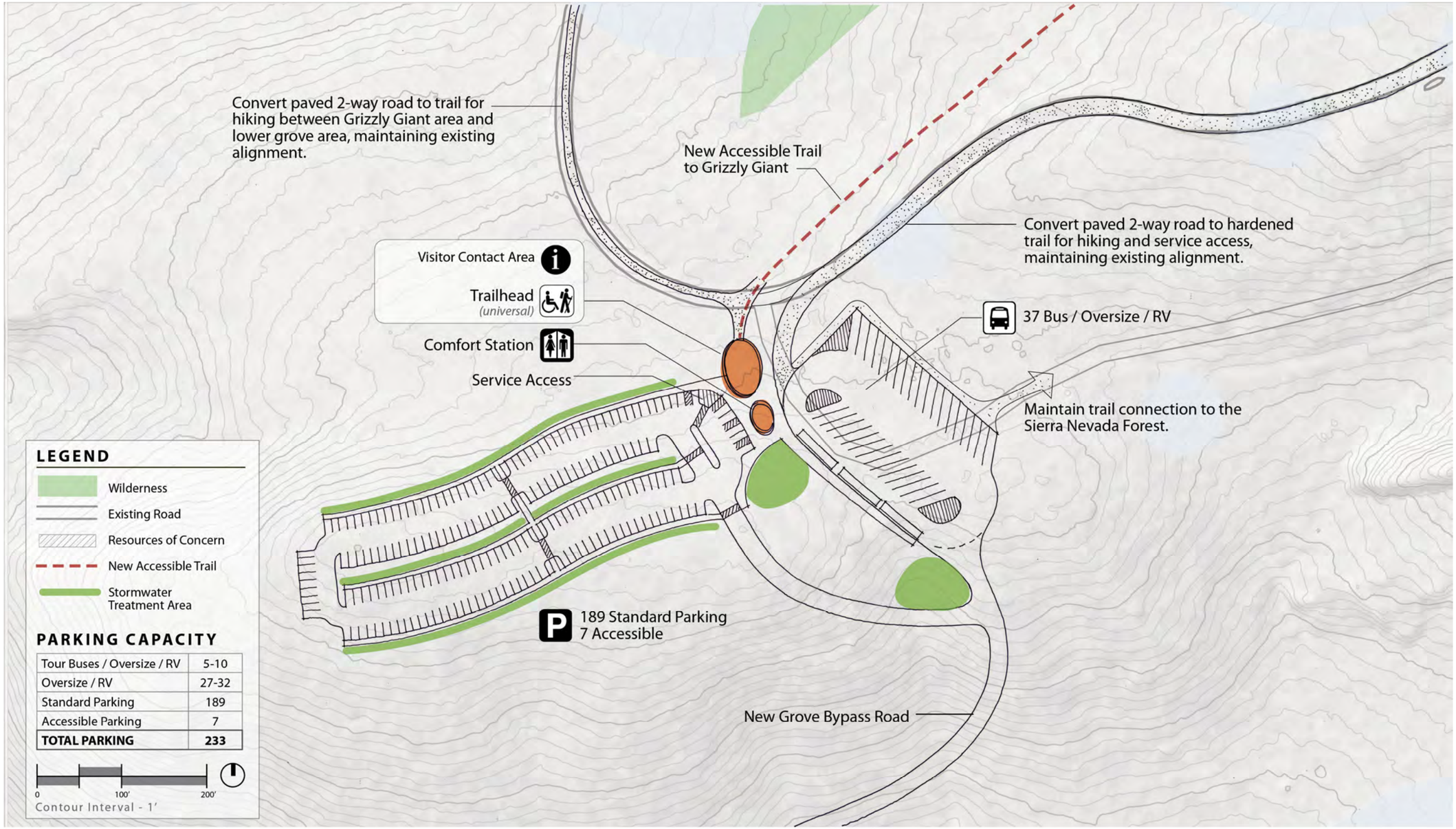


Figure 2-11 – Alternative 3: Grizzly Giant Hub – Grizzly Giant Area Detail

Source: Mithun 2013

ALTERNATIVE 4: SOUTH ENTRANCE HUB WITH MODIFIED COMMERCIAL TRAM SERVICE

Alternative 4, South Entrance Hub with Modified Commercial Tram Service, would remove most public parking, the gift shop, and commercial tram staging from Mariposa Grove, and relocate the parking and tram staging to the park's South Entrance. New visitor services would be provided at the South Entrance including visitor information and educational and other sales items. Previously developed areas not slated for reuse would undergo ecological restoration of wetlands and giant sequoia habitat, similar to that described for Alternative 2. An overview of the principal components of Alternative 4 is shown in figure 2-12, and details are depicted in figures 2-13 through 2-15.

Under Alternative 4, visitor parking would be relocated to South Entrance east of Wawona Road and south of the Mariposa Grove Road (figures 2-12 and 2-13). The proposed configuration at the South Entrance as the primary arrival node would be very similar to Alternative 2. However, the commercial tram tour would operate from the South Entrance, with stops at the lower and mid Grove areas, and end in the vicinity of the Mariposa Grove Museum. To obtain a balance between visitor access and opportunities for quiet and solitude in the upper portion of the Grove, the hours of operation for the tram would be reduced.

Shuttle service would also continue to operate as a free service between the South Entrance and the lower area of the Grove. Under Alternative 4, the shuttle and the commercial tram would share the same road from South Entrance to the lower Grove area. In addition, a shuttle with a more limited schedule than existing conditions would connect visitors staying at Wawona, including the Hotel and campground, with the South Entrance. Commercial bus activity would occur in the same manner as proposed under Alternative 2, with buses greater than 40 feet long stopping at South Entrance for transfer to shuttle. Depending on facility capacity and shuttle operations, buses less than 40 feet long may drop off passengers in lower Grove area and park at South Entrance.

The paved road through Mariposa Grove would undergo drainage improvements, including installation of new culverts to improve sheet flows and reduce channelization and diversion of water out of the Grove watershed. The short section of road below the Grizzly Giant would be signed to encourage visitors to use the pedestrian trail instead of the road. This would help separate pedestrians from vehicles. The paved road would be maintained to the historic museum building and restroom in the upper portion of the Grove, and tram service would transport visitors to the upper Grove along this road. Similar to the other action alternatives, a 2/3 mile long segment of the loop road in the upper Grove area would be converted into a 4- to 8-foot wide trail.

Pending geotechnical assessments, new septic systems and leach fields would be installed at both the South Entrance and the lower Grove area to accommodate flush toilets to the extent practicable. The final locations of the new leach fields would be determined based on further analysis of resource and topographic constraints. The installation of septic in the lower Grove area would be contingent upon additional soil surveys; an additional option is installation of a sewer line between the Grove and the South Entrance that would be located within the Mariposa Grove road right-of-way. Each leach field option would require the allocation of a 100% replacement area to be set aside for future use at the time the constructed leach field reaches the end of its life cycle. The leach field would require between 2.16 and 3.54 acres, including the 100% replacement area set-aside. Replacement areas would not need to be constructed at the same time as the designated leach fields, but must be set aside for future use. Options for the leach field locations are identified on the figures, however final locations are contingent upon additional geotechnical investigation and would be identified based on feasibility related to soil conditions and to avoid or minimize impacts on sensitive resources

including archeological sites. The final determination of flush or vault fixtures would be contingent on the feasibility of the septic system and leach field based on the continuing investigation of site-specific conditions.

Path-of-travel accessibility improvements would be made to the historic comfort stations at the South Entrance and in the upper Grove area. Modifications would be designed to meet the Secretary of the Interior's rehabilitation treatment standard for historic properties. Historic materials, such as any character-defining stonework along the existing paths to the comfort stations, would be incorporated into the upgraded accessible paths-of-travel. The upper Grove leach field would be renovated, and the leaking water line would be repaired or replaced.

One non-historic trail segment would be removed under Alternative 4: a section that extends from the southern end of the upper Grove loop road northwestward to a point below and west of Wawona Point. Because of occasional commercial tram use of the Mariposa Grove Road, the non-historic trail segment proposed for removal under Alternative 2 would remain under Alternative 4 to give pedestrians a vehicle-free option above the Grizzly Giant.

Wawona Road/Mariposa Grove Road Intersection

Under Alternative 4, the park would reconstruct and possibly realign the intersection of Wawona Road and Mariposa Grove Road (figure 2-13). This would include up to 1,100 feet of road beginning on Wawona Road approximately 200 feet south of the intersection with Mariposa Grove Road, and ending approximately 400 feet west on Wawona Road and 200 feet east on Mariposa Grove Road beyond the existing comfort station parking. Under Alternative 4, the T-intersection would be shifted to the northwest, making the entrance into the park a through movement directly toward Wawona and Yosemite Valley destinations, and allowing a right turn onto the Mariposa Grove Road as the minor intersecting roadway. A protected left turn lane for traffic coming from Yosemite Valley and headed toward Mariposa Grove would be provided. This would widen the existing exit lane to three lanes: one in each direction and a turning lane. Realignment of the intersection is intended to reduce accident risks, better accommodate larger vehicles, increase the intersection's through-traffic capacity, improve clarity of way finding and travel directions for visitors, reduce traffic congestion at the intersection, and improve working conditions for Yosemite National Park staff.

Accessibility

Under Alternative 4, placarded vehicles would be able to drive beyond the Grizzly Giant into the vicinity of the Museum in the upper Grove area. Accessible parking spaces would be provided at the upper Grove (4 spaces) as well as Grizzly Giant (4), lower Grove area (6), and South Entrance (8). The tram would also be available for visitors with limited mobility from the South Entrance to the upper Grove, with several stops in between. Visitors would be able to experience the mid-Grove area from an accessible overlook; unlike Alternatives 2 and 3, an accessible trail would not be constructed under Alternative 4. The shuttle originating at the South Entrance would also be available to visitors with limited mobility to take to the lower Grove.

Accessibility improvements would be made at the South Entrance, lower Grove area, and upper Grove. An accessible trail would be constructed in the ecologically restored lower Grove area, and an accessible overlook would be provided near the Grizzly Giant.

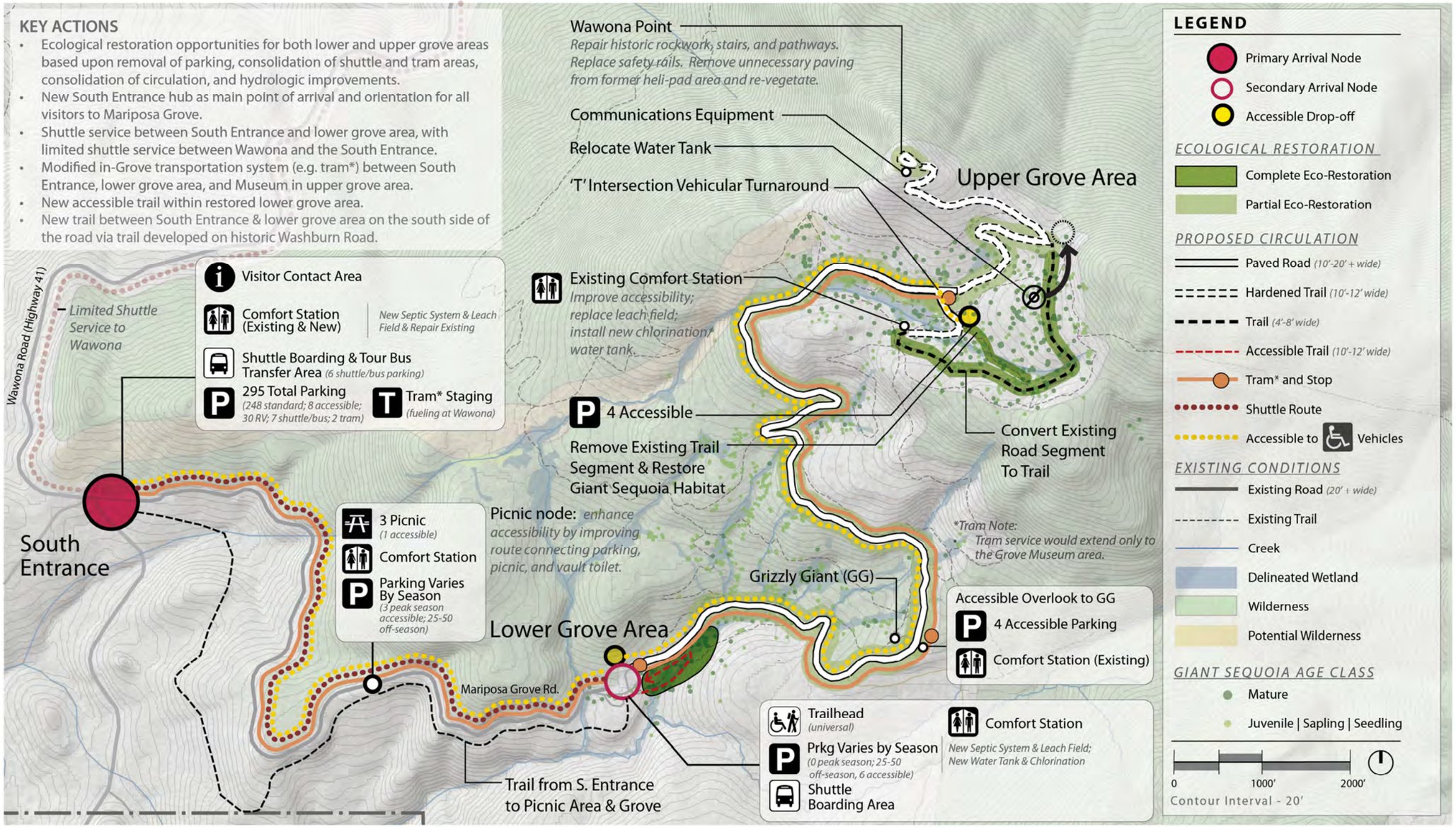


Figure 2-12 – Alternative 4: South Entrance Hub with Commercial Tram Service

Source: Mithun 2013

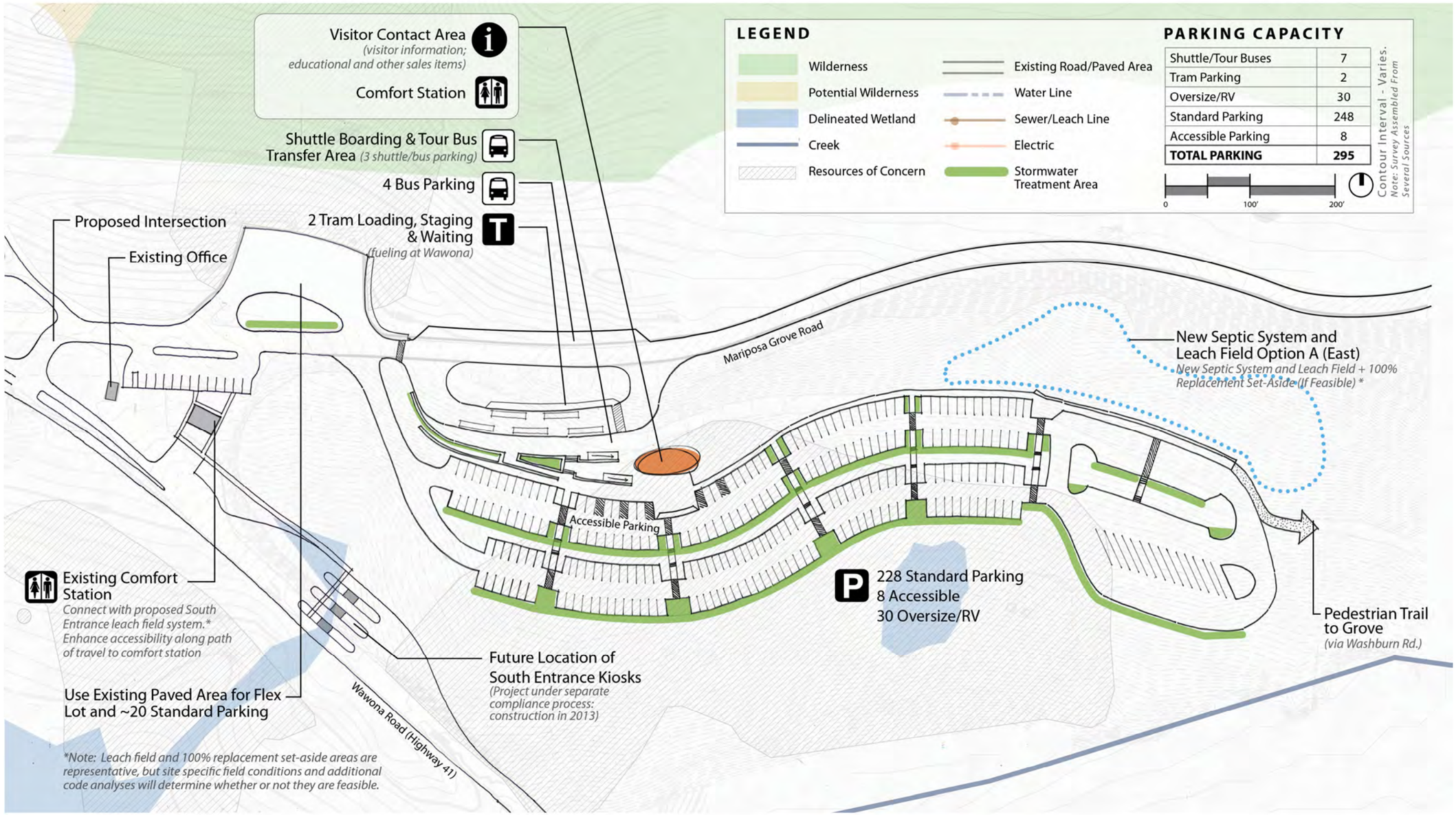


Figure 2-13 – Alternative 4: South Entrance Hub with Commercial Tram Service – South Entrance Detail

Source: Mithun 2013

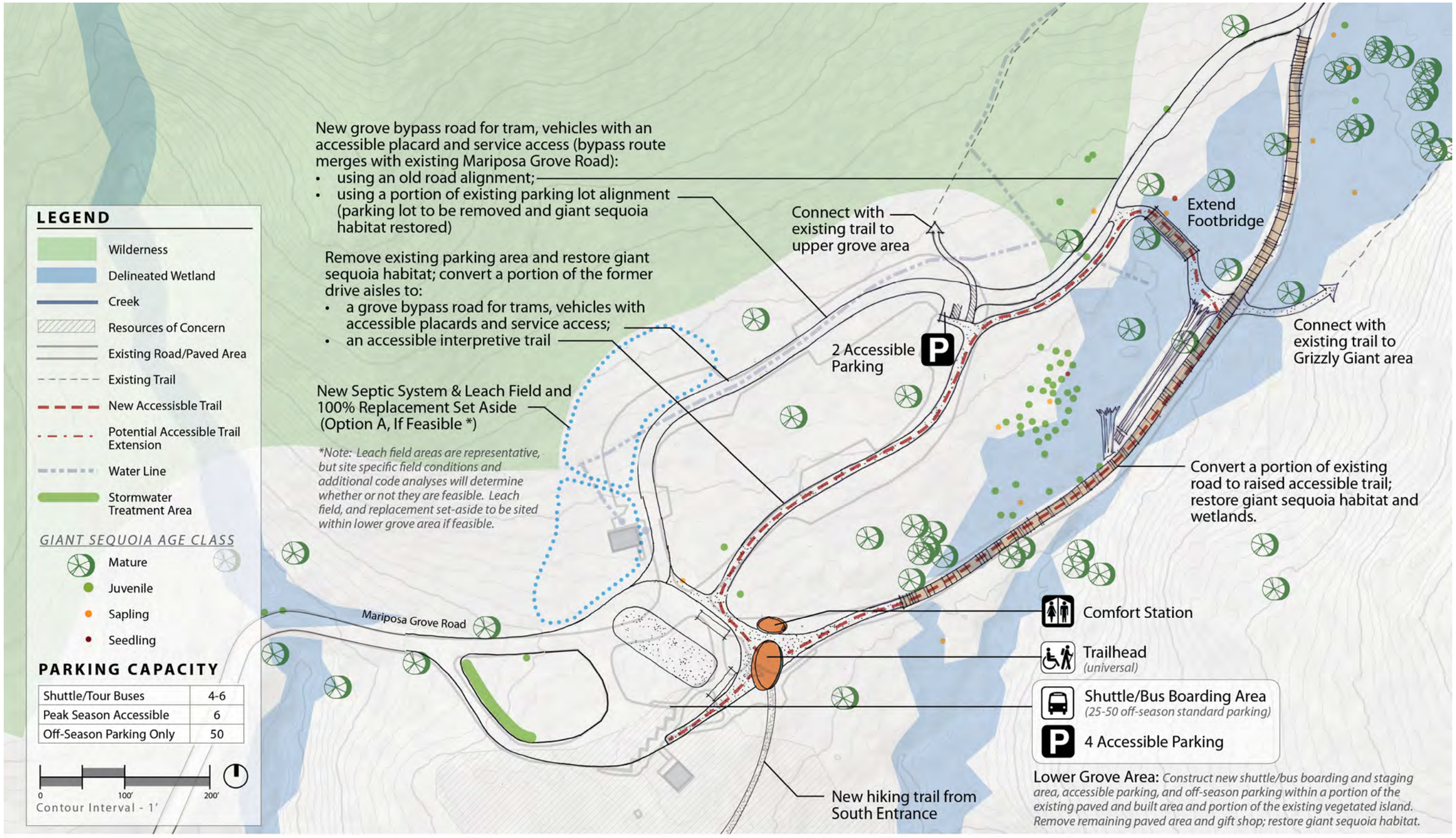


Figure 2-14 – Alternative 4: South Entrance Hub with Commercial Tram Service – Lower Grove Area Detail

Source: Mithun 2013

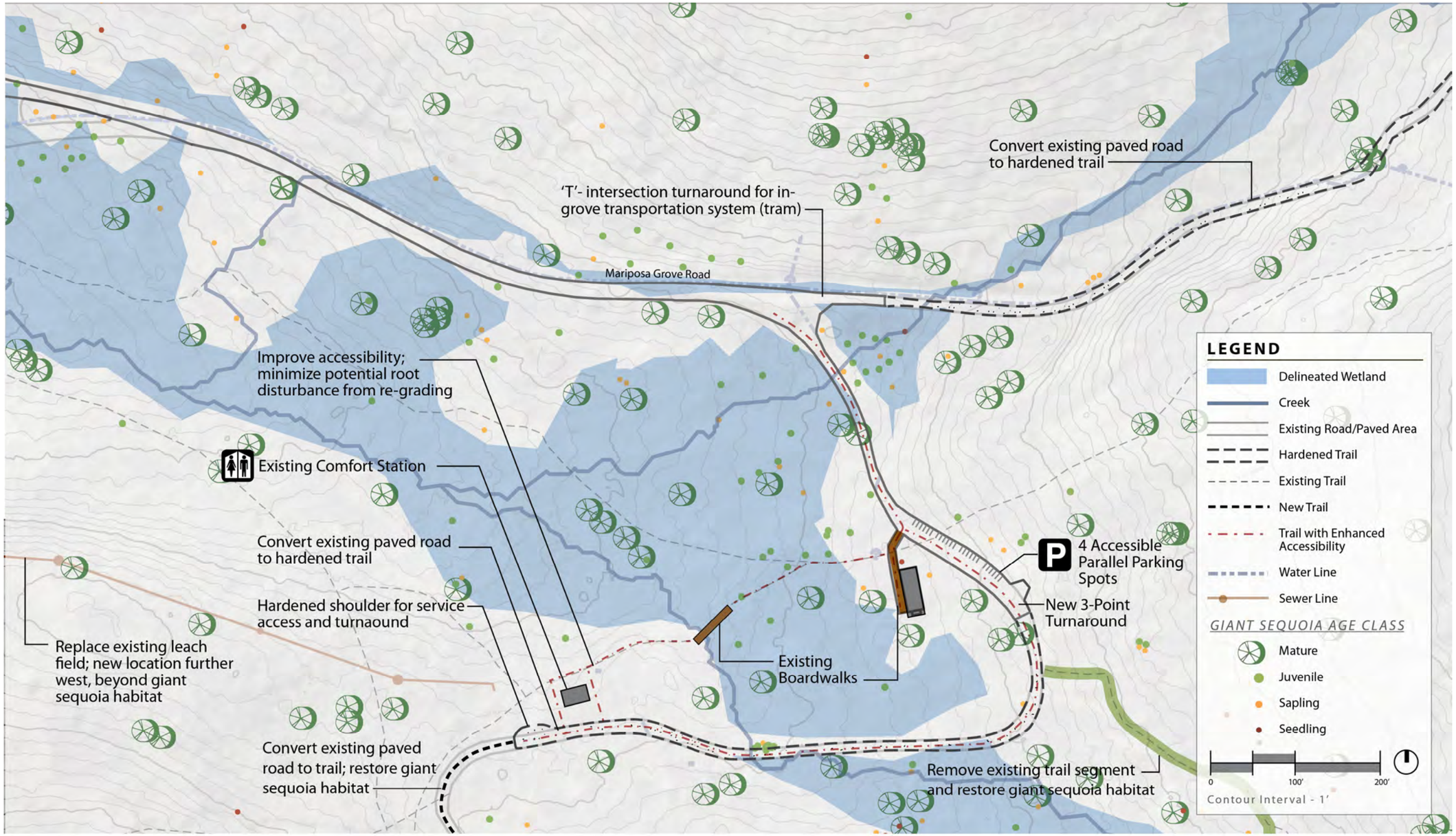


Figure 2-15 – Alternative 4: South Entrance Hub with Commercial Tram Operation – Upper Grove Area Detail

Source: Mithun 2013

ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

Under the National Environmental Policy Act (NEPA), an alternative may be eliminated from detailed study for the following reasons (Title 40 Code of Federal Regulations [CFR] Part 1504.14 (a)):

- Technical or economic infeasibility
- Inability to meet project objectives or resolve need for the project
- Duplication of other less environmentally damaging alternatives
- Conflicts with a current, valid plan, statement of purpose and significance, or other policy; and therefore, would require a major change in that plan or policy to implement
- Environmental impacts are too great

The following alternatives and options were considered during the preliminary design phase of the Mariposa Grove of Giant Sequoias restoration project; because they met one or more of the above criteria, they were eliminated from detailed analysis in this EIS.

Lower Grove Area Hub

This alternative was developed to explore low-cost changes that might make a significant difference in resolving the major issues at the Mariposa Grove. In this alternative, the commercial tram would be removed, the Mariposa Grove parking lot would have a smaller footprint, and modest giant sequoia habitat restoration could be achieved in the lower Grove area that would improve existing conditions. An accessible trail could be constructed, and restroom accessibility at the lower Grove area could be greatly improved. This conceptual alternative had an accessible viewpoint overlooking the Grizzly Giant, but no accessible trails. The primary arrival point and contact area for visitors would have remained in the lower Grove area, and access and parking would remain fragmented at the Grove, South Entrance, and Wawona. The alternative, though offering some restoration opportunities, did not adequately address the purpose and need components associated with the sustained overflow parking problems at South Entrance and the subsequent adverse impact on visitor access times and visitor experience. In addition, lower Grove area buildings and infrastructure that are currently adversely impacting giant sequoias as well as other sensitive resources such as wetlands would have remained under this alternative. Therefore, because this alternative did not adequately meet the project purpose and need, it was dismissed from further analysis.

South Entrance Hub, Complete Commercial Tram Road Removal, Relocate Wawona Point Communications Equipment

This alternative was developed to provide extensive giant sequoia habitat restoration by completely removing and restoring the existing commercial tram/service road from the lower Grove area to Wawona Point, including the upper Grove area loop road. Other aspects of this alternative were essentially the same as the Alternative 2, South Entrance Hub. To eliminate the service road, the NPS would have had to relocate the recently installed communications tower at Wawona Point. The location of the Wawona Point communications tower is a critical component of the park-wide communications network. The tower requires periodic maintenance (e.g., refueling) throughout the year, and therefore must be accessible via a roadway for service vehicles.

The park reviewed possible sites for tower relocation, but the only suitable alternate location lies within designated wilderness, and relocation costs would be prohibitive, possibly exceeding several million dollars. The project team also considered alternate power supply for the Wawona Point equipment, but determined that new power transmission lines would cross designated wilderness, solar panels would be unreliable in the winter due to snow cover, and delivery of propane via other transportation modes (e.g., helicopter) during winter months would require extensive site preparation and would be expensive and unreliable during inclement weather. Because the communications tower and the current fueling system could not reasonably be relocated or replaced, the "full" restoration benefits envisioned in this alternative could not be realized, and the alternative ended up being nearly identical to Alternative 2: South Entrance Hub. Therefore, this alternative was dismissed from further analysis. Under the retained action alternatives, the road to Wawona Point would continue to be maintained for occasional vehicular use until the telecommunications tower becomes obsolete due to technological advances, after which more permeable trail surfaces may be explored.

Studhorse Parking

NPS considered adding supplemental parking at the Studhorse parking area located on Wawona Road between Wawona and the South Entrance, to support visitation at the Mariposa Grove. However, the area's proximity to designated wilderness and topographic constraints made a new large parking lot infeasible in the area. In addition, the South Entrance area, being in closer proximity to the Grove, provides more logical centralized placement for Grove visitor parking. Therefore, this area was dismissed as a possible parking component of the alternatives, and was not evaluated further.

Sierra National Forest Parking Siting

NPS considered collaborating with the U.S. Department of Agriculture, Forest Service to create a collection/parking hub and visitor contact area for Mariposa Grove in the Goat Meadow snow play area on Sierra National Forest land, or using Sierra National Forest land for road access. Extensive issues with road widening and fee collection were identified. Complications of planning and managing an out-of-park site with multiple jurisdictions, and a desire to have parking and other visitor facilities closer to the Grove and within the boundaries of the park, led to the dismissal of this option.

New Parking at South Entrance West of Wawona Road

The option to develop new parking on the west side of Wawona Road, near the Wawona Road/ Mariposa Grove Road intersection, was considered. Initial analysis indicated this option would be problematic in terms of topography, visitor orientation, traffic flow, and pedestrian safety. The main concerns were the safety of entrances and exits on the Wawona Road curve and the safety of pedestrians crossing the highway. A possible vehicle or pedestrian underpass beneath Wawona Road was considered to mitigate some of the safety concerns, but the cost associated with a grade separation at this location, coupled with the difficulty in maintaining efficient operations at the South Entrance due to parking congestion, led to dismissal of this alternative. Operational issues were also a concern, as the park service ranger shooting range would be close to the proposed visitor parking. Parking on the east side of the road is more intuitive for people going eastward from South Entrance to Mariposa Grove and allows for a simpler transition for people entering the park from the south. This option also would displace the existing septic system and leach field at South Entrance. The possibility of routing wastewater from South Entrance to the Wawona treatment plant via a new sewer line that would be constructed along Wawona Road also was considered for all alternatives. However, the 7-mile-long sewer line was determined to be cost-prohibitive at an estimated cost of $12 million to $14 million, and this option was dismissed.

Oakhurst or Fish Camp Parking and Visitor Contact

Developing a visitor contact area (similar to that in Mariposa) and possible parking outside park boundaries in Fish Camp or Oakhurst was considered. Complexities with land and building ownership outside the park and a desire to have visitor facilities for the Mariposa Grove closer to the Grove and within the boundaries of the park led to the dismissal of this option.

MITIGATION MEASURES

The NPS places a strong emphasis on avoidance, minimization, and mitigation of adverse impacts under NEPA, and adverse effects under the National Historic Preservation Act (NHPA). To help ensure that project activities protect natural, cultural, and social resources and the quality of the visitor experience, mitigation measures have been developed that would be implemented as part of the action alternatives (see Appendix E: Mitigation Measures). These mitigation measures would occur prior to, during, and after implementation of all proposed actions in Alternatives 2, 3, and 4. Additional mitigation measures may be identified through consultation with the California State Historic Preservation Officer (SHPO) and implemented through a project-specific Memorandum of Agreement, as required under 36 CFR Part 800. All the mitigation measures are considered to be integral to each alternative.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with NPS *Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making* and Council on Environmental Quality requirements, the NPS is required to identify the "environmentally preferred alternative" in all environmental documents, including EISs. The environmentally preferred alternative is determined by applying the criteria listed in NEPA Sec. 101(b). The Council on Environmental Quality (46 Federal Register 18026-18038) states that the "environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in NEPA's Section 101." Generally, the environmentally preferred alternative is the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources (46 Federal Register 18026 – 46 Federal Register 18038). Per Section 101 of NEPA, it is the responsibility of the federal government to:

(1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

All of the action alternatives would, to varying degrees, reduce development footprints within the Mariposa Grove, restore hydrologic and ecological systems to more natural conditions, and stabilize, and/or rehabilitate cultural resources at South Entrance, the Grove, and Wawona Point. Alternative 2 best meets goal 1 because it would reduce developed area within sequoia habitat; require the least new development outside sequoia habitat; implement substantial restoration of wetlands and giant sequoia habitat; and better protect Pacific fishers from road fatalities on the Mariposa Grove Road and within the Grove. The project would also improve the soundscape throughout the Grove by eliminating most private vehicle parking in the lower Grove area during peak-use periods and discontinuing operation of the commercial tram in the upper Grove area. All of these actions would address visitor and operational services that are adversely affecting giant sequoia habitat and provide the best opportunity for sustaining the long-term health of the Mariposa Grove.

(2) Assure for all visitors safe, healthful, productive, and aesthetically and culturally pleasing surroundings.

All of the action alternatives would meet goal 2. Alternative 2 best fulfills this goal for several of the reasons stated above, in conjunction with affording the best balance of more efficient visitor transport via shuttle to and from the Grove and relocation of traffic- and parking-related impacts outside of the Grove. Alternative 2 provides universal access to a quality giant sequoia grove experience in the lower Grove while preserving a less developed, more natural visitor experience in the upper Grove through elimination of the commercial tram operations and reducing the footprint of trails and roadways. The short section of road below the Grizzly Giant would be signed to encourage visitors to use the pedestrian trail instead of the road. This would help separate pedestrians from vehicles with accessible parking placards going to the Grizzly Giant. Alternative 2 assures a safe, productive, and aesthetically and culturally pleasing environment for visitors to the Mariposa Grove of Giant Sequoias.

(3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.

Alternative 2 would attain the widest range of beneficial uses of the environment while minimizing further degradation of the sensitive giant sequoia environment, and managing risks to visitor health and safety concerns by eliminating vehicle/pedestrian conflicts within the Grove. All of the action alternatives would improve sanitary facilities, and reduce current safety hazards associated with Grove traffic, shuttle stops, and parking. Alternative 2 would also improve visitor safety by separating hikers and pedestrians from roadway traffic, eliminating the commercial tram service and redesigning parking areas and shuttle stops, thereby reducing vehicle/pedestrian conflicts currently associated with shared use of the in-Grove parking lot and roadway. The road below the Grizzly Giant would be signed to encourage visitors to use the pedestrian trail to help separate pedestrians from vehicles.

(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.

Alternative 2 would best restore and preserve the giant sequoias of the Mariposa Grove, which are important to our national heritage and the development of both state and national park systems. Alternatives 2 and 3 would provide a better opportunity for solitude in the upper Grove area with the removal of the tram and private vehicles. All of the action alternatives would avoid and/or minimize effects to historic and traditional cultural aspects of the Grove and South Entrance areas; Alternative 3 would have the least effect on the historic setting at South Entrance, but would sustain the most extensive disturbances on archeological resources and alter historic circulation patterns within the Grove by constructing a new road to a new visitor parking and information hub near the Grizzly Giant.

(5) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities.

Alternative 2 would reduce in-Grove infrastructure. Alternative 2 best conserves energy by significantly restricting private vehicle access to the Grove and eliminating commercial tram operations within the Grove. All action alternatives improve accessibility to the Grove for visitors with limited mobility. Alternative 2 offers the best opportunity for expanding the range of visitor experiences by expanding accessible trail opportunities in diverse areas in the lower Grove area and at Grizzly Giant. Alternatives 2 and 3 would provide a better

opportunity for quiet, natural sounds, and solitude in the upper Grove with the removal of the tram and private vehicles, enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

All of the action alternatives would implement sustainable principles and technologies in accordance with *Guiding Principles of Sustainable Design* (NPS 1993). Sustainable principles and technologies would include recycling of demolition debris to the extent practicable, using recycled materials in construction, repair or replacement of inefficient systems, improved operational practices, and installation of energy- and water-efficient features and utilities. Alternative 2 represents the most efficient management of depletable fossil fuels both by eliminating in-Grove tram operations, and most private vehicle access during peak visitor season, and by concentrating visitor and employee parking near a park entrance and implementing efficient shuttle service using buses that operate on alternative fuels.

On balance, Alternative 2 (the preferred alternative) best achieves these national environmental policy goals, and therefore is identified as the environmentally preferred alternative.

COST ESTIMATES

The estimated costs of "hard construction" for each alternative, as understood at the 50-percent schematic design development phase, were assembled using empirical market data and input from vendors and industry professionals. These cost estimates present a relative comparison of costs among the alternatives. The estimating process attempted to anticipate design and scope in advance of the development of engineering, architectural detailing, inventory of existing conditions, and topographical surveys. The estimate employed unit assembly costs extrapolated, in part, from modeling data from similar completed projects. The unique nature and remote location of the Mariposa Grove of Giant Sequoias, however, presented a challenge for identifying comparable project data. Table 2-1 presents the preliminary cost estimates for construction costs. With regard to the accuracy of the estimated costs, Alternative 3 has the most uncertainty since additional geotechnical investigation would be needed to determine the costs of construction for a new segment of road within the Grove. Unlike the action alternatives, the No Action Alternative has no net construction costs.

Table 2-1 – Preliminary Cost Estimates

Action	Alternative 1: No Action	Alternative 2: South Entrance Hub	Alternative 3: Grizzly Giant Hub	Alternative 4: South Entrance Hub with Commercial Tram Operation
Facilities at South Entrance	$ 0	$9,986,000	$ 0	$9,986,000
Facilities in Lower Grove Area	$ 0	$1,317,000	$433,000	$1,578,000
Facilities at Grizzly Giant	$ 0	$214,000	$3,819,000	$54,000
Facilities in Upper Grove Area	$ 0	$547,000	$476,000	$498,000
Roads, Trails, and Restoration	$ 0	$8,647,000	$18,070,000	$9,339,000
Construction Costs	**Existing conditions**	**$20,711,000**	**$22,798,000**	**$21,455,000**

Notes:
1) Construction of an optional bridge in the lower Grove area under Alternative 2 would require additional cost/design analysis and compliance. A preliminary estimate for construction of the bridge is $4M.
2) If soil conditions in the lower Grove area are such that a septic system is not feasible, a sewer line would need to be installed within the road prism and would add an additional $2M to the cost for Alternatives 2 and 4. Alternative 3 relies on use of vault toilets at the Grizzly Giant.
3) 50-year project life cycle costs assume a 2.2% discount rate (which refers to the interest rate used in discounted cash flow

SUMMARY OF ALTERNATIVES AND POTENTIAL IMPACTS

Table 2-2 presents a summary comparison of alternatives, and Table 2-3 summarizes build-out and ecological restoration acreages by alternative.

Table 2-2 – Summary Comparison of Alternatives

Proposed Project Action/Component	Alternative 1: No-Action	Alternative 2: South Entrance Hub (Preferred Alternative)	Alternative 3: Grizzly Giant Hub	Alternative 4: South Entrance Hub with Modified Commercial Tram Service
Ecological Restoration				
Wetland restoration at lower Grove area with boardwalk	No	Common to all action alternatives	Common to all action alternatives	Common to all action alternatives
Remove 115-car parking lot and other infrastructure in lower Grove area	No	Yes, but addition of 6 accessible and 25-50 parking spaces in new shuttle turnaround for when shuttle is not in operation	Yes, but addition of 10 accessible spaces in new design	Yes, but addition of 6 accessible and 25-50 parking spaces for when shuttle is not in operation
Remove upper Grove area loop road/convert to trail	No	Common to all action alternatives	Common to all action alternatives	Common to all action alternatives
Install/repair/replace culverts to improve hydrology	No	Common to all action alternatives	Common to all action alternatives	Common to all action alternatives
Prescribed fire and thinning within and surrounding the Grove	Yes	Common to all action alternatives	Common to all action alternatives	Common to all action alternatives
Soil decompaction	No	Yes	Yes	Yes, more limited than Alternative 2
Natural soundscapes improved/restored	No	Yes	Yes	Yes, more limited than Alternative 2
Additional fencing for root protection	No	Common to all action alternatives	Common to all action alternatives	Common to all action alternatives
Visitor Use and Access				
Improved visitor orientation and wayfinding	No	Common to all action alternatives	Common to all action alternatives	Common to all action alternatives
Improved ecological, historical and cultural interpretation	No	Common to all action alternatives	Common to all action alternatives	Common to all action alternatives
Primary visitor contact	At lower Grove staging area	At South Entrance Hub	At Grizzly Giant Hub	At South Entrance Hub
Visitor amenities	Gift Shop (snacks) at lower Grove area, Museum (interpretation, books) in upper Grove area	New/relocated visitor information and services at South Entrance Hub, including information, educational and other sales items	New /relocated visitor information and services at Grizzly Giant Hub	New /relocated visitor information and services at South Entrance Hub, including information, and educational and other sales items
Mariposa Grove Museum interpretive components	Contains primary interpretative exhibits for the Grove.	Primary interpretive information relocated to South Entrance Hub. Repurpose museum to ensure protection of historic resource.	Primary interpretive information relocated to Grizzly Giant Hub. Repurpose museum to ensure protection of historic resource.	Primary interpretive information relocated to South Entrance Hub. Repurpose museum to ensure protection of historic resource.
Wawona Point overlook	Access for utility functions only.	Common to all action alternatives: Repair historic walls and overlook.	Common to all action alternatives: Repair historic walls and overlook.	Common to all action alternatives: Repair historic walls and overlook.
Visitor winter access to Grove (all-season visitor enjoyment)	Road closed, not plowed. Can ski/snowshoe from South Entrance, limited parking (20 spaces) at South Entrance.	Could ski/snowshoe, hike from South Entrance if road/gate closed, ample parking at South Entrance. 50-80 seasonal spaces available at the picnic area and lower Grove if road open.	Could ski/snowshoe, hike from Grizzly Giant trailhead if road open (parking at Grizzly Giant lot). If road closed, still have limited parking at South Entrance (20 spaces).	Could ski/snowshoe, hike from South Entrance if road/gate closed, ample parking at South Entrance lot. 50-80 seasonal spaces available at the picnic area and lower Grove if road open.
Accessible trail	No Paths of travel in lower Grove area not up to accessibility standards.	Lower Grove area, Grizzly Giant with potential accessible trail expansions in those areas	Lower Grove area, Grizzly Giant	Lower Grove area, Grizzly Giant overlook
Trail from South Entrance to the Grove	None	Utilize abandoned Washburn Road as trail to picnic area and continue into lower Grove area.	None	Utilize abandoned Washburn Road as trail to picnic area and continue into lower Grove area.
Accessible road access(for private vehicles with placards)	Access to lower Grove area, Grizzly Giant, and upper Grove area loop road.	Access to lower Grove area and Grizzly Giant.	Access to lower Grove area and Grizzly Giant.	Access to lower Grove area, Grizzly Giant, and a portion of the upper Grove area.
Accessible parking spaces	2 at lower Grove area	8 at South Entrance; 6 at lower Grove area ; 3 at picnic area; 8 at Grizzly Giant	7 at Grizzly Giant; 10 at lower Grove area	8 at South Entrance; 6 at lower Grove area ; 3 at picnic area, 4 at Grizzly Giant; 4 at upper Grove
Accessibility of visitor amenities	Accessible vault toilet at picnic area along Mariposa Grove Road (outside Grove). Accessible vault toilet in lower Grove area.	Accessible comfort stations at South Entrance and lower Grove. Accessible vault toilets at Grizzly Giant and picnic area.	Accessible vault toilets at picnic area, lower Grove, and Grizzly Giant.	Accessible comfort stations at South Entrance and lower Grove. Accessible vault toilets at Grizzly Giant and picnic area.
Transportation				
Commercial tram staging area and operations (approximate) (Tram is accessible.)	Yes, through upper Grove loop road, staging at lower Grove area	No service	No service	Yes, to museum, staging at South Entrance
Shuttle access to lower Grove area (Shuttle is accessible.)	Yes, peak season (Memorial Day-Labor Day)	Yes, expanded to include shoulder seasons (April through October as weather permits)	N/A	Yes, during peak season
Shuttle schedule (approximate)	May – October, South Entrance and Wawona to lower Grove area	April – October, South Entrance to lower Grove area; occasional service between South Entrance and Wawona	No service	April – October, South Entrance to lower Grove area; occasional service between South Entrance and Wawona
Standard vehicle parking spaces	20 at South Entrance, 115 seasonal at lower Grove area. Over 100 spaces at Wawona are used for overflow parking.	248 at South Entrance, 25-50 seasonal at lower Grove area, 25-50 seasonal at picnic area	20 seasonal at South Entrance, 189 at Grizzly Giant	248 at South Entrance, 25-50 seasonal at lower Grove area, 25-50 seasonal at picnic area

Proposed Project Action/Component	Alternative 1: No-Action	Alternative 2: South Entrance Hub (Preferred Alternative)	Alternative 3: Grizzly Giant Hub	Alternative 4: South Entrance Hub with Modified Commercial Tram Service
Large vehicle parking spaces	<5	30 oversize, 9 commercial bus/shuttle at South Entrance	27-32 oversize, 5-10 bus at Grizzly Giant	30 oversize, 7 commercial bus/shuttle, 2 commercial tram at South Entrance
Tour bus access	Buses less than 40 feet long can park and drop passengers in lower Grove area. Buses greater than 40 feet park at Wawona and transfer passengers to park shuttles.	Buses greater than 40 feet long would stop at South Entrance for transfer to shuttle. Depending on facility capacity and shuttle operations, buses less than 40 feet long may drop off passengers in lower Grove area and park at South Entrance.	All buses would drive to Grizzly Giant Hub.	Buses greater than 40 feet long would stop at South Entrance for transfer to shuttle. Depending on facility capacity and shuttle operations, buses less than 40 feet long may drop off passengers in lower Grove area and park at South Entrance.
Infrastructure Improvements				
Retain Mariposa Grove Road surface within the Grove	Paved to Wawona Point	Paved to Grizzly Giant	Paved to Grizzly Giant	Paved to museum
Conversion of Mariposa Grove Road to hardened trail	No	Yes, from Grizzly Giant to Wawona Point (10-12'wide)	Yes, from Grizzly Giant to Wawona Point (10-12'wide),	Yes, from museum to Wawona Point (1012' wide)
Water pipe repair or replacement	No	Yes	Yes	Yes
Water tank and chlorination unit	Present location along upper Grove loop road	Relocate near museum	Relocate near museum	Relocate near museum
Comfort station fixtures (flush or vault)	10 at South Entrance, 1 at picnic area, 8 at lower Grove area, 1 at Grizzly Giant, 1 and 10 at upper Grove area	28 at South Entrance, 1 at picnic area, 10 at lower Grove area, 1 at Grizzly Giant (shuttle drop off), 10 at upper Grove	10 at South Entrance, 1 at picnic area, 2 at lower Grove area, 18 at Grizzly Giant, 10 at upper Grove	28 at South Entrance, 1 at picnic area, 10 at lower Grove, 1 at Grizzly Giant (shuttle drop off), 10 and 2 at upper Grove area
Infrastructure Relocation/Realignment				
Parking hub	Lower Grove area	South Entrance	Grizzly Giant	South Entrance
New roads	None	Lower Grove bypass road (0.10 mile)	New road from Three Sentinels to Grizzly Giant (0.76 mile)	Lower Grove bypass road (0.10 mile)
New vehicular bridges	None	Optional bridge at Three Sentinels pending further study	Two in lower Grove area	None
Septic tank/leach field installation and/or improvement	No	New system at South Entrance and lower Grove areas (if feasible), replace system in upper Grove area	Replace system, in upper Grove area	New system at South Entrance and lower Grove areas (if feasible), replace system in upper Grove area
Mariposa Grove shuttle drop-off areas	Wawona, South Entrance, and lower Grove area	South Entrance and lower Grove area	None	South Entrance and lower Grove area
Bus parking pads (for heavy vehicle parking loads)	No	Yes, South Entrance and lower Grove area	Yes, Grizzly Giant	Yes, South Entrance, and lower Grove area
South Entrance intersection	Existing T	Roundabout if T-intersection exceeds capacity	Existing T	Modified T
Sustainability				
Infrastructure consolidation	No	Yes	Yes	Yes, more limited than Alternatives 2 and 3
Improved traffic flow and orientation	No	Yes	Yes	Yes
Improvements to energy- and water-efficient design	No	Yes	Yes, more than Alternative 2	Yes, more limited than Alternatives 2 and 3

Table 2-3 – Summary of Potential Impacts and Restoration Footprint Areas

Surfaces / Ground Disturbance	Alternative 1: No Action	Alternative 2: South Entrance Hub	Alternative 3: Grizzly Giant Hub	Alternative 4: South Entrance Hub with Modified Commercial Tram Service
Existing Conditions				
Existing impervious (asphalt)surface in lower Grove area	2.9 acres	N/A	N/A	N/A
Existing impervious (asphalt) surface at South Entrance parking lot	0.31 acre	N/A	N/A	N/A
Existing impervious(asphalt) surface at Wawona Point	Yes, at overlook	N/A	N/A	N/A
Existing road through the Grove	8.4 acres	N/A	N/A	N/A
Existing trails within the Grove	3.5 acres minimum (based on estimated widths)	N/A	N/A	N/A
Ecological Restoration				
Net change in development, excluding areas needed for new leach fields	N/A	0.74 acre *addition* of developed area project-wide (comprised of 3.98 acre net reduction of developed area within the Grove, plus 4.72 acre new development at the South Entrance)	0.5 acre *addition* of developed area project-wide (comprised of 5.75 acre net reduction of developed area within the Grove, plus 6.25 acre new development at the Grizzly Giant arrival area and the new Grove bypass road)	2.88 acre *addition* of developed area project-wide (comprised of 1.84 acre net reduction of developed area within the Grove, plus 4.72 acre new development at the South Entrance)
Restoration of giant sequoia habitat through reduction of impervious surfaces in lower Grove	N/A	1.44 acres restoration of giant sequoia habitat (1.45 acre of new build out, all except 0.32 acre atop previous impervious footprint.) Removal of 1.44 acres of the existing development footprint within the lower Grove area would comprise a 50% reduction of impervious surfaces (includes footprint of accessible trails)	2.38 acres restoration of giant sequoia habitat (0.52 acre of new build out, all atop previous impervious footprint.) Removal of 2.38 acres of the existing development footprint within the lower Grove would comprise an 82% reduction of impervious surfaces	1.59 acres available for restoration of giant sequoia habitat (1.30 acres of new buildout, all except 0.17 acre atop previous impervious footprint.) Removal of 1.59 acres of the existing development footprint within the lower Grove area would comprise a 55% reduction
Net restorable area due to trail removal	N/A	0.43 acre	0.58 acre	0.02 acre
Restoration of giant sequoia habitat resulting from narrowing of Mariposa Grove Road or conversion of road segments to trails	N/A	Removal of 2.11 acres of the existing paved road throughout the Grove comprises a 25% reduction of road	Removal of 2.79 acres of the existing paved road throughout the Grove comprises a 33% reduction of road	Removal of 0.23 acres of the existing paved road throughout the Grove comprises a 3% reduction of road
Restoration of hydrologic connectivity to areas where natural flow is disrupted	N/A	Restore two areas where water is currently diverted from its natural course within the Grove (areas are 21.1 acres and 27.5 acres). Restore flow in one area where water is being diverted from the Grove altogether (88.5 acres)	Same as Alternative 2	Same as Alternative 2
Giant sequoia habitat restoration area within the Grove	N/A	3.99 acres removal of built footprint within Grove (27% reduction)	5.75 acres removal of built footprint in the Grove (39% reduction)	1.84 acres removal of built footprint in the Grove (12% reduction)
Restore of natural hydrologic process by repairing leaking water pipe in upper Grove area	N/A	Restore natural hydrologic condition within the western end of the upper Grove Palustrine Emergent wetland by analyzing 4000 lineal feet of water pipe that is understood to be leaking and contributing chlorinated water to the wetland	Same as Alternative 2	Same as Alternative 2
Wetland restoration	N/A	1.0 acre total of wetland restoration due to ecological restoration activities in the lower Grove area and removal of trails and road narrowing in the upper Grove area	Same as Alternative 2	0.77 acre total of wetland restoration due primarily to ecological restoration activities in the lower Grove area
Construction Footprint				
Trail from South Entrance to picnic area using existing Washburn Road to picnic area and construction of a new trail extending from picnic area to lower Grove	N/A	0.66 acre (includes 0.42 acre along old road alignment through non-giant sequoia forest; 0.21 acre new trail through non-giant sequoia forest; and 0.03 acre new trail through giant sequoia forest)	N/A	Same as Alternative 2
Area required for South Entrance construction	N/A	5.0 to 6.0 acres +/- of non-giant sequoia forest	N/A	Same as Alternative 2
South Entrance build out (i.e. net footprint after construction)	N/A	4.72 acres of non-giant sequoia forest (3.13 acres of impervious surfaces)	N/A	Same as Alternative 2
Clearing area required for Grizzly Giant Hub construction	N/A	N/A	5.61 acres +/- of non-giant sequoia forest/ shrubland	N/A

Surfaces / Ground Disturbance	Alternative 1: No Action	Alternative 2: South Entrance Hub	Alternative 3: Grizzly Giant Hub	Alternative 4: South Entrance Hub with Modified Commercial Tram Service
Grizzly Giant area build out (net new footprint after construction)	N/A	0.06 acre of non-giant sequoia forest (includes 0 acres impervious surfaces)	3.13 acres of non-giant sequoia forest (includes 2.92 acres impervious surfaces)	0.06 acre of non-giant sequoia forest (includes 0 acres impervious surfaces)
New bypass road build out footprint under Alternative 3	N/A	N/A	2.20 acres, primarily through non-giant sequoia forest, but with 0.33 acre through giant sequoia forest and 0.10 acre of raised crossings over wetlands	N/A
Prime Habitat Considerations				
Disturbance to prime denning pacific fisher habitat	0 acres	0 acres	3.11 acres disturbed by new road	0 acres
Traffic impacts through fisher habitat	Current activity in habitat areas	Decreases overall traffic	Increases overall traffic	Decreases overall traffic
Potential Impacts to Trees				
Giant Sequoia seedlings/saplings potentially removed or transplanted (0-15" DBH) [1]	N/A	30 (+5 at least seedlings)	0	30 (+5 at least seedlings)
Juvenile Giant Sequoia trees potentially removed(15-30" DBH) [1]	N/A	5	0	5
Giant Sequoia Trees potentially removed (30"or greater DBH) [1]	N/A	0	0	0
Non-Giant Sequoia habitat potentially removed (area in acres)	N/A	4.0 – 5.0 acres	6.9 acres (Includes bypass road and new parking lot at Grizzly Giant.)	4.0 – 5.0 acres
Non-Giant Sequoia trees potentially removed (Total comprised of cedar, pine, fir, and oak [2]	N/A	414 trees	591 trees (comprised of the sizes and species noted below)	414 trees
• By Size:Non-Giant Sequoia trees potentially removed (10-15" DBH)	N/A	17 trees	189 trees (160 estimated in Grizzly Giant west parking lot and bypass road, 29 measured in Grizzly Giant east parking lot and lower Grove accessible drop off)	17 trees
• By Size: Non-Giant Sequoia trees potentially removed (15-30" DBH)	N/A	281 trees	291 trees (242 estimated in Grizzly Giant west parking lot and bypass road, 49 measured in Grizzly Giant east parking lot and lower Grove accessible drop off)	281 trees
• By Size: Non-Giant Sequoia trees potentially removed (30+" DBH)	N/A	116 trees	111 trees (100 estimated in Grizzly Giant west parking lot and bypass road, 11 measured in Grizzly Giant east parking lot and lower Grove accessible drop off)	116 trees
• By Species: Cedar trees potentially removed	N/A	161	59	161
• By Species: Pine trees potentially removed	N/A	109	135	109
• By Species: Fir trees potentially removed	N/A	138	394	138
• By Species: Oak trees potentially removed	N/A	6	3	6
Non-Giant Sequoia tree habitat potentially impacted by construction of new trail from South Entrance to the lower Grove area using Washburn Road alignment	N/A	0.67 acres (includes 0.42 acres along old road alignment through non-giant sequoia forest; 0.21 acres new trail through non-giant sequoia forest; 0.03 acres new trail through giant sequoia forest)	N/A	Same as Alternative B

[1] Giant sequoia tree impacts would be due to the proposed re-route of Mariposa Grove Road through the lower Grove area under Alternatives 2 and 4. The potential tree impacts are based on a visual assessment of the general location of the re-route, but specific locations have not been surveyed yet. During the design of the re-route, impacts on giant sequoia trees would be avoided as much as possible.

[2] Tree Impact Measurement Constraints: (1) Trees below 10" diameter at breast height (DBH) were not surveyed at South Entrance. (2) Tree density and composition was estimated for the Grizzly Giant bypass road (Alternative 3) based on average composition in non-giant sequoia surveyed areas. (3) Tree density and composition was estimated for west Grizzly Giant parking area (Alternative 3) based on average composition in surveyed east Grizzly Giant parking area.



Chapter 3:
Affected Environment and Environmental Consequences

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the existing environment that could be affected by implementation of the alternatives in the *Mariposa Grove FEIS*. It also analyzes the impacts that could result from implementation of each of the alternatives. The information is structured around 14 general topics, which were derived from National Environmental Policy Act (NEPA) requirements, the purpose and need of the project, and input gathered during internal and public scoping. These topics are:

- Vegetation
- Wildlife
- Special-status species
- Wetlands
- Hydrology and water quality
- Soils
- Air quality and climate change
- Soundscapes
- Historic structures
- American Indian traditional cultural resources
- Archaeological resources
- Visitor experience and recreation (including public safety and transportation)
- Park operations
- Energy use and sustainability

NEPA IMPACT ANALYSIS

This chapter provides a scientific and analytic basis for comparisons among the alternatives, in accordance with direction in NEPA and National Park Service (NPS) policy. The analysis examines both direct and indirect impacts that could result from the alternatives based on the context, duration, intensity, and type of potential impact, and whether the impacts would be cumulative. The following guidelines are applicable to all the analysis topics, with the exception of selected cultural resources and rare, threatened, and endangered species (see Assessment of Effects on Special-Status Species and Historic Properties, below).

Context. The context of the impact considers whether the impact would be site-specific, local, parkwide, or regional. For the purposes of this analysis, local impacts would occur within Mariposa Grove or South Entrance. Regional impacts refer to Yosemite National Park in conjunction with adjacent private and public lands in the western Sierra Nevada.

Duration. The duration of an impact considers whether the impact is short term or long term.

- Short-term impacts are generally as long as the construction period (including demolition, materials staging, renovation or repair of existing facilities, establishment of relocated facilities, rehabilitation of historic properties, and preparation of areas for ecological restoration). Impacted resources would return to or resume their previous conditions

following these activities. In this analysis, short-term impacts may last from a few days for site-specific activities, to up to six months for historic rehabilitation or extensive construction.

- Long-term impacts last well beyond the construction period, and the resources may not resume to their previous condition. Permanent impacts could last many years. Successful ecological restoration is an example of a long-term impact.

Intensity. Intensity refers to the degree or magnitude of impacts on a resource. Each impact is identified as negligible, minor, moderate, or major, in conformance with the definitions provided under each impact topic.

Type. The type of impact considers whether the impact is beneficial or adverse. Because the definition of beneficial varies by resource topic, a discussion is provided separately for each resource topic.

- 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. Because the definition of adverse varies by resource topic, a discussion is provided separately for each resource topic.

IMPACT TOPICS CONSIDERED BUT DISMISSED

The impact topics in this section originate from a list that the Council on Environmental Quality (CEQ) developed to ensure consideration of specific topics during preparation of an environmental impact statement. The items on the CEQ list that the NPS considered but dismissed are discussed below. The remaining items on the CEQ list are impact topics addressed in this chapter.

Night Sky. This project is not expected to have an impact on night skies. All new design and construction, or substantial modifications to structures, would conform to the *Yosemite Lighting Guidelines* (NPS 2011j) and avoid impacts on night sky (see Appendix E, Mitigation Measures). Therefore, this topic was dismissed from further analysis.

Museum Collections. The Yosemite Museum collection would not be affected by the proposed project. Therefore, this topic was dismissed from further analysis.

Growth-Inducing Impacts. The alternatives proposed in the *Mariposa Grove FEIS* are unlikely to foster additional growth in the region surrounding the park. A growth-inducing project would directly or indirectly:

- Foster economic or population growth or additional housing
- Remove obstacles to growth
- Tax community services or facilities to such an extent that new services or facilities would be necessary
- Encourage or facilitate other activities that cause significant environmental effects

The regional economy in the vicinity of Yosemite National Park is likely to remain the same under all the alternatives proposed in the *Mariposa Grove FEIS*, as all the alternatives would accommodate existing visitor use levels. In the long-term, growth-inducing impacts would be similar to those of

current conditions, with regional communities providing employment and services similar to current levels (see Socioeconomics, below). Therefore, this topic was dismissed from further analysis.

Socioeconomics. A socioeconomic analysis for this purpose would evaluate potential impacts on the social environment, visitor populations, and the regional economy. The social and economic environments of the surrounding communities are primarily affected by changes in visitor levels, visitor spending, park and concessioner employment, and park and concessioner spending in the regional economy. Impacts on Yosemite National Park and the primary concessioner are addressed in the *Mariposa Grove FEIS* under Chapter 3, Park Operations.

There would be no measureable changes expected in park-wide annual visitation (estimated 3,951,393 people in 2011) as a result of the *Mariposa Grove FEIS*. The goal of the plan is to accommodate the current visitor use levels of the Mariposa Grove area. Concessioner employment associated with the tram, which is eliminated under Alternatives 2 and 3, is a nominal amount of employment and revenue generated within the park. While the gift shop would be removed under all action alternatives, new visitor services would be provided at the South Entrance area (Alternatives 2 or 4) or at Grizzly Giant (Alternative 3). These services would include visitor information, educational, and other sales items, and it is anticipated that there would be little to no net employment change under the action alternatives.

Overall, the project is expected to result in negligible impacts on the socioeconomic environment, visitor populations, and the regional economy. Similarly, the project is not expected to result in growth-inducing impacts either regionally or in nearby communities; this is a consideration under the California Environmental Quality Act. Therefore, socioeconomics was dismissed from further analysis.

Prime and Unique Farmlands. There are no agricultural lands within Yosemite National Park. There would be no direct or indirect effects on downstream agricultural lands. Therefore, this topic was dismissed from further analysis.

Land Use. None of the *Mariposa Grove FEIS* alternatives would fundamentally affect land use in the Mariposa Grove area. Proposed changes at South Entrance and the Grizzly Giant area of the Grove would be consistent with the overall land use pattern: a combination of undeveloped open space, wilderness, and visitor use and recreation. Therefore, this topic was dismissed from further analysis.

Environmental Justice. An environmental justice analysis determines whether a proposed action would have "disproportionately high and adverse human health or environmental effects on minority populations and low-income populations." The NPS and other federal agencies have determined that a disproportionately high and adverse effect on minority and low-income populations would be an adverse effect that (1) is predominately borne by a minority population and/or a low-income population, or (2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the nonminority population and/or non-low-income population.

Potential adverse effects identified in an environmental justice analysis include air, noise, and water pollution; soil contamination; destruction or diminution of aesthetic values; destruction or disruption of community cohesion and economic vitality; displacement of public and private facilities and services; increased traffic congestion; and exclusion or separation of minority or low-income populations from the broader community. Of particular concern is the effect on property acquisition and displacement of people.

No aspect of any alternative in the *Mariposa Grove FEIS* 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 alternatives would be equally applied to all visitors, regardless of race or socioeconomic standing. The one exception to this policy is that use by traditionally associated American Indian tribes and groups would continue to be managed independently of general public recreational use.

Employee housing decisions are not expected to 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.

Cumulative Impacts

The environmental consequences analysis includes a discussion of the *cumulative impacts*, which considers the implementation of the alternatives in the context of other past, current, or proposed projects in the area. A cumulative impact is described in the regulations developed by the Council on Environmental Quality, as follows:

> *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.* (CEQ regulation 1508.7)

The cumulative impacts addressed in this analysis include past and present projects, as well as planning or development activity being implemented or planned for implementation in the reasonably foreseeable future. Appendix B lists the past, present, and reasonably foreseeable actions considered in the cumulative impacts analysis. These cumulative actions are evaluated in conjunction with the impacts of an alternative to determine whether they would have additive effects on a particular resource or value.

Impairment

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies 2006* (NPS 2006) and NPS Director's Order 12 require analysis of potential effects to determine if actions would impair park resources and values. Following public review and after conclusion of the no-action period, the evaluation for determination of impairment for the selected alternative will be documented in an attachment to the Record of Decision for the final *Mariposa Grove EIS*.

Assessment of Effects on Special-Status Species and Historic Properties

The effect of proposed actions on special-status species and historic properties are determined under procedures of the Endangered Species Act (Section 7) and the National Historic Preservation Act (NHPA) (Section 106), respectively. For species listed under the Endangered Species Act, the NPS, in consultation with the U.S. Fish and Wildlife Service (USFWS), must determine if the action will have "no effect," "may effect, not likely to adversely affect," or "may effect, likely to adversely affect" listed species or their habitats. Impact assessments on historic properties (i.e. cultural resources listed on or determined eligible for listing on the National Register of Historic Places [National Register]) under Section 106 of NHPA must determine whether there is " no effect on historic properties," "no adverse effect," or "adverse effect." Some cultural resources impact determinations may be characterized as necessary to fulfill NEPA requirements. Specific methodologies are described in respective sections of this chapter.

NATURAL RESOURCES

VEGETATION

Affected Environment

About 1,700 plant species, subspecies, and varieties and numerous bryophytes and lichens occur in Yosemite National Park (NPS 2010b). The major ecological zones of the Sierra Nevada form readily apparent, large-scale, 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 includes six major ecological zones: west slope oak-chaparral, west slope lower mixed conifer, west slope California red fir belt, west slope subalpine conifer, and alpine, (Keeler-Wolf et al. 2012). The Mariposa Grove of giant sequoias occurs between 5,700 and 6,700 feet in the west slope mixed conifer zone (figures 3-1 and 3-2). The study area around the South Entrance is at approximately 5,150 feet elevation.

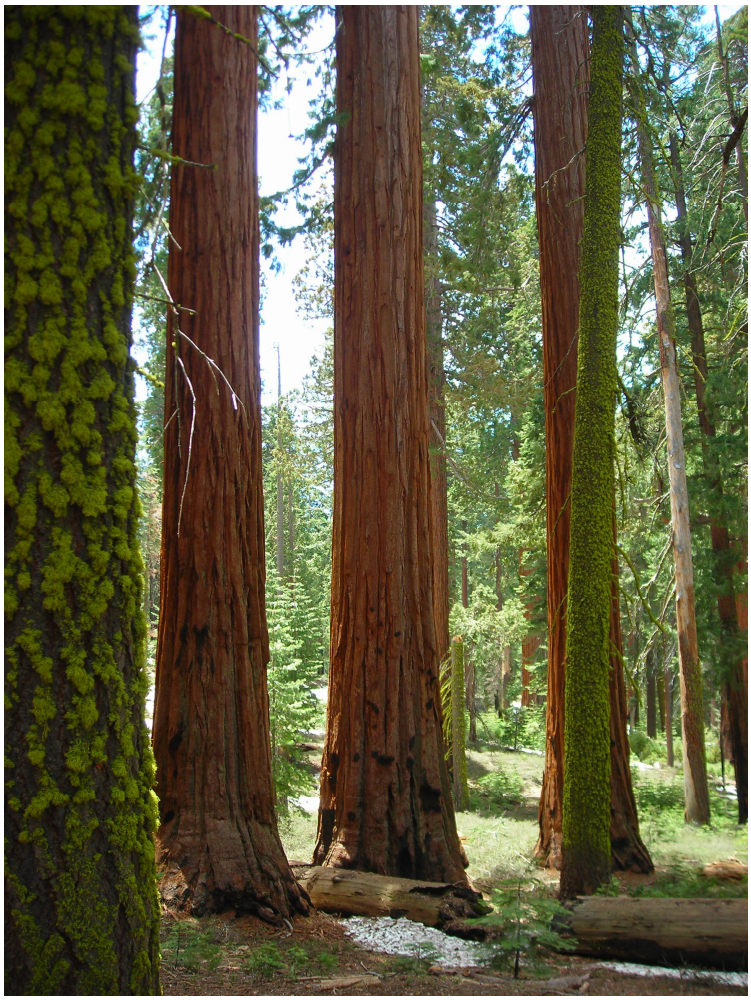


Figure 3-1 – The Big Trees

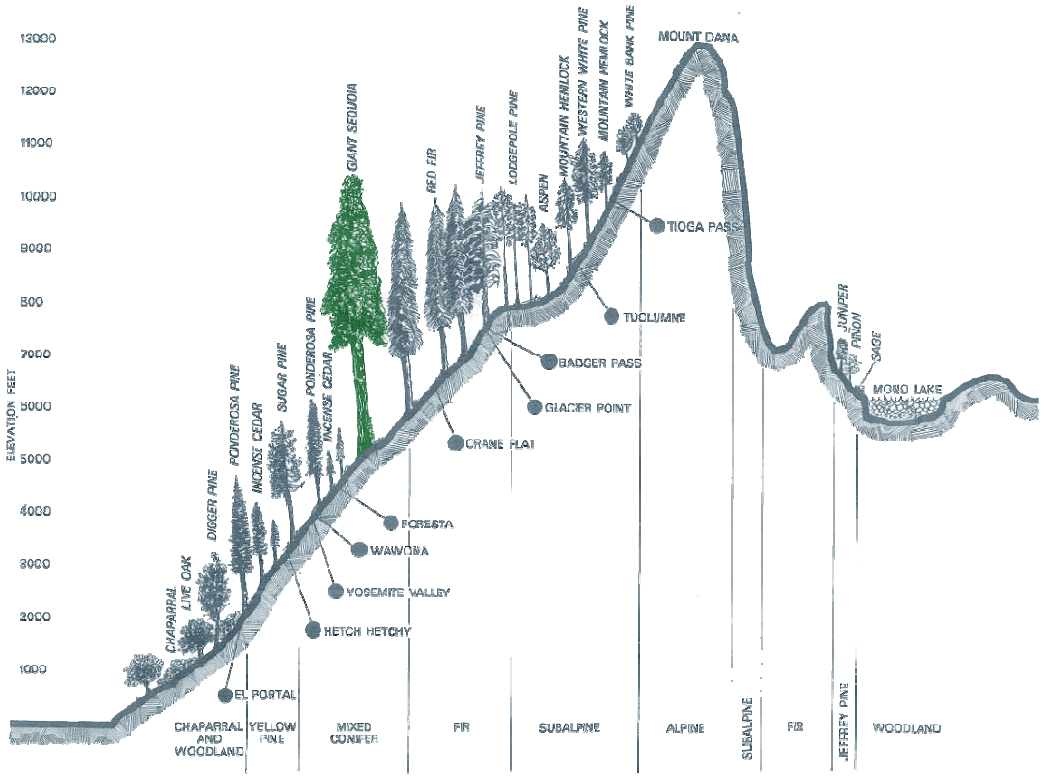


Figure 3-2 – Schematic of Vegetation by Elevation within Yosemite National Park

Source: National Park Service 1980a

Mariposa Grove

The Mariposa Grove of Giant Sequoias covers an area of approximately 222 hectares (550 acres). This is the boundary of the grove of trees and includes most of the roads, trails, and facilities (NPS 2011a). It is the largest of the three groves of giant sequoia within Yosemite National Park. Giant sequoias occur in the giant sequoia/sugar pine alliance, which is one of three upland forest types in the Grove along with the white fir – Sierran mixed conifer alliance and California red fir associations (figure 3-3). The giant sequoia/sugar pine alliance is dominated or co-dominated by giant sequoia (*Sequoiadendron giganteum*). Associated tree species include sugar pine (*Pinus lambertiana*), Jeffrey pine (*P. jeffreyi*), white fir (*Abies concolor*), ponderosa pine (*P. ponderosa*), and incense cedar (*Calocedrus decurrens*). Two oak species, California black oak (*Quercus kelloggii*) and canyon live oak (*Q. chrysolepsis*), and Pacific dogwood (*Cornus nuttallii*) also occur in some locations. Pockets of shrub species include whitethorn ceanothus (*Ceanothus cordulatus)*, greenleaf manzanita (*Arctostaphylos patula*), bush chinquapin (*Chrysolepis sempervirens*) and huckleberry oak (*Quercus vaccinifolia*) (NPS 2011a). Nine vegetation associations that occur in the Mariposa Grove partly define the types of wildlife habitat. These are described in the Wildlife section and include: Sierran mixed conifer, white fir, montane hardwood conifer, montane hardwood, ponderosa, montane chaparral, wet meadow, barren and Jeffrey pine. Wetlands within the Grove are discussed in the Wetlands section of Chapter 3. Figure 3-3 presents vegetation types of the Mariposa Grove, South Entrance, and much of southwestern Yosemite National Park and adjacent lands.

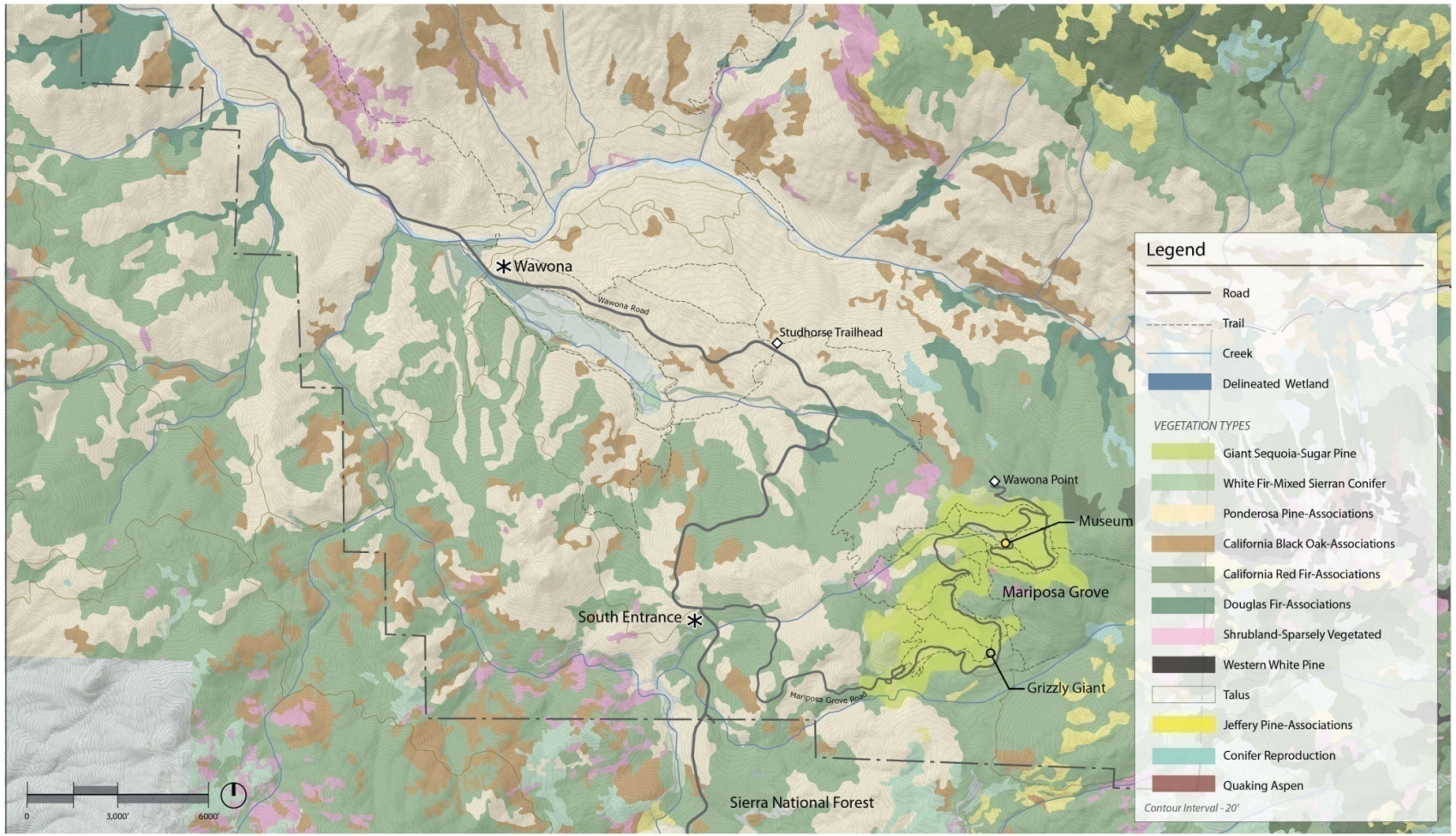


Figure 3-3 – Vegetation Alliances and Associations of Southwestern Yosemite National Park

The adult giant sequoia population in Mariposa Grove is roughly divided into two subpopulations, a lower subpopulation in the lower Grove area and an upper subpopulation in the upper Grove area. Detailed information about the number of adults, juveniles, saplings, and seedlings, as well as their spatial relationship with roads, burned areas, wetlands, and other geographic features is contained in the document *Giant Sequoias of the Mariposa Grove: Population Status and Trends: 2011* (NPS 2011a). The relevant key findings of this reference and other relevant reports are discussed below.

Many factors contribute to the current conditions of plant communities in the Mariposa Grove. Giant sequoia mixed coniferous forest typically requires recurring, moderately intense fires to maintain healthy ecosystem function (NPS 2011b). The past century of fire suppression has resulted in increased density and proportion of shade tolerant tree species such as white fir and incense cedar, increased accumulation of dead and down woody debris, reduced regeneration of giant sequoia and pines, and reduced density of shrubs (Weatherspoon 1986). Native diseases, insects and pathogens also shape plant communities. Annosus root disease (*Fomes annosus*), primarily spread by tightly spaced white fir, occurs in the Grove and can contribute to failure of mature giant sequoia (Piirto 1994). Outbreaks of the native Douglas-fir tussock moth (*Orgyia pseudotsugata*) periodically occur, causing some mortality in white fir. In addition, snow removal, road repairs, and utilities maintenance regularly damage or kill vegetation. An average of 30 hazard trees are cut annually to protect Mariposa Grove parking areas, buildings, and the Grove road (NPS 2011a).

Of the many factors important for successful giant sequoia germination and establishment, the most influential are fire and hydrology. Fire is critical for successful giant sequoia reproduction since it fulfills several requirements for regeneration. Fire prepares a seed bed by consuming surface fuels, including downed trees and dense understories; it provides a nutrient rich layer of ash on the soil surface;, and it opens up the canopy to provide ample light for emerging seedlings (figure 3-4) (Harvey et al. 1980).



Figure 3-4 – Burned Area in Mariposa Grove

Topography and groundwater levels also influence the spatial distribution of giant sequoias, with most adults and juveniles occurring in concave to flat areas (figure 3-5). Soil moisture, important in all life stages of the giant sequoias, is especially critical at the germination stage. In the Mariposa Grove, recruitment of giant sequoia appears to be tied to wetlands for several size classes. Juvenile giant sequoias are strongly associated with the mapped wetlands: 54 percent are within wetland boundaries, and approximately 81 percent are within 100 feet of wetlands. Saplings also are correlated with wetlands, with 42 percent established within wetlands, and 68 percent within 100-feet of wetlands (NPS 2011c). Based on these associations, it is likely that altered hydrology and impacts on wetlands affect recruitment of giant sequoias.

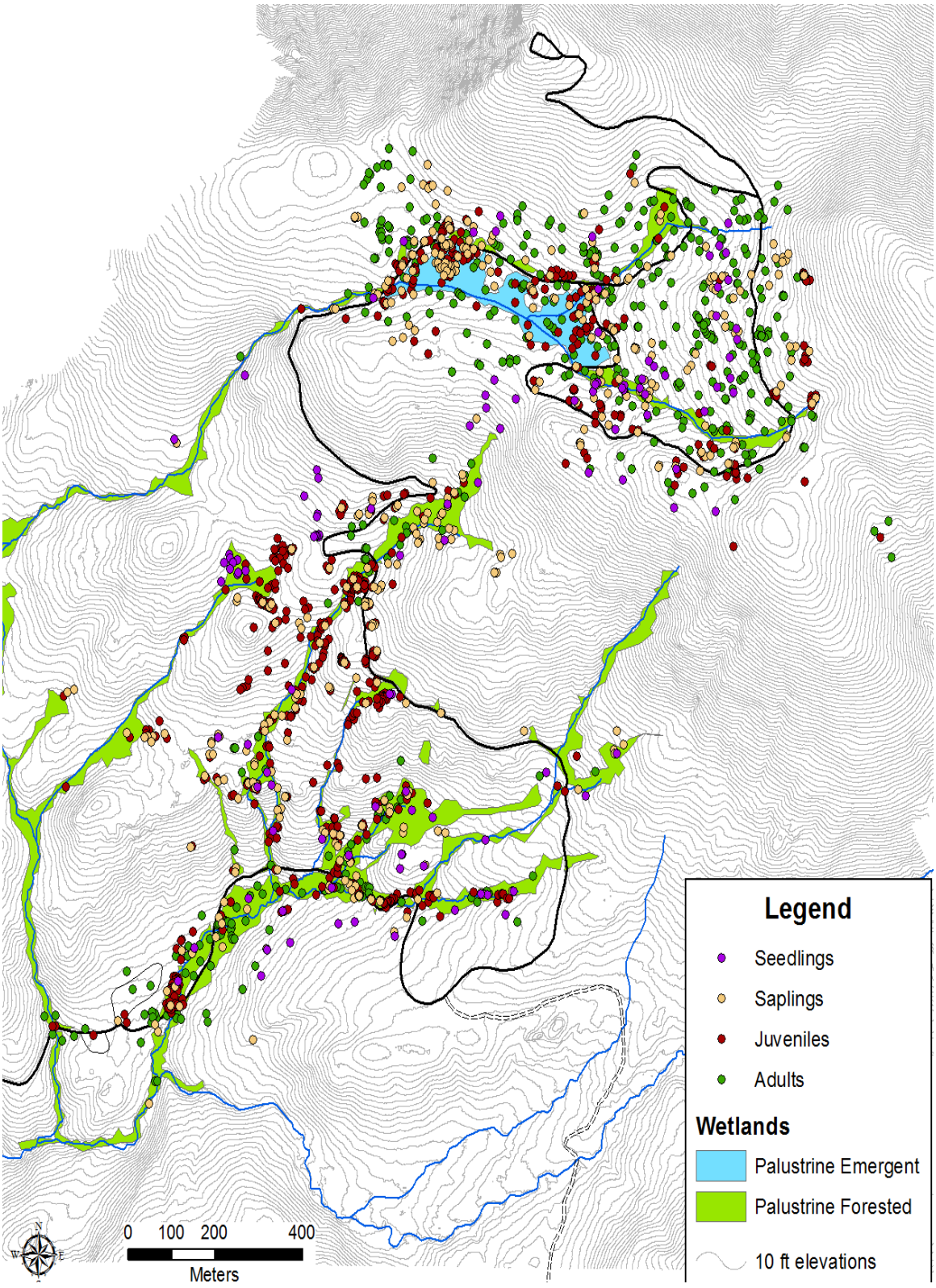


Figure 3-5 – Location of Giant Sequoias in the Mariposa Grove

(Note age class distribution and proximity to wetlands particularly in the lower Grove area.)

Giant sequoias have expansive but shallow root systems that provide stability for the tree's enormous mass; rather than succumbing to insects or pathogens, toppling or fire are the primary causes of giant sequoia mortality. The root systems are vast and extend to as much as 200 feet from mature trees (NPS 2011c). A majority of mature giant sequoias in the Mariposa Grove are found close to existing roads. An analysis of the spatial arrangement of mature trees in relation to the paved roads in the Grove found the mean distance from road centerline to tree centerline was 180 feet, with a range of 6.5 to 817 feet; 68 percent of all mature trees lie within 175 feet of road centerlines, which is well within the root zones of the giant sequoias (NPS 2011c). Because the root systems are so large and extend under roads, the roads themselves and the maintenance thereof may negatively impact the majority of adult giant sequoias. Most direct and indirect road impacts are adverse, primarily the cutting of roots during road construction and maintenance, as well as bole and bark damage from road maintenance and passing vehicles. In addition, similar to roads, hiking trails are suspected to have negative impacts (albeit less so than roads) on giant sequoias; where hikers could cause considerable soil erosion, exposing giant sequoia roots and potentially contributing to tree failure. However, there is no empirical evidence to substantiate anecdotal impacts that hiking trails influence the longevity of giant sequoias. Seventy percent of all adult trees are within 200 feet of trails, which is within the maximum estimated root zone distance for adult giant sequoias (NPS 2011c).

A large number of giant sequoia seedlings and saplings are found near roads. However, as younger trees mature, the roads may begin to exert the negative impacts described in the previous paragraph.

Climate change may play an important role in the future of Mariposa Grove ecology. The Mariposa Grove is relatively dry and is close to the elevation where the dominant form of precipitation transitions from snow to rain, suggesting that it may be more vulnerable to changes in precipitation relative to other groves (York 2011). As the climate warms, snow melt, a major source of soil-water recharge in giant sequoia groves, is likely to come earlier in the spring than at present, potentially prolonging the summer drought that is characteristic of the Sierra's Mediterranean-type climate (York 2011).

Non-native Species. The Mariposa Grove has a relatively low level of infestation of non-native plant species. However, invasive plant populations in the Mariposa Grove are a concern because of their potential to spread into more remote wilderness locations. Invasive species mapping in Mariposa Grove identified six priority species including Himalayan blackberry (*Rubus discolor*), cut-leaf blackberry (*R. laciniatus*), bull thistle (*Cirsium vulgare*), common mullein (*Verbascum thapsus*), foxglove (*Digitalis purpurea*), many-flowered tobacco (*Nicotiana acuminata* var. *multiflora*), and velvet grass (*Holcus lanatus*) (NPS 2012a).

Fire Management. Yosemite National Park fire managers began prescribed burning in the Mariposa Grove in 1971, and nearly the entire Grove has burned at least once over the past 40 years, with most areas having burned more than once since then (figure 3-6). During this period, the repeated prescribed fires have greatly reduced the density of fuels and trees within the Grove. However, forests surrounding the Mariposa Grove have not been managed intensively through the years. Much of the forest surrounding the Grove has not burned in the last 100 years. Historically, these forests burned roughly every 9 years prior to Park Service management. As more time passes, there is a greater build-up of fuels and greater departure from the historic fire return frequency, which is described by the fire return interval departure (FRID). Most of the surrounding forests have a FRID of 4 or higher. The unburned forest and high concentration of surface fuels, including downed trees, as well as dense understories in forests surrounding the Grove leave it vulnerable to a high-intensity fire in the future (NPS 2011b) (figure 3-7).

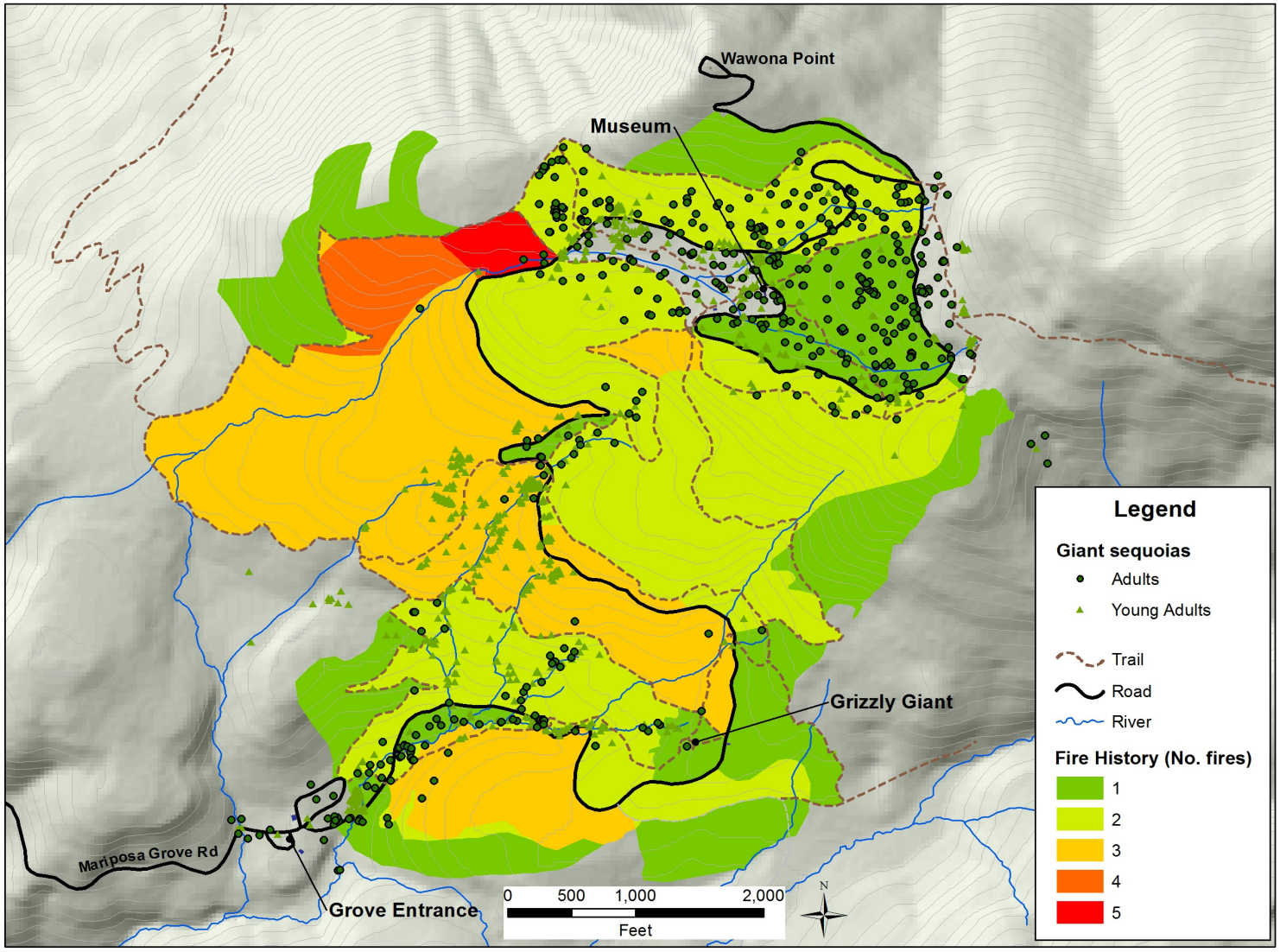


Figure 3-6 – Fire History of the Mariposa Grove

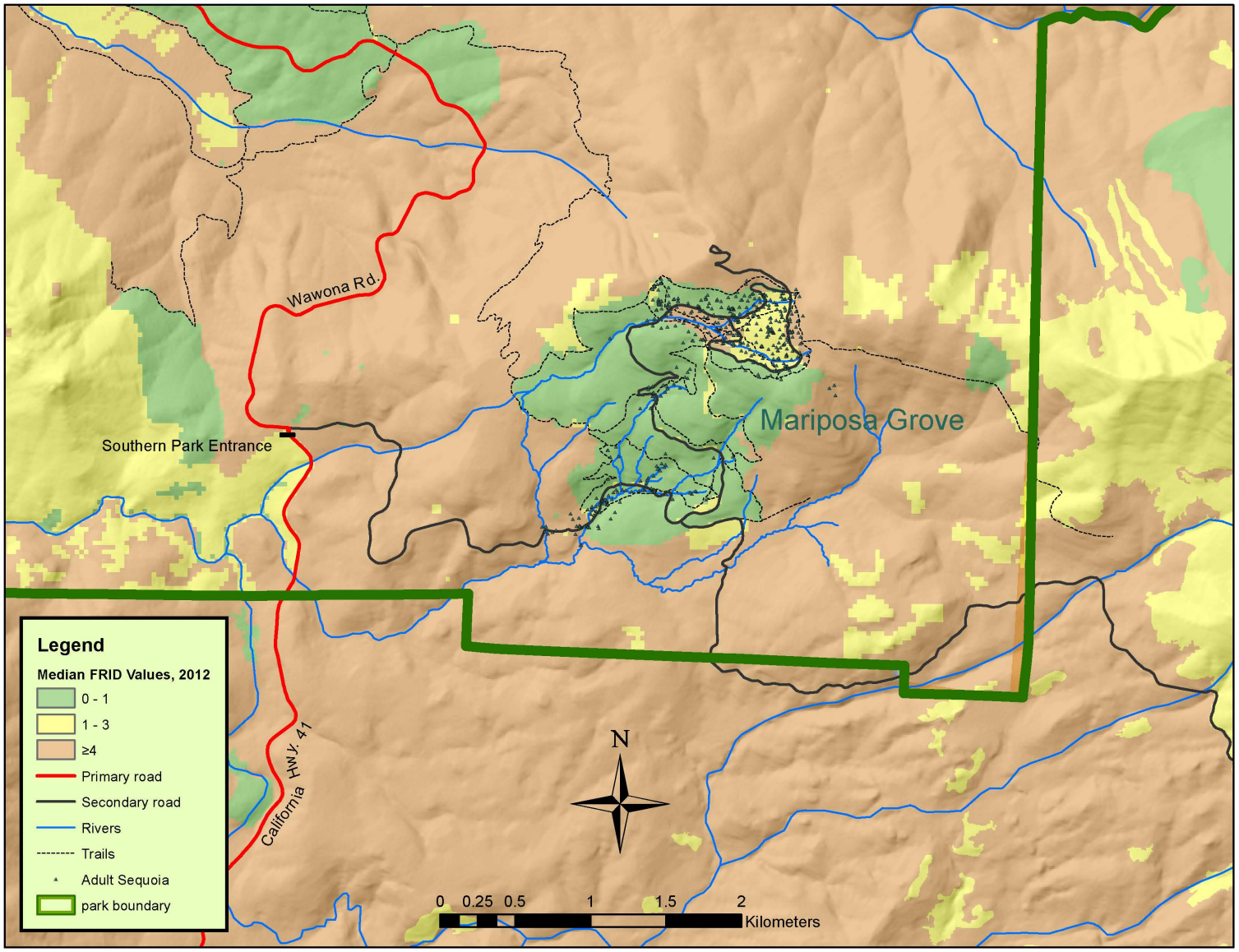


Figure 3-7 – Fire Return Interval Departure for the Mariposa Grove and Surrounding Forest

South Entrance

Upland Vegetation. The dominant vegetation at the South Entrance includes two forest types, one co-dominated by white fir and sugar pine, with a smaller proportion of incense cedar and Jeffrey pine, and the other co-dominated by ponderosa pine and incense cedar, with a smaller proportion of California black oak and canyon live oak (NPS 2011a). The South Entrance also includes a small pocket of ponderosa pine and incense cedar forest.

This area was heavily logged in the early 1900's by the Madera Sugar Pine Company and, therefore, consists of second growth smaller diameter trees. In 1909, the company's logging activities and land holdings so worried Wawona hotelier E.P. Washburn that he expressed concern for the scenic preservation of the drive between Wawona and the Grove (Greene 1987).

Wetlands within the South Entrance area are discussed in the later Wetlands section.

Non-native Species. The South Entrance has a low level of infestation of non-native plant species, with conditions and treatment similar to those described above for the Mariposa Grove.

Fire Management. The FRID of most of the area immediately surrounding the South Entrance is greater than 4. An exception is a small section of FRID 2 to the west of the entrance station, which burned in the 1980s and again in 2003. Due to fire suppression, the area has an increased stem density of more shade-tolerant species such as white fir and incense cedar. This species mix was encouraged by the logging of pines, which occurred in the late 1800s. Fire suppression has also resulted in an increased stem density of small-diameter trees, and higher concentrations of dead and downed wood. Hazard trees are removed annually for safety and fuels management.

Environmental Consequences

Impact Assessment Methodology

Determination of the significance of potential impacts on vegetation is based on the context, duration, type, and intensity of impact that could result from actions associated with implementation of an alternative under consideration. For the alternatives evaluated in this *Mariposa Grove FEIS*, vegetation impact assessment was based on a qualitative analysis of project area vegetation and the potential effects anticipated as a result of ongoing maintenance, construction, or rehabilitation. The qualitative analysis also considered areas that were likely to be affected by selective road and infrastructure improvements, relocation, and/or development, as well as other aspects of the project.

The essential qualities of native plant communities include their spatial extent, integrity (consistency) of species composition, repeated association with natural features, and vigor in terms of the growth and reproduction of constituent species. Actions that reduce/degrade these qualities are considered to have adverse impacts; actions that preserve or restore these qualities have beneficial impacts. The proposed action alternatives have a variety of different components that would affect vegetation, including ground disturbance and vegetation removal, alteration of drainage patterns, changes in vehicle and pedestrian traffic volumes and patterns, impacts on roadside areas, and active revegetation and restoration measures.

Impact Intensity Level Definitions

Negligible – Native vegetation would not be affected, or impacts would not be measurable.

Minor – Impacts on native vegetation would be detectable however restoration would minimize or rectify adverse impacts, and would be relatively simple to implement and would have a high probability of success.

Moderate – Impacts on native vegetation would be readily apparent and restoration would be necessary to reduce or rectify adverse impacts.

Major – Impacts on native vegetation would be readily apparent and would substantially change the biological value of the native plant community in the context of the park or Region. Restoration would be necessary to reduce or rectify adverse impacts, and its success could not be guaranteed.

Alternative 1: No Action

Construction Impacts. Plant community qualities would be unchanged under Alternative 1 because concessioner services maintenance and park management would remain as is. No actions such as removal or renovation of existing infrastructure, improvement of hydrologic flow, project-specific prescribed fire treatments, soil decompaction, and construction of facilities would be implemented.

Operations-related Impacts. Under Alternative 1, current park resource management programs such as prescribed burning and invasive species management would continue. Existing road design and alignment, impermeable surfaces (including parking facilities), insufficient or plugged culverts, and trails would continue to impair hydrologic connectivity, infiltration, subsurface flow, and retention of available water within the Mariposa Grove which could degrade native plant communities. Specific facilities and structures impacting hydrologic flow/process include: (1) 41 roadway drainage culverts with diminished function or capacity, (2) 2.9 acres of impervious surface in the lower Grove area and 0.31 acre at the South Entrance, (3) 8.4 acres of existing road through Mariposa Grove and (4) about 3.5 acres of existing trails with Mariposa Grove. As a result, 48.6 acres of surface water runoff is diverted from natural flow patterns within the Mariposa Grove and 88.5 acres of surface water runoff is diverted from the Mariposa Grove. Road and parking area stormwater runoff would continue to discharge waterborne pollutants directly into the giant sequoia ecosystem. Leaks from the chlorinated-water pipeline through the upper Grove area would continue to affect soil saturation and plant communities along the water line.

Tram operations, employee parking, and visitor use off trails would continue to damage giant sequoia root systems and plant communities by compacting soils in local areas. Compacted soils from pedestrian traffic along trails would continue sheet erosion of litter, duff, and topsoil; the indirect removal of this protective covering could expose roots and would change conditions required for giant sequoia seedling survival. Damage to trees, such as stripping off protective bark, pedestrian trampling of the roots, and collection of seed cones, would continue in high-use areas. The impact would be minimized with proper fencing, educational programs and signage, and regular management and patrols of these areas. Narrow points along the Mariposa Grove Road would continue to result in scrapes that damage giant sequoia as drivers attempt to avoid vehicle collision.

Fire management practices would include prescribed burning in and near the Grove and would favor a long-term change in plant community composition away from shade-tolerant and fire-intolerant species. Prescribed fire also would help in the reproductive success and recruitment of giant sequoia within the Grove. However, the fuels outside the immediate Mariposa Grove vicinity, particularly to the south and west, could continue to grow, increasing the possibility of a catastrophic crown fire, which could threaten the survival of the giant sequoias at the Grove.

Impact Significance. Alternative 1 would be expected to have major adverse impacts on vegetation within the Mariposa Grove that are not widespread but that exist as long-term impacts.

Conclusion. Park infrastructure would not be improved and existing adverse impacts on vegetation would continue, including damage to giant sequoia roots systems, vehicle scraping of giant sequoia, and impaired hydrologic function within the Mariposa Grove. Commercial tram service, visitor access, and current fire management practices would continue at existing levels, and would result in adverse impacts on vegetation resources.

Cumulative Impacts. Cumulative impacts on vegetation discussed in this section consider the past, present, and reasonably foreseeable future actions in the Yosemite region in conjunction with the potential effects of Alternative 1(No Action). In the past 150 years, activities associated with urbanization and regional population growth (e.g., building and dam construction, utility installation, road and bridge building, intensive logging, stormwater discharge) contributed to direct loss of native plant communities in the Yosemite region. Impacts range from direct loss of native vegetation (e.g., replaced with structures); alteration of natural patterns (e.g., fire suppression around structures, the introduction of night light); increased erosion and sedimentation (e.g., during grading activities, overuse of trails); to indirect losses such as changes in water flows that sustain vegetative habitat. Other activities, particularly fire suppression, changed the nature of existing native plant communities. These past impacts correlate with the spread of invasive plants in California. While fewer than 10 percent of the 1,000-plus (Hickman 1993) non-native plant taxa that have established in California are recognized as serious threats, the spread of non-native plants has dramatically changed the landscape of the Yosemite region. For example, grasses native to the Mediterranean region are now a dominant understory plant in the Sierra Nevada foothills. Changes in vegetation are likely to increase in intensity or rate as the climate continues to change (D'Antonio 2004; Mutch 2007). The overall effect of these past actions and future trends on vegetation in the Yosemite region has been adverse, long-term, and major.

Current and future plans and projects in the region would have beneficial and adverse impacts on vegetation (Appendix B). The *Parkwide Invasive Plant Management Plan Update,* Comprehensive Ecological Restoration Projects*,* Wawona Meadow Restoration Project, and ecological restoration elements of the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans* would result in long-term beneficial impacts on plant communities. Activities associated with the *Fire Management Plan/Operational Fire Management Plan* and U.S. Forest Service fuels reduction projects would greatly reduce the threat of large high-severity catastrophic fires, and reduce the potential for vegetation type conversion. Within the Mariposa Grove area, prescribed burns will continue to take place periodically; the last burn was in 2008. The *Wilderness Stewardship Plan* could contribute watershed-scale protection to native plant communities, depending on the outcome of the final plan. Past and future actions would have a long-term moderate beneficial effect on vegetation.

There would be adverse impacts on vegetation associated with the current South Entrance Station Kiosks Replacement project, the *Scenic Vista Management Plan*, the Environmental Education Center, and future actions associated with new development proposed in the *Draft Merced River Plan* and *Draft Tuolumne River Plan*, due to the localized loss of vegetation. Site-specific adverse effects on vegetation could be short-term (during construction) and long-term (direct displacement of vegetation). These plans include mitigation measures to preserve the genetic integrity of native plants and reduce the risk of importation and spread of invasive plants.

In summary, past impacts on vegetation in the region have been adverse, long-term, and major. Present and foreseeable future actions would contribute to reversing the adverse impacts of past actions in the region to moderate adverse impacts. Past, present, and future impacts, in conjunction with the localized, long-term major adverse impacts on vegetation under Alternative 1 (No Action), would result in a long-term moderate adverse impact on vegetation in the Yosemite region.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the gift shop and commercial tram operation from the Mariposa Grove, and reduce the amount of lower Grove parking while expanding and relocating primary visitor parking to the South Entrance, making the South Entrance the departure point for visitors accessing the Grove. Rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improved way-finding and protective barriers that would reduce off-trail pedestrian use, would be components of this alternative.

Construction-related Impacts. Adverse impacts on vegetation from Alternative 2 within the Mariposa Grove would include vegetation removal associated with construction of new infrastructure and the removal of existing buildings and infrastructure. This alternative includes the option to construct a newly aligned vehicle bridge at the entrance curve to Mariposa Grove, which would occur within 50 feet of three mature giant sequoias. This, plus the re-route of Mariposa Grove Road out of the wetland in the lower Grove area, would potentially impact up to 35 seedling or juvenile giant sequoias; these trees may be removed or transplanted if less than 15 inches diameter at breast height. This estimate is based on a visual assessment of the general location of the re-route, and during the design phase tree locations would be surveyed and avoided to the extent possible. While the construction of the new vehicle bridge would impact giant sequoia roots, the removal of the existing road alignment through the wetland would reduce impacts on roots of other giant sequoia in the vicinity over the long term. Shrubs and groundcover would be removed or salvaged during construction to clear and restore roadside ditches. Removal of the vehicle bridge at the entrance curve, vault toilets, and trailhead at the lower Grove parking area; extending the existing footbridge in the lower Grove area; and reducing the size of the lower Grove parking area would result in changes to plant community composition and structure. In addition, narrowing and converting the existing paved road past the Grizzly Giant to a hardened trail and developing accessible pathways in the lower Grove area and at Grizzly Giant would also alter plant community composition and structure.

Construction of the roundabout at the Wawona Road – Mariposa Grove Road intersection would result in some vegetation removal, though in a previously disturbed area. It is estimated that the construction of the roundabout could result in the removal of between 15 and 20 non-giant sequoia trees. Clearing of vegetation and grading would occur along the existing Washburn Road and in an undisturbed area south of the Mariposa Grove Road and east of the picnic area during construction of the proposed pedestrian trail from the South Entrance to the lower Grove area. Areas where buildings and infrastructure are removed would be restored; indirectly this could result in improving the plant community function.

Leach fields may be constructed at the South Entrance and lower Grove area contingent upon further soil surveys and analysis. The potential options for leach field locations plus the allocation of a 100 percent replacement set-aside area would result in the removal of non-giant sequoia trees. No giant sequoia habitat would be affected, although the types of trees impacted would vary slightly.

The leaking water line would be repaired or replaced, and the water tank and chlorination unit would be moved to a site below the museum in the upper Grove area. Repair of the water distribution system would reduce the extent of or eliminate hydrophitic vegetation currently supported by water line leaks. Additional discussion of potential wetland impacts associated with Alternative 2 is provided in the Wetlands section. Selected limbing or tree removal would be conducted at Wawona Point to restore the panoramic vista. This could help move these areas towards a more natural plant community composition and structure.

Adverse vegetation impacts at the South Entrance would result from construction of a new parking area with primary access and visitor support facilities. During construction activities plants may be broken, crushed, or completely removed. Revegetating areas temporarily impacted by construction would restore natural plant community composition and structure. South Entrance would require clearing between 5.0 acres and 6.0 acres of non-giant sequoia habitat. The net footprint after landscape restoration at the South Entrance build-out would equal 4.72 acres of non-giant sequoia habitat, including 3.13 acres of impervious surfaces. A new trail from South Entrance to lower Grove area would impact a total of 0.66 acre, including 0.42 acre along old Washburn road alignment, 0.21 acre of new trail across non-giant sequoia habitat, and approximately 0.03 acre of the new trail across giant sequoia habitat.

Impact Significance. Under Alternative 2, construction is expected to have site-specific, long-term minor adverse and beneficial impacts on vegetation within the Mariposa Grove, and moderate long-term adverse impacts on non-Sequoia vegetation at the South Entrance.

Restoration-related Impacts. Beneficial impacts on vegetation under Alternative 2 include (1) a 1.44 acre-reduction of impermeable surfaces within the lower Grove area due to removal of the lower Grove parking lot, gift shop, and commercial tram staging area and operations, (2) restoration of 0.43 acre of giant sequoia habitat from the removal of trails with Mariposa Grove, and (3) restoration of 2.11 acres of giant sequoia habitat from the narrowing of road or conversion of roads to trails within Mariposa Grove.

Restoration after the removal of impermeable surfaces would provide for giant sequoia habitat restoration, soil decompaction, and increased water infiltration. Improvements to roadway drainage culverts with diminished function or capacity, and implementation of sustainable stormwater strategies would improve hydrologic connectivity, restore subsurface flows, and retain water within the Mariposa Grove which would restore giant sequoia habitat, and could improve survival and seedling recruitment. Two areas (21.1 acres and 27.5 acres, respectively) where water is being diverted from its natural course within Mariposa Grove and one area (88.5 acres) where water is being diverted outside of Mariposa Grove would be restored. Alternative 2 would restore 1.0 acre of wetlands due to ecological restoration activities within the lower Grove area and removal of trails and road narrowing in the upper Grove area.

Over the long-term, removal of infrastructure and elimination of the commercial tram service from the Mariposa Grove would protect and restore giant sequoia habitat and could improve the health of mature sequoias and aid in seedling recruitment. Project-wide, the net change in development under Alternative 2 would equal the addition of 0.74 acre in developed area which is comprised of 3.98 acres net reduction in of developed area within the Grove plus 4.72 acres of new development at the South Entrance. The removal of facilities and roads would improve water infiltration and could reduce impacts on vegetation by removing pavement that covers roots. Human-induced impacts that change the environment (e.g., impermeable surfaces that alter soil moisture content) and indirectly affect the vigor and reproduction of giant sequoia would be reduced. Removal of facilities and roads could reduce the need for hazard tree removal in some areas. Hazard tree removal would continue to ensure visitor safety and infrastructure protection where appropriate. Appendix D provides the restoration plan for the Grove.

Impact Significance. Alternative 2 is expected to have site-specific, long-term, major beneficial impacts and minor adverse impacts on vegetation within the Mariposa Grove.

Operations-related Impacts. Narrowing the existing road past the Grizzly Giant into a hardened trail and converting the southern portion of the upper Grove loop road to a pedestrian trail would reduce traffic and operational activities in the Mariposa Grove and reduce adverse impacts on vegetation. Adverse impacts on vegetation would be introduced from vehicle and visitor use at the new Grove parking area at the Grizzly Giant. The South Entrance would experience an increase in visitation and operational use resulting in greater adverse impacts on vegetation. Day use activities would continue to cause vegetation impacts in the Mariposa Grove. Pedestrian traffic would include direct impacts on the trails from soil compaction, erosion, and root exposure that could affect the health of giant sequoia; but much of this can be minimized through clear trail delineation. Vandalism, such as stripping off bark from giant sequoia, could continue in high-use areas. But the impact would be minimized with proper fencing, educational programs and signage, and regular management and patrols of these areas. The addition of way-finding signs and improving visitor orientation could reduce off-trail use, indirectly improving plant community composition and structure.

Mechanical thinning and prescribed fire planned south and west of the Grove up to the park's boundary with the Sierra National Forest would mitigate risks of a catastrophic crown fire reaching the Mariposa Grove. Implementing these fire management actions would improve plant communities and return areas to the pattern of natural plant composition and structure.

Impact Significance. Alternative 2 operations are expected to have site-specific, long-term minor beneficial and adverse impacts on vegetation within the Mariposa Grove, and minor adverse impact on vegetation at the South Entrance.

Conclusion. Construction activities within the Mariposa Grove would result in some temporary adverse impacts on vegetation. There would be long-term major beneficial impacts from the termination of commercial tram services and the removal of developed areas that would result in 3.98-acres of ecological restoration within Mariposa Grove. Restoration of hydrological flows would have long-term beneficial impacts on vegetation within the Mariposa Grove. The second growth vegetation at the South Entrance would experience moderate long-term adverse impacts from greater use and development of parking and other facilities.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting vegetation would be the same as those under Alternative 1 (No Action)—an overall long-term moderate adverse impact on vegetation in the Yosemite region. These impacts, in conjunction with the long-term major beneficial impacts of Alternative 2 on vegetation in the Mariposa Grove, and the long-term moderate adverse impacts on vegetation at the South Entrance, would result in long-term moderate adverse impacts on vegetation in the Yosemite region.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, including two new bridges, and a new larger parking lot near the Grizzly Giant, outside of giant sequoia habitat. This alternative would make the Grizzly Giant the primary departure point for visitors to the Grove. The current South Entrance parking lot would remain as is, and the lower Grove parking lot would be largely removed; ten ABAAS-compliant parking spaces would be provided in the lower Grove area. Accessible pathways would be developed in the lower Grove area and at Grizzly Giant. Rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, and soil decompaction would be similar to those described under Alternative 2, South Entrance Hub.

Construction-related Impacts. Adverse vegetation impacts from Alternative 3 would include vegetation removal associated with removal of existing infrastructure and construction of new structures, including the bypass road, two new vehicle bridges, new parking facility and primary access node at the Grizzly Giant Hub, flush toilets at the lower Grove parking area, extending the existing footbridge in the lower Grove area, reducing the size of the lower Grove parking area to include only ABAAS-compliant parking spaces, narrowing and converting the existing road surface to a hardened trail. Construction of the newly aligned vehicle bridges south of the current road would occur within 50 feet of one mature giant sequoia. While the new vehicle bridges would impact giant sequoia roots, the removal of the existing road alignment and culverts would reduce impacts on roots of other giant sequoia in the vicinity. Construction of the bypass road would impact about 2.2 acres of vegetation, primarily non-giant sequoia habitat but including 0.33 acre of giant sequoia forest and 0.10 acre of raised crossings over wetlands. Construction activities for the bypass road and new bridge structure would occur near existing mature giant sequoia, which could adversely impact the root system. The Grizzly Giant Hub would require clearing approximately 5.61 acres of non-giant sequoia habitat and shrub lands. The net footprint after landscape restoration at the Grizzly Giant Hub after build-out would equal 3.13 acres of non-giant sequoia habitat, including 2.92 acres of impervious surfaces.

Adverse vegetation impacts from Alternative 3 at the Grizzly Giant area would include vegetation removal associated with construction of a parking lot and vault toilet facilities. Adverse vegetation impacts from Alternative 3 would be concentrated in different locations than under Alternative 1 or 2, because under Alternative 3 the South Entrance would remain unchanged and the primary facility improvements would occur within the Grove at Grizzly Giant.

Impact Significance. Alternative 3 is expected to have site-specific, long-term moderate adverse impacts on non-giant sequoia vegetation at the Mariposa Grove, and minimal adverse impacts on vegetation at the South Entrance.

Restoration-related Impacts. Beneficial impacts on vegetation from Alternative 3 include (1) a 2.38-acre reduction of impermeable surfaces within the lower Grove area, (2) restoration of 0.58 acre of giant sequoia habitat due to the removal of trails with Mariposa Grove, and (3) restoration of 2.79 acres of giant sequoia habitat due to the narrowing of road or conversion of roads to trails within Mariposa Grove. Project-wide, the net change in development under Alternative 3 would result in the addition of 0.50 acre in developed area which is comprised of 5.75 acre net reduction in of developed area within the Grove plus 6.25 acres of new development at the Grizzly Giant arrival area and new bypass road. Restoration after the removal of impermeable surfaces would provide for giant sequoia habitat restoration, soil decompaction, and increase water infiltration. Improvements to roadway drainage culverts with diminished function or capacity, and implementation of sustainable stormwater strategies would improve hydrologic connectivity, restore subsurface flows, and retain water within the Mariposa Grove which would restore giant sequoia habitat, and could improve survival and seedling recruitment. The amount of area where hydrologic connectivity is being restored would be similar to Alternative 2. Alternative 3 would restore 1.0 acre of wetlands within the lower Grove area. Appendix D includes the restoration plan for the Grove.

Impact Significance. Alternative 3 is expected to have site-specific, long-term major beneficial impacts on vegetation within the Mariposa Grove.

Operations-related Impacts. Narrowing portions of the existing road into a hardened trail and converting the southern portion of the upper Grove loop road to a pedestrian trail would reduce traffic and operational activities in the Mariposa Grove and reduce adverse impacts on vegetation. Removing the existing road from the lower Grove area to the Grizzly Giant and routing operational

use to the bypass road would reduce operational-related impacts on vegetation at the lower Grove area compared to Alternative 2 but would introduce disturbance into new non-giant sequoia habitat areas. Shifting the primary arrival node to Grizzly Giant would increase visitation and operational use in that location resulting in greater indirect adverse impacts on vegetation from pedestrian trampling and off-trail use. However, additional way-signing and day-use-related activities would result in similar impacts on vegetation as Alternative 2.

Impact Significance. Alternative 3 operations would have site-specific, long-term minor adverse impacts on vegetation within the Mariposa Grove, and moderate adverse impact on vegetation at the Grizzly Giant.

Conclusion. Construction activities within the Mariposa Grove would result in long-term moderate adverse impacts on non-giant sequoia vegetation associated with the construction of the bypass road, parking area, and primary access facilities at Grizzly Giant Hub. Long-term beneficial impacts would result from the termination of commercial tram services and the removal of developed areas that would make 5.75 acres available for ecological restoration within the Mariposa Grove. Alternative 3 would result in a net addition of 0.05 acre in developed areas project-wide after build-out. Overall, long-term beneficial impacts on vegetation are expected to be moderate within the Mariposa Grove and negligible at the South Entrance.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting vegetation would be the same as those under Alternative 1 (No Action)—an overall long-term moderate adverse impact on vegetation in the Yosemite region. These impacts, in conjunction with the long-term beneficial impacts of Alternative 3 in the Mariposa Grove, and the long-term adverse impacts on vegetation near the Grizzly Giant and access road, would result in long-term moderate adverse impacts on vegetation in the Yosemite region.

Alternative 4: South Entrance Hub with Modified Commercial Tram Service

Alternative 4 would maintain the commercial tram tour, but with a limited route and hours of operation, while also relocating the majority of the parking to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Adverse impacts resulting from construction of new facilities or modification of existing infrastructure are expected to be similar to those described in Alternative 2. However, construction of the modified T-intersection at the Wawona Road – Mariposa Grove Road intersection would result in slightly different vegetation removal affecting between 5 and 10 trees, though these impacts would occur in a previously disturbed area.

Impact Significance. Alternative 4 is expected to have site-specific, long-term minor adverse impacts on vegetation within the Mariposa Grove and moderate adverse impacts on vegetation at the South Entrance.

Restoration-related Impacts. Beneficial impacts on vegetation from Alternative 4 include (1) a 1.59 acre reduction of impermeable surfaces within the lower Grove area due to removal of the lower Grove parking lot, gift shop, and commercial tram staging area and operations, (2) restoration of 0.02 acre of giant sequoia habitat from the removal of trails with Mariposa Grove, and (3) restoration of 0.23 acres of giant sequoia habitat from the narrowing of road or conversion of roads to trails within Mariposa Grove. Drainage and hydrologic improvements would be similar to those in

Alternative 2. Alternative 4 would restore 0.77 acre of wetlands within the lower Grove area. Project-wide, Alternative 4 would result in a net addition of developed areas of2.88 acres, which is comprised of an estimated 1.84 acre net reduction in developed area within the Grove plus 4.72 acres of new development at the South Entrance.

Impact Significance. Alternative 4 is expected to have site-specific, long-term major beneficial impacts on vegetation within the Mariposa Grove.

Operations-related Impacts. Commercial tram operations would require keeping the existing road width and improved road surfaces which would continue to impair giant sequoia root systems and encroach on the ability of some sequoias to grow in diameter due to the proximity of asphalt. Road stormwater runoff would continue to discharge waterborne pollutants directly into the giant sequoia ecosystem. Commercial tram operations, employee parking, and visitor use would continue to damage giant sequoia root systems. Narrow points along the Mariposa Grove Road would continue to result in vehicle scraping the bark of giant sequoia.

Impact Significance. Alternative 4 is expected to have site-specific, long-term moderate adverse impacts on vegetation within the Mariposa Grove.

Conclusion. Construction activities within the Mariposa Grove would result in some temporary adverse impacts on vegetation. There would be long-term major beneficial impacts from the removal of developed areas that would result in 5.98 acres of ecological restoration within Mariposa Grove. Restoration of hydrological flows would have long-term beneficial impacts on vegetation within the Mariposa Grove. The second growth vegetation at the South Entrance would experience moderate long-term adverse impacts from greater use and development of parking and other facilities.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting vegetation would be the same as those under Alternative 1 (No Action)—an overall long-term moderate adverse impact on vegetation in the Yosemite region. These impacts, in conjunction with the long-term beneficial impacts of Alternative 4 in the Mariposa Grove, would result in moderate adverse impacts on vegetation in the Yosemite region.

WILDLIFE

Affected Environment

Wildlife in the Mariposa Grove and South Entrance is diverse and abundant, reflecting the wide range of Yosemite National Park habitats. The mixed conifer hardwood habitat type of the project area adjacent to and surrounding the Mariposa Grove supports an especially rich diversity of wildlife species. The mixture and interface of vegetation types provide complex forest structure with numerous ecological niches. The uniqueness of the Mariposa Grove supports a distinct assemblage of wildlife species (NPS 2013a).

Park biologists reviewed park data (NPS 2013a) and used the California Wildlife Habitat Relationships model to predict which wildlife species are likely to occur in and around the Grove and South Entrance. Together, the Mariposa Grove and South Entrance are home to 78 different reptile, amphibian, mammal, and bird species. Concentrated areas of human use in the Mariposa Grove may have degraded habitat of some wildlife, especially in upper and lower Grove areas. Giant sequoia stands within the Mariposa Grove are highly productive, structurally diverse habitats that support a high number of wildlife species. In addition, introduced non-native species within the Mariposa Grove and South Entrance have the potential to degrade habitat for wildlife. Wildlife

species and their habitat requirements are reviewed in this section, along with the potential effect on wildlife resources from the project alternatives.

Mariposa Grove

There are a total of nine vegetation types within the Mariposa Grove that are components of the various wildlife habitats. These include Sierran mixed conifer, white fir, montane hardwood conifer, montane hardwood, ponderosa, montane chaparral, wet meadow, barren, and Jeffrey pine (NPS 1997). The vegetation types present are Sierran mixed conifer forest and white fir forest; dominant tree species in these communities include white fir (*Abies concolor*), giant sequoia (*Sequoiadendron giganteum),* and sugar pine (*Pinus lambertiana*) (NPS 1997). Old-growth forest types provide habitat for raptor species such as the California spotted owl (*Strix occidentalis occidentalis*) (California species of special concern [CSC]) and northern goshawk (*Accipiter gentilis*) (CSC), as well as cavity-dependent mammal species such as the Pacific fisher (*Martes pennanti pacicica)* (federal candidate for listing [FC]/CSC) and various bat species. Less common forested types in the Mariposa Grove include montane hardwood conifer, montane hardwood, ponderosa, and Jeffrey pine, which provide habitat for a variety of bird species, including the olive-sided flycatcher (*Contopus cooperi*) (CSC), and bat species. Montane chaparral, the only shrub-dominated plant community, provides habitat for a variety of mammal species and reptile species. Barren rock outcrops are present at Wawona Point and provide valuable habitat for a variety reptiles and roost sites for a number of bat species, including the western mastiff bat (*Eumops perotis californicus*) (CSC). Finally, a small amount of wet meadow habitat is present in the Mariposa Grove and provides valuable habitat for a variety of songbird species and amphibians such as the song sparrow (*Melospiza melodia*) and the Sierra Nevada ensatina (*Ensatina eschscholtzii plattensis*). These vegetation communities are shown in figure 3-8.

The Mariposa Grove is moderately developed, with a variety of paved roads and trails primarily through the Sierran mixed conifer, montane hardwood conifer, and white fir habitats. In addition there are two paved areas in the Sierran mixed conifer forest. The Grove experiences high levels of pedestrian traffic from May through October, with use dissipating as one travels from the lower Grove area to the upper Grove area, and on to Wawona Point. These conditions can affect wildlife use patterns or condition wildlife to relatively high human activity levels. Park and concessioner management practices, such as no-wildlife-feeding reminders for visitors, no camping or fires, and bear-proof trash receptacles, have been implemented to discourage attractive nuisance conditions for wildlife. The Grove's proximity to wilderness may offer superior quality for some habitat types.

A high diversity of wildlife is present in the Mariposa Grove; a total of 72 wildlife species (including special-status wildlife species) have been observed in the area. This diverse array of species includes: eight amphibian and reptile species, such as the gregarious slender salamander (*Batrachoseps gregarious*), northern alligator lizard (*Elgaria coerulea*), and northwestern fences lizard (*Sceloporus occidentalis occidentalis*); 32 mammal species, such as black bear (*Ursus americanus*), bobcat (*Lynx rufus*), mountain lion (*Puma concolor*), Douglas squirrel (*Tamiasciurus douglasii*), California ground squirrel (*Spermophilus beecheyi*), and yellow-bellied marmot (*Marmota flaviventris*), plus a variety of bat species; and 32 bird species, including Cooper's hawk (*Accipiter cooperii*), golden-crowned kinglet (*Regulus satrapa*), mountain chickadee (*Poecile gambeli*), mountain quail (*Oreortyx pictus*), pileated woodpecker (*Dryocopus pileatus*), and western bluebird (*Sialia mexicana*) (NPS 2013a).

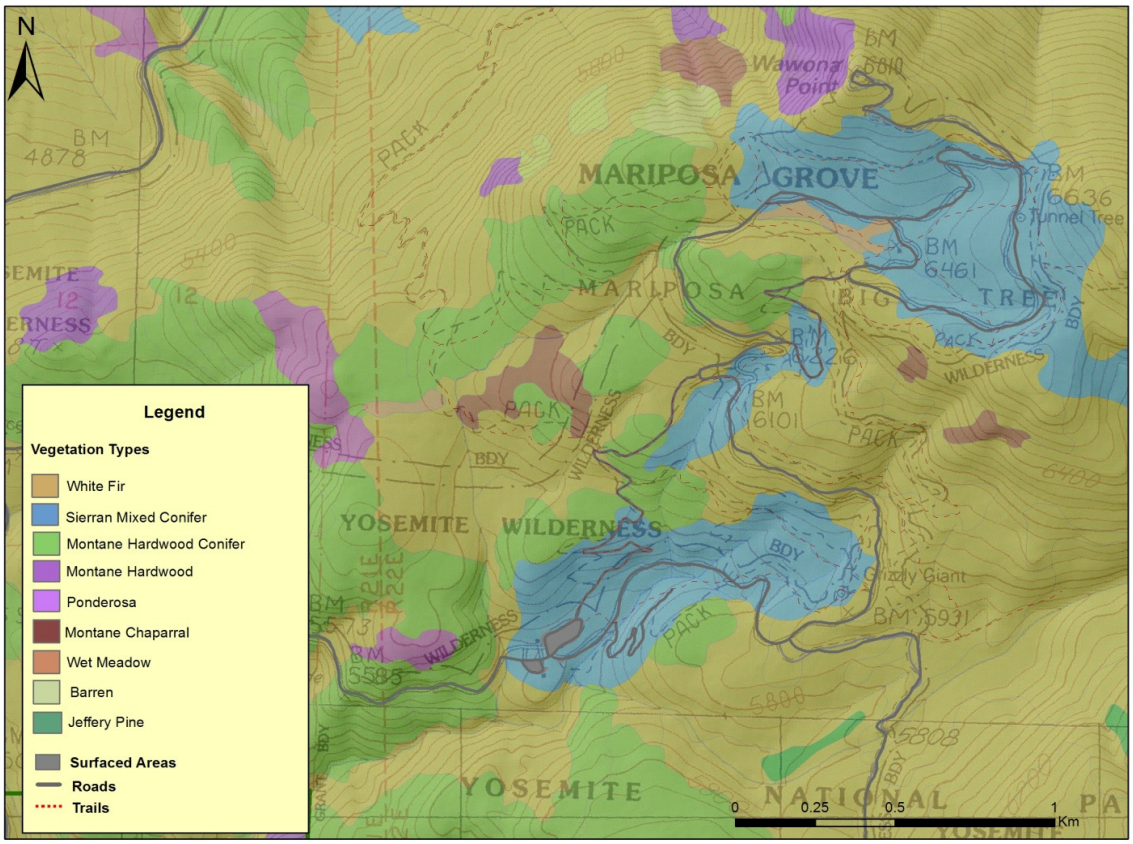


Figure 3-8 – Vegetation as a Component of Wildlife Habitat in and Near the Mariposa Grove

Source: NPS 1997
Note: This map of park plant communities was used by biologists to predict habitat suitability for wildlife in the project vicinity.

South Entrance

The South Entrance contains habitats similar to those at the Mariposa Grove and is dominated by montane hardwood conifer. Dominant tree species within this community include ponderosa pine, incense cedar, California black oak, and canyon live oak. These habitats are shown in figure 3-9. This diversity of plant species creates a complex habitat structure that includes pure stands of conifers interspersed with stands of broad-leaved trees, often with an understory of shrubs. This provides habitat for a variety of bird and mammal species, as discussed below.

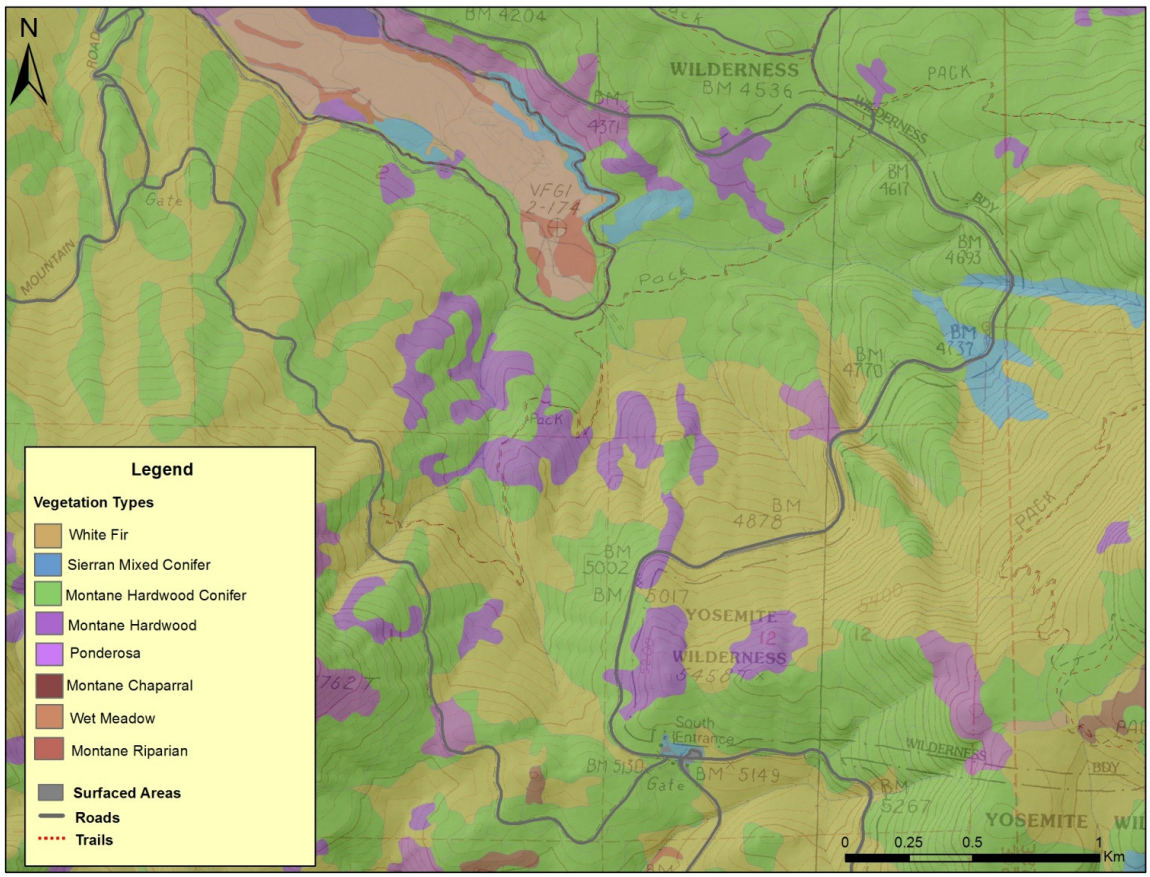


Figure 3-9 – Vegetation as a Component of Wildlife Habitat in and Near the South Entrance

Source: NPS 1997
Note: This map of park plant communities was used by biologists to predict habitat suitability for wildlife in the project vicinity.

The South Entrance is moderately developed, with a variety of paved roads and trails primarily through the montane hardwood conifer and white fir habitats, and high year-round vehicle traffic volumes along Wawona Road and the Mariposa Grove Road. There is one small paved area off of the main road. Similar to the Grove environment, the abundance of vehicles and pedestrians can affect wildlife use patterns or condition wildlife to relatively high human activity levels. Park and concessioner management practices, such as no-wildlife-feeding reminders for visitors, no camping or fires, and bear-proof trash receptacles, have been implemented to discourage wildlife from becoming habituated to human food.

There is lower diversity of wildlife present in the South Entrance area than in the Mariposa Grove area. Species observed include 10 mammal species, such as the black bear, bobcat, coyote (*Canis latrans*), mule deer (*Odocoileus hemionus*), and western gray squirrel (*Sciurus griseus*); and five bird species, such as the acorn woodpecker (*Melanerpes formicivorus*), Canada goose (*Branta canadensis*), spotted owl, and western bluebird (NPS 2013a).

Environmental Consequences

Impact Assessment Methodology

Determination of the significance of potential impacts on wildlife is based on the duration, type, and intensity of impact; all are influenced by the scale (area) of impact. Impacts can be direct, i.e. an immediate result of the action, or indirect, resulting from the action but occurring later in time or removed from the location of direct physical impacts. Wildlife impact analysis was based on a qualitative assessment of the project area and the impacts anticipated as a result of ongoing maintenance, construction or rehabilitation. Quantitative analysis was conducted to determine areas that were likely to be affected by selective roadside tree thinning and brush removal as well as other aspects of the project.

Adverse impacts include those that would negatively affect the size, continuity, or integrity of wildlife habitat, or result in unnatural changes in the abundance, diversity, or distribution of wildlife species. Conversely, impacts were classified as beneficial if they would positively affect the size, continuity, or integrity of wildlife habitat.

Impact Intensity Level Definitions

Intensity of impacts on wildlife was analyzed by determining the extent at which the proposed road improvements would disturb wildlife and their habitat.

Negligible – Wildlife would not be affected, or impacts would not result in a loss of individual or habitat.

Minor – Impacts on wildlife would be measurable or perceptible and local; however, the overall viability of the population or subpopulation would not be affected and without further adverse impacts the population would recover. Impacts on wildlife, such as displacement of nests or dens or obstruction of corridors, would be detectable. If mitigation is needed to reduce or rectify adverse impacts, it would be relatively simple to implement.

Moderate – Impacts would be sufficient to cause a change in the population or subpopulation (e.g., abundance, distribution, quantity, or viability); however, the impact would remain local. The change would be measurable and perceptible, but the negative impacts could be reversed. Mitigation would probably be necessary to reduce or rectify adverse impacts.

Major – Impacts would be substantial, highly noticeable, and could be permanent in their impact on population or subpopulation survival without active management. Extensive mitigation would likely be necessary to reduce or rectify adverse impacts, and its success could not be guaranteed.

Alternative 1: No Action

Under Alternative 1 current infrastructure, concessioner services and maintenance, and park management would remain as is. No rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be implemented.

Operation-related Impacts. Disturbance from operations, recreations, and routine maintenance affect wildlife using the habitats at the Mariposa Grove and in the surrounding areas. Types of disturbance include noise, artificial light, human presence, automobile traffic, and other use-associated effects. Because of the level of disturbance that has been ongoing for 30 years, some

wildlife species have probably abandoned the habitat. The remaining species are not likely to further change because they have adapted to the level of human disturbance. Natural hydrologic flow and processes that are currently impacted by inadequate drainage culverts would continue to degrade wildlife habitat in Mariposa Grove. Erosion and sedimentation form runoff would continue to impact nearby habitat.

Impact Significance. Local, long-term, minor to moderate, adverse impacts.

Conclusion. No construction-related impacts would occur. Though there would be some continued adverse effects on wildlife species, Operation-related impacts would include minor to moderate human disturbance of wildlife.

Cumulative Impacts. The cumulative impacts on wildlife discussed in this section consider the past, present, and reasonably foreseeable actions in the Yosemite region in combination with potential effects of Alternative 1 (No Action). Regional impacts on wildlife began before the inception of Yosemite National Park. Past impacts on wildlife include regional population growth, intensive logging, fire suppression, rangeland clearing, grazing, mining, draining, damming, water diversions, and the introduction of nonnative species. Purposeful efforts to eradicate predators were widespread. For example, fur-bearing mammals were trapped by park rangers until 1925; mountain lions were considered dangerous predators and controlled through the 1920s. Removal of predators can have cascading effects through the food-chain. Natural wildfires with their overall beneficial effects on wildlife habitat were suppressed routinely until 1972 (Wuerthner 1994).

Mammal species that once thrived in Yosemite, but are now extremely rare, are the fisher, wolverine (possibly extinct), and Sierra Nevada red fox. Willow flycatchers no longer nest in Yosemite Valley for a variety of complex reasons, including parasitism by brown-headed cowbirds, destruction of riparian and meadow habitat, past cattle grazing, nest predation, and lack of a regionally sustainable population. Population declines have been detected in numerous other bird species in the Sierra Nevada, including the Yosemite area. Possible causes for these declines include grazing, logging, fire suppression, development, recreational use, pesticides, habitat destruction on wintering grounds, and large-scale climate changes.

Amphibians in Yosemite have suffered population declines similar to those seen in the rest of the Sierra Nevada (Drost and Fellars 1996). Red-legged frogs were found in Yosemite in the past, but are presumed extirpated from the park. Significant factors in their disappearance probably include reduction in perennial ponds and wetlands, and predation by bullfrogs. At higher elevations, Sierra Nevada yellow-legged frogs and Yosemite toads are still present in a number of areas but are severely reduced in population and range. Foothill yellow-legged frogs may no longer be found in the park. However, one population of foothill yellow-legged frog occurs adjacent to the park boundary on the Tuolumne River, and there may be a small population in the park. Research continues to identify the causes of Sierra Nevada-wide amphibian declines; possible causes include nonnative fish, pesticides, habitat destruction, and diseases. Native fish in Yosemite were probably limited to rainbow trout and the Sacramento sucker. Rainbow trout introduced through stocking have now hybridized with and/or displaced, the original strain. The combined impact of these past regional actions on wildlife has been long-term, major, and adverse.

Present and future actions in the region would have beneficial and adverse effects (Appendix B). Plans and actions with generalized beneficial impacts on special-status habitat include the *Fire Management Plan/Operational Fire Management Plan*, Fuels reductions/forest rehabilitation projects (US Forest Service), *Invasive Plant Management Plan Update*, Comprehensive Ecological Restoration Actions, ecological restoration elements proposed in the *Draft Merced* and *Tuolumne Wild and Scenic*

River Comprehensive Management Plans, Wawona Meadow Restoration, and the Wilderness Stewardship Plan. Activities associated with the *Fire Management Plan/Operational Fire Management Plan* and U.S. Forest Service fuels reduction projects would greatly reduce the threat of large high-severity catastrophic fires, and reduce the potential for vegetation type conversion and habitat loss. Ecological restoration elements of the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans* would result in long-term beneficial impacts on potential habitat for wildlife. The Wawona Road Wildlife Crossings project and the under-road wildlife crossing at the South Entrance Station Kiosks Replacement project would reduce the threat of future vehicle-related fisher mortality in the south portion of Yosemite. Future efforts such as the *Wilderness Stewardship Plan* could contribute watershed-scale protection to habitat for wildlife, depending on the outcome of the final plan. These present and future actions would have a long-term moderate beneficial effect on special-status species by increasing the quantity and quality of affected habitats.

There would be construction-related adverse impacts associated with the Yosemite Environmental Education Center and new development proposed in the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans*, due to the localized loss of upland habitat. There would be localized clearing-related effects from the *Scenic Vista Management Plan* and the South Entrance Station Kiosks Replacement projects in upland habitats. Site-specific adverse effects on wildlife could be short-term (during construction) and long-term (permanent displacement of vegetation). NPS plans and projects include mitigation measures to protect wildlife, with emphasis on protection during prime denning and nesting periods.

Changes in climate also pose a threat to wildlife, including American pika, yellow-legged frog and bighorn sheep. These species, as well as a variety of amphibians, would be affected by warming temperatures through transitions in vegetation communities, changes in snow pack and runoff, and increasing competition from other species (including invasive species. Present and future construction- and climate-related impacts on wildlife would be long-term minor to moderate, and adverse.

In summary, past impacts on wildlife in the have been adverse, long-term, and major. Some present and foreseeable future actions would contribute to reversing the adverse impacts of past actions in the region. Past, present, and future impacts, in conjunction with the local, long-term minor to moderate adverse impacts of Alternative 1 (No Action) would result in a long-term moderate adverse impact on wildlife in the Yosemite region.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the commercial tram operation and reduce the amount of lower Grove area parking while expanding and relocating primary visitor parking to the South Entrance, making the South Entrance the departure point for visitors accessing the Grove. Rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, and soil decompaction would be components of this alternative.

Construction-related Impacts. Construction-related activities would result in few adverse impacts on wildlife and would be limited to the immediate construction zone. Removal of existing buildings and infrastructure and construction of new facilities would generate noise and ground vibrations, disturb habitat, and create other disturbances associated with human presence. Noise and human activity within the construction zone may temporarily interrupt foraging, mating, and nesting behavior, cause wildlife to temporarily avoid the area or interfere with animal movement patterns. Disturbed nests in the immediate vicinity of construction activity would be susceptible to abandonment. As a result, impacts on bird species and wildlife would be minor. Use of heavy

equipment creates the potential for wildlife injuries or death, specifically for small wildlife, such as lizards and mammals that may become entrapped.

Removal of trees or snags could affect breeding bats or birds by removing nests or roosts. The impact of tree removal would be minimized though site design and timing of removal; thus, impacts on breeding bats or birds would be minimal. Removal of mature trees and snags would negatively impact previously high-quality fisher habitat by removing dens. The impacts would be minimized by timing the removal outside of the denning season (March 1 to June 30). These impacts would be restricted to the development footprint and immediate vicinity and would be short-term, lasting only as long as construction. Construction of infrastructure in the lower Grove area would occur in previously disturbed wildlife habitat; as a result adverse impacts would be minor. Infrastructure and facilities built at the South Entrance would be constructed in largely previously undeveloped wildlife habitat. South Entrance would require clearing between 5.0 acres and 6.0 acres of non-giant sequoia wildlife habitat. The net footprint after landscape restoration following South Entrance build-out would equal 4.72 acres of non-giant sequoia wildlife habitat, including4.08 acres of impervious surfaces. A new trail from South Entrance to the lower Grove area would impact a total of 0.66 acres, which includes 0.42 acre along an existing road, 0.21 acre of new trail through non-giant sequoia wildlife habitat, and 0.03 acre through giant sequoia wildlife habitat.

Impact Significance. Local, short-term, minor, adverse impacts would occur from construction related noise and activity, and local, long-term, moderate, adverse impacts would occur from the removal of trees and snags.

Restoration-related Impacts. The restoration of the Mariposa Grove of Giant Sequoias would include restoring hydrology processes and wetland ecosystems to natural conditions, removing infrastructure such as the road and parking lots, removing invasive species, and planting native vegetation. Restoration activities have the potential to temporarily disturb populations of wildlife; however, reduced vehicular traffic through the Mariposa Grove would have beneficial impacts on the wildlife populations currently found in at the site because human disturbance, including sound and noise pollution, would greatly decrease. Restoring native vegetation and hydrologic function would help preserve the unique natural features and potentially increase biodiversity of wildlife using the habitats surrounding the Mariposa Grove. Improvements to drainage culverts would restore natural flow, and reduce sedimentation and erosion within wildlife habitat.

Beneficial impacts on wildlife habitat under Alternative 2 include (1) a 1.44 acre reduction of impermeable surfaces within the lower Grove area due to removal of the lower Grove parking lot, gift shop, and commercial tram staging area and operations, (2) restoration of 0.43 acre of giant sequoia habitat from the removal of trails with Mariposa Grove, and (3) restoration of 2.11 acres of giant sequoia habitat from the narrowing of road or conversion of roads to trails within Mariposa Grove. Project-wide, the net change in development under Alternative 2 would result in the addition of 0.75 acre in developed area which is comprised of 3.98 acres net reduction in of developed area within the Grove plus 4.72 acres of new development at the South Entrance.

Impact Significance. Site specific, long-term, moderate, beneficial impacts on wildlife.

Operation-related Impacts. Disturbance from operations, recreations, and routine maintenance affect wildlife using the habitats at the Mariposa Grove and in the surrounding areas. Types of disturbance include noise, artificial light, human presence, automobile traffic, and other use-associated effects. Alternative 2 would remove and relocate public parking from the lower Grove area to the park's South Entrance and remove the commercial tram staging and operations resulting in a change in traffic patterns and operations use. There would be a reduction in traffic in Mariposa

Grove and a potential reduction in wildlife vehicle collisions. However, new facilities would increase operational activity at the South Entrance and potential impacts on wildlife in that location.

Where roads in the Mariposa Grove would be narrowed and converted to primarily trail use, the need to remove hazardous trees (dead snags or diseased trees that may fall on the road but provide important wildlife habitat) would be reduced. Private vehicles with accessible placards (a vehicle displaying a state-issued license plate, a state-issued accessible parking permit, or a temporary Yosemite-issued parking permit) would still be able to drive to the Grizzly Giant, but traffic would be reduced on the road due to the absence of the commercial tram tour.

Operational activities in the vicinity of the South Entrance would increase human disturbance in the area. Wildlife in this area may be somewhat accustomed to human disturbance related to the existing facilities. However, placing the main entrance facilities for the Mariposa Grove in this area would increase activities that produce noise, which would disturb local wildlife, particularly breeding birds and night-dwelling animals. These changes at the South Entrance would affect the local wildlife populations by causing them to relocate to more suitable, less disturbed habitat or find new nesting areas, which could affect reproductive success for a short period after new infrastructure is developed.

Impact Significance. Local, long-term, minor, adverse impacts in the Mariposa Grove where operations-related impacts would be reduced from current levels. Local, long-term, moderate, adverse impacts at the South Entrance where operational-related impacts are greater than current levels.

Conclusion. Construction activities within the Mariposa Grove would result in some adverse impacts on wildlife. Beneficial impacts from restoration-related activities would potentially restore 3.93 areas of wildlife habitat within the Mariposa Grove. After build-out, Alternative 2 would result in a net 0.05 acre reduction of developed area, which is comprised of 3.98 acres net reduction of developed area within the Grove plus 4.72 acres of new development at the South Entrance. Construction of facilities at the South Entrance would require clearing between 5.0 acres and 6.0 acres of non-giant sequoia wildlife habitat. The net footprint after landscape restoration at the South Entrance build-out would equal 4.72 acres of non-giant sequoia wildlife habitat, including 4.08 acres of impervious surfaces. A new trail from South Entrance to the lower Grove area would impact 0.63 acre of non-giant sequoia wildlife habitat and 0.03 acre of giant sequoia wildlife habitat. Operation-related adverse impacts on wildlife would be reduced in the Mariposa Grove as a result of changes in traffic and use patterns, but would increase at the South Entrance from increases in traffic and use patterns as a result of the new entrance facility.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting wildlife would be the same as those under Alternative 1 (No Action)—an overall long-term moderate adverse impact on wildlife in the Yosemite region. These impacts in conjunction with the long-term moderate beneficial impacts of Alternative 2 on wildlife in the Mariposa Grove, would contribute to reversing the adverse impacts of past actions in the region, particularly within Yosemite. On a regional scale, long-term moderate adverse impacts on wildlife in the Yosemite region would continue.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, two new bridges, and a new larger parking lot near the Grizzly Giant. These new facilities would be located outside of giant sequoia habitat but the new construction may affect Pacific fisher habitat. This alternative would make the Grizzly Giant the primary departure point for visitors to the Grove. The current South Entrance parking lot would remain as is and the lower Grove parking lot would be

reconfigured as a smaller lot of ABAAS-compliant parking spaces. Rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, and soil decompaction would be similar to those in Alternative 2.

Construction-related Impacts. Short-term minor adverse impacts and long-term adverse impact on wildlife would primarily occur at the new Grizzly Giant bypass road and primary access facilities. Construction of the bypass road would impact about 2.2 acres of wildlife habitat, which includes 0.33 acre through giant sequoia forest and 0.10 acre of raised crossings over wetlands. In addition, the bypass road would disturb about 3.11 acres of prime denning habitat for the fisher. Construction-related impacts on wildlife at the South Entrance would be less than those for Alternative 2; because the South Entrance would not serve as the primary access node, fewer facility improvements would be required in that location resulting in less ground disturbance and less impact on wildlife and wildlife habitat. The Grizzly Giant Hub would require clearing approximately 5.61 acres of non-giant sequoia wildlife habitat. The net footprint after landscape restoration at the Grizzly Giant Hub following build-out would equal 3.13 acres of non-giant sequoia wildlife habitat, including 2.92 acres of impervious surfaces.

Impact Significance. Site specific, long-term, moderate, adverse impacts on wildlife within the Grizzly Giant area and minor adverse impacts on wildlife at Mariposa Grove and South Entrance.

Restoration-related Impacts. Beneficial impacts on wildlife from Alternative 3 include (1) a 2.38-acre reduction of impermeable surfaces within the lower Grove area, (2) restoration of 0.58 acre of giant sequoia habitat due to the removal of trails with Mariposa Grove, and (3) restoration of 2.79 acres of giant sequoia habitat due to the narrowing of road or conversion of roads to trails within Mariposa Grove. Project-wide, the net change in development under Alternative 3 would result in the addition of 0.50 acre in developed area which is comprised of 5.75 acre net reduction in of developed area within the Grove plus 6.25 acres of new development at the Grizzly Giant arrival area and new bypass road.

Impact Significance. Site specific, long-term, moderate, beneficial impacts on wildlife.

Operation-related Impacts. Under Alternative 3 disturbance to wildlife from operations, recreation, and routine maintenance would occur primarily at Grizzly Giant bypass road and primary access facilities. Types of disturbance include noise, artificial light, human presence, automobile traffic, and other use-associated effects. Similar to Alternative 2, Alternative 3 would remove and relocate public parking from the lower Grove area and remove the commercial tram staging and operations resulting in a change in traffic patterns and operational use. There would be a reduction in traffic in Mariposa Grove beyond Grizzly Giant and a potential reduction in wildlife vehicle collisions in those areas. However, new facilities would increase operational activity and potential wildlife impacts at the Grizzly Giant bypass road and access facility as the result of more vehicles traveling to the bigger parking lot. Adverse impacts due to construction of new facilities at the Grizzly Giant would occur in high quality wildlife habitat areas previously unaffected by roads, vehicle transportation, and access facility operations. As a result, wildlife within areas previously undisturbed by operation-related activities could experience moderate adverse impacts, but these may be short-term if wildlife acclimates to new operation-related disturbance levels.

Impact Significance. Site specific, long-term, moderate, adverse impacts on wildlife within the Grizzly Giant area and minor adverse impacts on wildlife at Mariposa Grove and South Entrance.

Conclusion. Adverse impacts from construction and operations on wildlife are expected to be moderate at the Grizzly Giant bypass road and access facility and minor elsewhere within the

Mariposa Grove and South Entrance. The moderate adverse impacts on wildlife would be associated with the construction of the bypass road and increased traffic through prime fisher habitat, along with the parking area and primary access facilities at the Grizzly Giant Hub. Project-wide, the net change in development under Alternative 3 would result in the addition of 0.50 acre in developed area which is comprised of 5.75 acre net reduction in of developed area within the Grove plus 6.25 acres of new development at the Grizzly Giant arrival area and new bypass road.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting wildlife would be the same as those under Alternative 1 (No Action)—an overall long-term moderate adverse impact on wildlife in the Yosemite region. These impacts, in conjunction with the long-term beneficial impacts of Alternative 3 within the Mariposa Grove, and the long-term moderate adverse impacts near the Grizzly Giant hub and associated access road, would result in long-term moderate adverse impacts on wildlife in the Yosemite region.

Alternative 4: South Entrance Hub with Modified Commercial Tram Service

Alternative 4 would maintain the commercial tram tours but with a limited route and hours of operation while also relocating the majority of the parking to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Adverse impacts resulting from relocation of infrastructure or modification to existing infrastructure are expected to be similar to those described in Alternative 2. Alternative 4 would construction the South Entrance similar to Alternative 2 and would require clearing between 5.0 acres and 6.0 acres of non-giant sequoia wildlife habitat and would result in a net build-out footprint of 4.72 acres including 4.08 acres of impervious surfaces. A new trail from South Entrance to the lower Grove area would be constructed similar to Alternative 2 and would impact 0.63 acre of non-giant sequoia wildlife habitat of which 0.42 acre follows an existing road, and 0.03 acre of giant sequoia wildlife habitat.

Impact Significance. Site specific, long-term, minor, adverse impacts on wildlife within the Mariposa Grove and moderate adverse impacts on wildlife at the South Entrance.

Restoration-related Impacts. Similar to Alternative 2 and Alternative 3, restoration-related impacts would result in beneficial impacts on wildlife from the restoration of giant sequoia habitat and hydrological function; and the resulting improvements to habitat quality and function from these restoration actions. Specifically, beneficial impacts on wildlife and wildlife habitat from Alternative 4 include (1) a 1.59 acre reduction of impermeable surfaces within the lower Grove area due to removal of the lower Grove parking lot, gift shop, and commercial tram staging area and operations, (2) restoration of 0.02 acre of giant sequoia wildlife habitat from the removal of trails with Mariposa Grove, and (3) restoration of 0.23 acres of giant sequoia wildlife habitat from the narrowing of road or conversion of roads to trails within Mariposa Grove. Drainage and hydrologic improvements would be similar to those in Alternative 2. Alternative 4 would restore 0.77 acre of wildlife habitat in wetlands within the lower Grove area. Project-wide, Alternative 4 would result in a net addition of developed areas of 2.88 acres, which is comprised of an estimated 1.84 acre net reduction in developed area within the Grove plus 4.72 acres of new development at the South Entrance.

Impact Significance. Site specific, long-term, moderate, beneficial impacts on wildlife.

Operation-related Impacts. Under Alternative 4, commercial tram service would continue to operate on the existing road and cause operations-related impacts on wildlife. Commercial tram operations would be reduced in the upper Grove area, but would continue unchanged in the lower Grove area. The South Entrance would experience an increase in visitation and operational use resulting in greater adverse impacts on wildlife similar to the impacts described for Alternative 2.

Impact Significance. Local, long-term, minor, adverse impacts in the upper Mariposa Grove where operations-related impacts would be reduced from current levels. Local, long-term, moderate, adverse impacts in the lower Grove area where operation levels would continue unchanged and at the South Entrance where operational-related impacts are greater than current levels.

Conclusion. The existing road within the lower Grove area would not be narrowed to the upper Grove area and existing adverse impacts on wildlife from traffic would continue. Construction activities at the South Entrance would impact between 5.0 acres and 6.0 acres of non-giant sequoia wildlife habitat, and at build-out the net footprint would total 4.72 acres. Operation-related adverse impacts on wildlife would increase at the South Entrance due to increases in traffic and use patterns as a result of the new transportation hub. The impacts from vehicular and commercial tram traffic on the road between the lower and upper areas of the Grove would continue under Alternative 4. Beneficial impacts on wildlife from Alternative 4 include a net restoration of about 1.84 acres within the Grove as the result of relocating facilities to the South Entrance. Long-term beneficial impacts would be similar to those in Alternative 2. Alternative 4 would result in less net reduction of developed area than Alternative 2 because Alternative 4 includes less trail removal and road narrowing.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting wildlife would be the same as those under Alternative 1 (No Action)—an overall long-term moderate adverse impact on wildlife in the Yosemite region. These impacts, in conjunction with the long-term moderate beneficial impacts of Alternative 4 on wildlife in the Mariposa Grove, would contribute to reversing the adverse impacts of past actions in the region, particularly within Yosemite. On a regional scale, long-term moderate adverse impacts on wildlife in the Yosemite region would continue.

Special-status Species

The USFWS and the State of California Department of Fish and Wildlife (CDFW) classify threatened, endangered, or rare species of plants and animals as those that have undergone serious national, state or local declines and which may be threatened with extinction if not otherwise protected. Federal and state regulations, including Section 7 of the 1973 Endangered Species Act (USFWS 1998), CEQ regulations, as well as NPS Management Policies 2006 (NPS 2006), require analysis of whether the proposed actions would cause impacts on any plant or animal species listed or under consideration for listing as threatened or endangered. In addition, Yosemite National Park recognizes state and local rare and sensitive species, and maintains its own list of "park special status plant species." These species have extremely limited distributions, represent relict populations from past climatic or topographic conditions, have unique adaptations to local conditions (endemics), occur at the extreme extent of their range in the park, or are listed by the California Native Plant Society or the California Natural Diversity Database as rare or sensitive.

Affected Environment

Special-status Species Considered

For the purposes of this analysis, special-status wildlife species are limited to species listed by the USFWS as an endangered, threatened, proposed, or candidate species; species identified by the CDWF as an endangered, threatened, or candidate species; or CDWF species of special concern or fully protected species, or California Bird Species of Special Concern. Special-states plant species in this analysis include the categories used for wildlife; in addition, plant species identified by Yosemite National Park as special-status species, species listed by the California Native Plant Society as Rank 1A, 1B, or 2, and species on the U.S. Forest Service Threatened and Endangered or Watch Lists are evaluated.

Each special-status species was evaluated to determine its potential to occur at either the Mariposa Grove or the South Entrance and to be affected by the alternatives. This evaluation considered the distribution and abundance of each species, habitat requirements of each species, habitat characteristics of each site, and existing human disturbance at each site. Special-status wildlife species with potential to occur or that occur at either project site are listed in table 3-1. Special-status plant species are listed in table 3-2 and are described briefly in the following pages.

A total of 20 special-status wildlife species and 32 special-status plant species were considered in the evaluation of the Mariposa Grove and South Entrance project sites (NPS 2013a and 2011e). As a result of the preliminary assessment, including an analysis of distribution and abundance, habitat requirements of each species, habitat characteristics of each project site, existing human disturbance issues of each project site, and targeted 2010 surveys verifying occurrences (for plants), it was determined that 12 of the 20 special-status wildlife species, and 10 of the 32 special-status plant species warranted further consideration in the body of this *Mariposa Grove FEIS* based on documented occurrence or suitable habitat available in the study area (table 3-1, table 3-2). The remaining eight special-status wildlife species and 22 special-status plant species do not occur in the project areas, have only anecdotal sightings, or suitable habitat is not present; therefore, there would be no direct, indirect, or cumulative effects on these species from actions proposed in the alternatives. These species are not evaluated further in this *Mariposa Grove FEIS*.

Table 3-1 – Special-status Wildlife Species

Species Name	Status	Habitat Preference	Mariposa Grove Occurrence	South Entrance Occurrence
Amphibians				
California red-legged frog (*Rana draytonii*)	FT	Lakes, ponds, slow streams, marshes, and swamps, sea level to 1,525 m (5,000 ft.)	X	X
Sierra Nevada yellow-legged frog (*Rana sierrae*)	FC	Lakes, ponds, meadow streams, isolated deep perennial pools, and riverbanks	X	X
Yosemite toad (*Bufo canorus*)	FC	Wet meadows ranging from 1,950 to 3,444 m (6,400 to 11,300 ft.)	X	X

Species Name	Status	Habitat Preference	Mariposa Grove Occurrence	South Entrance Occurrence
Birds				
Bald eagle (*Haliaeetus leucocephalus*)	CE, CFP	Forested riparian areas of lakes and rivers	A	X
California spotted owl (*Strix occidentalis occidentalis*)	CSC, BSSC	Late-stage oak and ponderosa pine forests	O	P
Great gray owl	CE	Mixed conifer and other conifer forest types, wet meadow	A	X
Golden eagle (*Aquila chrysaetos*)	CFP	Forest near open terrain	A	X
Long-eared owl (*Asio otus*)	CSC, BSSC	Dense vegetation adjacent to open grassland or shrubland, and open forests	P	X
Northern goshawk (*Accipiter gentilis*)	CSC, BSSC	Coniferous forests	O	P
Olive-sided flycatcher (*Contopus cooperi*)	CSC, BSSC	Coniferous forest	O	P
Peregrine falcon (*Falco peregrines*)	CFP	Sheer cliff habitat with adjacent woodlands, meadows, or marches	A	X
Vaux's swift (*Chaetura vauxi*)	CSC, BSSC	Coniferous or mixed forest; forages in forest openings, especially above streams	P	X
Yellow warbler (*Dendroica petechia*)	CSC, BSSC	Wet, deciduous thickets, especially in willows	P	X
Mammals				
Pacific fisher (*Martes pennanti*)	FC, CSC	Mature coniferous forests and deciduous-riparian habitats	O	P
Pallid bat (*Antrozous pallidus*)	CSC	Oak, ponderosa pine, and giant sequoia habitats	O	P
Sierra Nevada mountain beaver (*Aplodontia rufa californica*)	CSC	Moist meadows and montane riparian habitat	A	A
Spotted bat (*Euderma maculatum*)	CSC	Variety of habitats, crevices	O	P
Townsend's big-eared bat (*Corynorhinus townsendii*)	CSC	Near rocky areas; may also occasionally inhabit old buildings	P	X
Western mastiff bat (*Eumops perotis californicus*)	CSC	Desert scrub and chaparral to montane coniferous forest	O	P
Western red bat (*Lasiurus blossevillii*)	CSC	Strongly associated with riparian and large mature trees	O	P

Notes: FC = Federal Candidate; CSC = California Species of Special Concern; BSSC = California Bird Species of Special Concern; X = Does not occur, dismissed from further analysis; A = Anecdotal sighting habitat unsuitable, dismissed from further analysis; O = Occurs based on documentation; P = Suitable habitat available in study area, but no documentation

Table 3-2 – Special-status Plant Species

Scientific Name	Common Name	Location[1]	Status	Habitat Preference
Arnica dealbata	Mock leopardbane	UG	PSS	Open montane forest, slopes and dry meadows. Endemic to California, from southernmost Cascade Range to southern Sierra Nevada.
Asarum lemmonii	Lemmon's wild ginger	UG, LG, AR	PSS	Shaded drainage bottoms in montane forest. Endemic to California, known from Sierra Nevada and one station in the Southern Cascade ranges.
Arabis repanda var. repanda	Repand rockcress	UG	PSS	Openings in conifer forest, talus, rock outcrops, dry meadows. Known from the Sierra Nevada, Transverse Ranges, and ranges in western Nevada.
Carex sartwelliana	Yosemite sedge	UG, LG	PSS	Drainages in mid-elevation forests and meadow borders. Endemic to California, central Sierra Nevada south to Transverse and Peninsular Ranges, northern end of species' range in Yosemite.
Cinna bolanderi	Bolander's woodreed	UG, LG	PSS, CRPR 1B.2	Moist, partly shaded meadows and stringers. Endemic to central Sierra Nevada, with a significant proportion of species range and occurrences within Yosemite.
Collinsia childii	Child's blue-eyed Mary	MR	PSS	Shaded slopes of open oak and mixed coniferous woodlands. Endemic to central and southern Sierra Nevada, reaching the northern extent of its range in Mariposa County.
Hulsea brevifolia	Short-leaved alpinegold	UG	PSS, FSS, SC, CRPR 1B.2	Slopes with thin duff layer in montane conifer forest. Endemic to central and southern Sierra Nevada.
Myrica hartwegii	Sierra sweet-bay	SE	PSS, CRPR 4.3	Restricted to stream and river banks at the average high water line. Endemic to northern and central Sierra Nevada.
Piperia colemanii	Coleman's piperia	UG, LG, SE	PSS, CRPR 4.3	Dry shade of mid-elevation conifer forests.
Sequoiadendron giganteum	Giant sequoia	UG, LG	PSS	Well-watered drainages in montane mixed conifer forest.

Notes: PSS = Park Service Special Status; FSS = U.S. Forest Service Sensitive; CRPR = California Native Plant Society Rare Plant Rank (formerly CNPS list); UG = upper Grove; LG = lower Grove; AR = Access road south from Grizzly Giant to Hwy 41; SE = South Entrance; MR = Road from South Entrance to Mariposa Grove

[1] Location of 2010 Occurrences

Scientific and common names in this section match those found in Appendix C of NPS 2011a.

Critical Habitat

Section 7 of the Endangered Species Act requires federal agencies to ensure that any federal action authorized, funded, or carried out is not likely to jeopardize the continued existence of listed species or modify critical habitat. Critical habitat is defined as the specific geographic area, whether occupied by listed species or not, that is determined to be essential for the conservation and management of the listed species. Critical habitat for each listed species is formally described in the Federal Register.

There are no federally listed species with potential to occur in the Mariposa Grove project area. There are no designated critical habitat areas for federally listed species in the project area. The Pacific fisher is a Candidate for listing under the federal Endangered Species Act. The NPS is conducting informal consultation with the USFWS regarding the proposed actions described in this *Mariposa Grove FEIS*, and mitigation actions to protect the fisher are enhanced as a result of this consultation (see Appendix E, Mitigation Measures). Should the fisher be listed under the Endangered Species Act prior to the completion of Mariposa Grove project implementation, the NPS will enter into either informal or formal consultation or conference with the USFWS.

Special-Status Species Overview

A total of 12 special-status wildlife species, including six special-status bird species and six special-status mammal species, are known to occur or have suitable habitat available at the Mariposa Grove or the South Entrance. Status and habitat preferences are identified in table 3-1. Of these, six special-status wildlife species have a strong association with the Mariposa Grove and South Entrance and have been repeatedly detected during multiple surveys: the Pacific fisher, California spotted owl, pallid bat, spotted bat, western mastiff bat, and the western red bat. A discussion of suitable habitat or known populations of these special-status species at each of the project areas is provided below.

The special-status wildlife species observations discussed below are from the following four sources (NPS 2013a):

- 2009-2011 Pacific fisher surveys (Cline 2013);
- Bat surveys (Pierson et al. 2006);
- NPS camera surveys conducted in 2011; and
- Owl survey data conducted over multiple years.

A total of 10 special-status plant species are known to occur at the Mariposa Grove or South Entrance. Status and habitat characteristics of these 10 species are identified in table 3-2. A discussion of suitable habitat and locations of known populations of these special-status species at each project area is provided below (NPS 2013a).

Mariposa Grove

Special-status Wildlife

California spotted owl. There is one California spotted owl active nest site and at least one territory in the Mariposa Grove (NPS 2013a). The species has been detected in the Mariposa Grove since 1995 (1995, 2004-2006, 2007, and 2010-2011). Most recently surveys conducted by the U.S. Geological Survey have resulted in 41 detections since 2004. Sierra mixed coniferous forest is the most common plant community in the vicinity of the Mariposa Grove, and it provides suitable roosting, nesting, and foraging habitat for the spotted owl.

Long-eared owl. Little is known about the status long-eared owl in Yosemite National Park (NPS 2013a). Although they have not been observed in the Mariposa Grove, the Grove appears to contain suitable nesting and foraging habitat for long-eared owls.

Northern goshawk. There are five records of Northern goshawk in the Mariposa Grove and on Mariposa Grove Road, dating from 1930, 1974, 1990, and 1992 (NPS 2013a). Key breeding requirements, including suitable nesting and foraging habitat, and adequate prey, likely exist at the Mariposa Grove.

Olive-sided flycatcher. There are two records of the olive-sided flycatcher in the Mariposa Grove (1941, 1972) (NPS 2013a). The Mariposa Grove site appears to contain suitable coniferous forest habitat for the species.

Pacific fisher. Yosemite National Park lies at the northern tip of the fisher's current range in the southern Sierra Nevada. The Pacific Fisher Status and Recovery 2009-2011 Final Report (Cline 2013) documented five to eight individual animals in and around Mariposa Grove and along Wawona Road. Two fisher dens were documented in Yosemite National Park, and a third was documented very near the park border. One of the dens was located 300 meters from the Mariposa Grove Road. Additional NPS camera surveys conducted in 2011 confirm the presence of both female and male radio-collared fishers in an area that is proposed for future development under some alternatives of the EIS. These studies suggest that fishers are distributed in low abundance throughout a narrow corridor of habitat in the southern portion of the park that borders Sierra National Forest; fishers do not currently occupy suitable habitat north of the Merced River and in the western portion of the park (Cline 2013; 2013d). The Mariposa Grove is extremely important contiguous habitat for the Pacific fisher. All alternatives in the Mariposa Grove occur in high quality fisher habitat according to a fisher habitat suitability model by Spencer et al. (2008).

Pallid bat. Multiple occurrences of the pallid bat, including colonial roost sites in giant sequoias, have been documented in the Mariposa Grove. The Mariposa Grove's giant sequoias provide important refugia for pallid bats. A 2006 report entitled *Bat Use of the Giant Sequoia Groves in Yosemite National Park* documented the pallid bat's use of giant sequoia basal fire scars in the Mariposa Grove (Pierson et al. 2006). Three colonial roost sites in giant sequoias were documented in 2000-2001. Additional colonial roost sites were reported in the lower Grove area, near the commercial tram parking, and a pair of adjacent trees west of the Grizzly Giant. The largest number of pallid bat detections in the Mariposa Grove has been along trails or in the relatively open seep areas and rock outcrops, and the fewest have been along the creek and in the meadow (Pierson et al. 2006).

Spotted bat. Although rare in the Mariposa Grove, spotted bats have been detected acoustically in the wet meadow area in the upper Grove area. This species is known to travel large distances from its roost sites to forage and is thought to be an obligate cliff-dweller. It is likely that the Mariposa Grove provides only suitable foraging habitat for the species; however, suitable cliff roosting habitat may be found at adjacent Wawona Point.

Townsend's big-eared bat. Although the Townsend's big-eared bat has not been documented in the Mariposa Grove, suitable habitat adjacent to rocky areas is present.

Vaux's swift. In Yosemite National Park, Vaux's swifts are probably widely distributed in old-growth forests where standing, hollow snags afford suitable nesting sites (NPS 2013a). Although the Vaux's swift has not been documented in the Mariposa Grove, suitable old-growth forest habitat is present.

Western mastiff bat. There are few records of the western mastiff bat (2000, 2001) in the Mariposa Grove, mostly associated with an open rock outcrop at Wawona Junction (a gap that may be a flyway), and in the meadow in the upper Grove area (Pierson et al. 2006). The species has been detected only acoustically and was relatively rare during the Pierson et al. 2006 bat surveys.

Western red bat. There are 25 records of western red bats in the Mariposa Grove (2000, 2001) that were acoustically detected in an open rock setting at Rattlesnake Dome and on the road at Wawona Junction (Pierson et al. 2006). The Wawona Junction is suspected as being a flyway for bats to enter the grove (Pierson et al. 2006). Although other species, such as the pallid bat, have been documented using the giant sequoias at the Mariposa Grove for roosting, this species has not been observed roosting in these areas (Pierson et al. 2006).

Yellow warbler. The Mariposa Grove site contains a small amount of suitable riparian habitat for the species ().

Special-status Plants

The presence of special status species including Sequoias are tied to the rich deep soils in the groves which are partially attributable to glaciation of the grove site. The presence of a relatively large number of special-status plant species in the Grove ties in part to the presence of metamorphic bedrock and the consequent presence of metasedimentary soils and mineralized water. The soil and water of this substrate have added nutrients, and soils have higher water retention capacities than typical Sierra Nevada granitic bedrock environments.

Bolander's woodreed. The park's largest known population of Bolander's woodreed is in the wet meadow of the upper Grove area, below the Mariposa Grove Museum, with small patches also present along small streams throughout the Mariposa Grove. Its preferred habitat is mostly shady, moist sites along small streams or in stringer meadows at elevations ranging from 6,200 to 7,800 feet.

Child's blue-eyed Mary. This species appears to be restricted to soils derived from metasedimentary rocks, but is frequently encountered where the soil, slope, shade, elevation, and moisture conditions are met. It occurs on steep, shady banks of creek drainages along the Mariposa Grove Access Road and in the Wawona area.

Coleman's piperia. Coleman's piperia is often found in the dry shade of conifer forests. It is found as widely scattered individuals throughout the area of the Mariposa Grove and South Entrance Station. It is the most commonly encountered *Piperia* species in this area.

Giant sequoia. There are many stands of giant sequoia in the Mariposa Grove area. See the Vegetation section of this chapter for detailed information about habitat characteristics.

Lemmon's wild ginger. In the upper Grove area, this species is found in the wet meadow near the Museum, and is frequent in all the small streams and moist drainages throughout the Grove (NPS 2011e).

Mock leopardbane. There is a single known occurrence of the mock leopardbane in the upper Grove area that consists of several patches in the open forest along the trail from the upper Grove loop road to Wawona Point (NPS 2011e). Mock leopardbane is fire-dependent and prefers open ground in light shade of coniferous forests, where it grows in open mineral soil or shallow duff. Due to its short stature (3 to 9 inches tall) it is easily shaded out by encroaching shrubs and herbaceous vegetation.

Repand rockcress. Repand rockcress habitat is open, lightly shaded slopes with a thin duff layer, such as occurs after low-intensity fires that remove downed fuel and thick duff. In the upper Grove area, this species has appeared in large numbers on recent low-intensity prescribed burn slopes. Although it was not observed in unburned forest outside of the upper Grove area in 2010, it may appear on forest slopes outside the Mariposa Grove as these areas undergo prescribed burn (NPS 2011e).

Short-leaved alpinegold. The species has a single occurrence in the upper Grove area; this is a single patch where the loop road intersects with the Wawona Point spur. This occurrence was confirmed by additional surveys in 2003, 2004 and 2010 (NPS 2011e). Short-leaved alpinegold is fire-dependent and prefers light gaps in fir forest canopy where the duff layer is thin or mineral soil is exposed.

Yosemite sedge. Yosemite sedge is common in moist seepages in the Mariposa Grove. It is seen along the road between the upper and lower Grove areas (NPS 2011e). It prefers the thick organic soils of streamsides and seepages in partial shade, although it persists in full sun after fire has removed the overstory. Its population sizes appear to be boosted by fire.

South Entrance

Special-status Wildlife

California spotted owl. Although there are no records of the California spotted owl at the South Entrance, the South Entrance site contains suitable ponderosa pine and oak forest habitats for the species (NPS 2013a).

Northern goshawk. Although there are no records of the northern goshawk at the South Entrance, the South Entrance site contains suitable ponderosa pine and oak forest habitats for the species.

Olive-sided flycatcher. Although there are no records of the olive-sided flycatcher at the South Entrance, the South Entrance site contains suitable coniferous forest habitat for the species (NPS 2013a).

Pacific fisher: The South Entrance is located in high quality fisher habitat. Five to eight individual animals were documented in and around Mariposa Grove, along Wawona Road, and the South Entrance area (Cline 2013). A fisher den was documented in Mariposa Grove and the South Entrance is located within the home range for that den site. In addition, radio-collared fishers have been located at South Entrance during aerial telemetry flights (L. Cline, personal communication September 2013).

Pallid bat. Although there are no records of the pallid bat at the South Entrance, the South Entrance site contains Sierran mixed conifer forest habitat that is suitable for the species (NPS 2013a).

Spotted bat. Although there are no records of the spotted bat at the South Entrance, the species uses a variety of habitats for foraging and is known to travel large distances from its roost sites to forage. It is likely that the South Entrance provides only suitable foraging habitat for the species, as it does not contain suitable cliff roosting habitat (NPS 2013a).

Western mastiff bat. Although there are no records of the western mastiff bat at the South Entrance, the South Entrance site contains montane hardwood/conifer forest habitat that is suitable as a foraging site for the species, but the area does not include cliff or outcrop habitat needed for a roost site (NPS 2013a).

Western red bat. Although there are no records of the western red bat at the South Entrance, the South Entrance site contains suitable habitat for the species (NPS 2013a).

Special-status Plants

Child's blue-eyed Mary. Child's blue-eyed Mary appears to be restricted to soils derived from metasedimentary rocks, but is frequently encountered where the soil, slope, shade, elevation and moisture conditions are met. It occurs on steep, shady banks of creek drainages along the Mariposa Grove Access Road, and in the Wawona area (NPS 2011e).

Coleman's piperia. Coleman's piperia is often found in the dry shade of conifer forests. It is found in the vicinity of the South Entrance.

Sierra sweet-bay. The Sierra sweet-bay's preferred habitat is rocky stream banks within the seasonal flood zone, typically at the average high water line. It is found between 1,600 and 4,300 feet in mixed conifer forest. It is known from two populations in Yosemite, one of which is continuous along Big Creek from the South Entrance to its junction with the South Fork Merced River below Wawona.

Environmental Consequences

Impact Assessment Methodology

Determination of the significance of potential impacts on special-status species is based on the locality, duration, type, and intensity of impact. The impact evaluation for special-status 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; and (3) the loss or degradation of habitat, such as could occur through avoidance or abandonment due to construction or rehabilitation activity or noise, or the species' sensitivity to human disturbance. For plant species, this could occur due to loss of habitat features such as surface water flows.

Impacts were evaluated through determination of the location of the species or their habitat with respect to the proposed locations of various rehabilitation activities, such as culvert installation, plant thinning, etc. Sensitivity of a species to impacts was assessed through consideration of rarity, resilience, population size, and distribution throughout the park.

Data presented are based on field reconnaissance, literature review, the professional knowledge and judgment of park staff, records of observations, published references, and studies of selected species. Timely surveys specific to this planning effort would need to be conducted prior to implementation to identify individuals or populations of special-status species within the project area at the time of implementation.

Adverse impacts include those that would negatively affect the size, continuity, or integrity of habitat, or result in unnatural changes in the abundance, diversity, or distribution of the species. Conversely, impacts were classified as beneficial if they would positively affect the abundance, diversity, or distribution of the species or the size, continuity, or integrity of habitat.

This evaluation also determines impacts on federal- or state-listed special-status species based on metrics specific to the Endangered Species Act. These impacts are defined as follows:

No Impact – The project (or action) is outside suitable habitat and there would be no disturbance or other direct or indirect impacts on the species. The action would not affect special-status species or designated critical habitat (USFWS 1998).

May Affect, Not Likely to Adversely Affect – The project (or action) occurs in suitable habitat or results in indirect impacts on the species, but the impact on the species is likely to be entirely beneficial, discountable, or insignificant. The action may pose impacts on special-status species or designated critical habitat but given circumstances or mitigation conditions, the impacts may be discounted, insignificant, or completely beneficial. Insignificant impacts would not result in take. Discountable impacts are those that are extremely unlikely to occur. Based on best judgment, a person would not (1) be able to meaningfully measure, detect, or evaluate insignificant impacts or (2) expect discountable impacts on occur (USFWS 1998).

May Affect, Likely to Adversely Affect – The project (or action) would have an adverse impact on a special-status species as a result of direct, indirect, interrelated, or interdependent actions. An adverse impact on a listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions and the impact is not: discountable, insignificant, or beneficial (USFWS 1998).

Alternative 1: No Action

Under Alternative 1 current infrastructure, concessioner services and maintenance, and park management would remain as is. No rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be implemented.

Construction-related Impacts. There would be no construction-related effects on the Mariposa Grove under Alternative 1 (No Action).

Operation-related Impacts. Operational activities that disturb native vegetation have the potential to disturb or injure special-status plants, specifically giant sequoia, in the vicinity of existing use areas such as parking lots, roads, and trails. Operational activities are controlled to the extent possible and avoid known sensitive areas; however, individuals may be trampled, and suitable habitat may be affected, which could affect local populations and would be a noticeable, but minor, impact. Natural hydrologic flow and processes that are currently impacted by inadequate drainage culverts would continue to degrade special-status species habitat in the Mariposa Grove. Erosion and sedimentation form runoff would continue to impact nearby special-status species habitat.

Continued operations would disturb special-status wildlife in the vicinity of the Mariposa Grove and would continue to preclude species sensitive to human disturbance, such as the fisher. Operational activities that affect suitable habitat, such as giant sequoia forests, would continue to affect species that rely on the affected habitats for foraging, breeding, nesting and other uses by reducing the quality of the habitat and possibly forcing the species to relocate or find other suitable habitat in the region. Human disturbance from operational activities would continue to reduce the quality of the surrounding habitats and disturb special-status species. Disturbance during the breeding and nesting periods for special-status birds could result in effects on reproductive success, which could affect local populations.

In particular, the California spotted owl, pallid bat, and fisher have the highest potential to be affected by activities at the Mariposa Grove. Continued operations would disturb California spotted owl which nest within 2 kilometers of the current parking lot and paved road, and forage in high use areas (e.g., current parking lot). Operational and recreational activities can cause owls to abandon disturbed habitat, and reduce reproductive success. Human disturbance and noise pollution from operational activities and facilities would affect owls, which detect their prey primarily by sound, and would thus affect foraging and breeding success of these species. Disturbance during the breeding

and nesting periods for California spotted owls (breed from approximately February to September) could result in impacts on reproductive success, which could affect local populations.

Pallid bats have reproductive roosts in the Mariposa Grove and could experience disruptive impacts from operational activities similar to that of the California spotted owl. Pallid bats use giant sequoia trees as their maternal roosts and colonial roost sites were recorded in the lower Grove area, near the commercial tram parking, and a pair of adjacent trees in the middle grove, west of the Grizzly Giant. Pierson et al. (2006) concluded that giant sequoia trees provided important refugia for pallid bats in the Mariposa Grove. Pacific fishers have been detected in the Mariposa Grove, including in the vicinity of high use areas, such as the South Entrance, Mariposa Grove Road, parking lot, trails within the Grove, and the paved road leading up to Wawona Point (2013d). Wildlife vehicle collisions have become a concern in Yosemite, with nine documented road-kill fishers (including two lactating females) along the Wawona Road over the past two decades (Cline 2013). A tenth road-kill fisher has been documented on the nearby Glacier Point Road, and an additional three road-kill fishers have been documented south of the park in Sierra National Forest along Highway 41 (Cline 2013). This stretch of road poses a significant threat for fishers and other wildlife because it bisects a very narrow corridor of suitable habitat (Cline 2013). Existing surface water impacts that affect hydrology and wetland ecosystems would have a negative effect on the condition of riparian habitat that the Pacific fisher relies on for foraging, dispersal, and resting. Impacts on riparian areas could further fragment corridor habitat and impede movement of individual fishers. Overall, there would be long-term, minor operations-related adverse impacts on special-status plants and wildlife (NPS 2013a).

Restoration-related Impacts. There would be no restoration-related effects on the Mariposa Grove under Alternative 1 (No Action).

Impact Significance. Alternative 1 (No Action) may affect, but is not likely to adversely affect state-listed special-status species. There are no known federal-listed species in the project area.

Conclusion. No construction-related or restoration-related impacts would occur under Alternative 1 (No Action). Long-term, minor, adverse operation-related impacts would continue to affect special-status plants. Long-term, minor adverse effects related to disturbance and habitat degradation would continue for special-status wildlife.

Alternative 1 (No Action) may affect, but is not likely to adversely affect state-listed special-status species. There are no federal-listed species in the project area.

Cumulative Impacts. The cumulative impacts on special-status species discussed in this section consider the past, present, and reasonably foreseeable future actions in the Yosemite region in conjunction with the potential effects of Alternative 1 (No Action). In the past 150 years, activities associated with urbanization and regional population growth (e.g., building and dam construction, utility installation, road and bridge building, intensive logging, stormwater discharge) contributed to direct loss of habitat for special-status species in the Yosemite region. Impacts range from direct loss of special-status species habitat (e.g., replaced with structures), alteration of natural environments (e.g., fire suppression around structures, the introduction of night light), increased erosion and sedimentation, and habitat fragmentation, to indirect habitat losses such as changes in water flows that sustain plant communities. Purposeful efforts to eradicate predators were widespread. For example, fur-bearing mammals were trapped by park rangers until 1925; mountain lions were considered dangerous predators and controlled through the 1920s. The effect of reduced numbers of predators can cascade throughout wildlife food chains. Other activities, particularly fire suppression, changed the structure of existing native habitats.

Mammal species that once thrived in Yosemite, but are now extremely rare, are the fisher, wolverine (possibly extinct), and Sierra Nevada red fox. Willow flycatchers are likely extirpated from Yosemite for a variety of complex reasons including parasitism by brown-headed cowbirds, destruction of riparian and meadow habitat, past cattle grazing, nest predation, and lack of a regionally sustainable population (Seigel 2007). Population declines have been detected in numerous other bird species in the Sierra Nevada. Possible causes for these declines include grazing, logging, fire suppression, development, recreational use, pesticides, habitat destruction on wintering grounds, and large-scale climate changes.

Amphibians in Yosemite have suffered population declines similar to those seen in the rest of the Sierra Nevada (Drost and Fellars 1996). Red-legged frogs are presumed extirpated from the park. Significant factors in their disappearance probably include reduction in perennial ponds and wetlands, and predation by bullfrogs. At higher elevations, Sierra Nevada yellow-legged frogs and Yosemite toads are still present, but populations are severely reduced in population and range. Foothill yellow-legged frogs may no longer be found in Yosemite. However, one population of foothill yellow-legged frog occurs adjacent to the park boundary on the Tuolumne River, and there may be a small population in the park. Research continues to identify the causes of Sierra Nevada-wide amphibian declines; possible causes include nonnative fish, pesticides, habitat destruction, and diseases. The impacts of these past regional actions on special-status species have been adverse.

Present and future actions in the region have beneficial and adverse effects on special-status species (Appendix B). Plans and actions with beneficial impacts on special-status habitat include the Wilderness Sierra Nevada Yellow-legged Frog Reintroduction and Trout Eradication Project, *Fire Management Plan/Operational Fire Management Plan*, Fuels reductions/forest rehabilitation projects (US Forest Service), *Invasive Plant Management Plan Update*, Comprehensive Ecological Restoration Actions, ecological restoration elements proposed in the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans*, Wawona Meadow Restoration, and the Wilderness Stewardship Plan. The frog reintroduction and trout eradication project will increase the amount of high quality aquatic habitat for the Sierra Nevada yellow-legged frog and improve the success rate of Sierra Nevada yellow-legged frog reintroductions in high Sierra habitats. Activities associated with the *Fire Management Plan/Operational Fire Management Plan* and U.S. Forest Service fuels reduction projects would greatly reduce the threat of large high-severity catastrophic fires, and reduce the potential for vegetation type conversion and habitat loss. Ecological restoration elements of the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans* would result in long-term beneficial impacts on potential habitat for special-status species. The Wawona Road Wildlife Crossings project and the under-road wildlife crossing at the South Entrance Station Kiosks Replacement project would reduce the threat of future vehicle-related fisher mortality in the south portion of Yosemite. Future efforts such as the *Wilderness Stewardship Plan* could contribute watershed-scale protection to habitat for special-status species, depending on the outcome of the final plans. These present and future actions would have a long-term moderate beneficial effect on special-status species by increasing the quantity and quality of affected habitats.

There would be construction-related adverse impacts associated with the Yosemite Environmental Education Center and new development proposed in the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans*, due to the localized loss of upland habitat. Localized habitat for the valley elderberry longhorn beetle would be lost by actions proposed in the preferred alternative of the *Draft Merced Wild and Scenic River Comprehensive Management Plan.* The NPS would continue to work with the U.S. Fish and Wildlife Service on mitigation to reduce this potential loss. There would be clearing-related effects on upland habitat related to the South Entrance Station Kiosks Replacement project and the *Scenic Vista Management Plan*. Prime habitat for special-status species would not be affected, or effects would be mitigated. The current required site-specific tree

removal. Site-specific adverse effects on special-status species could be short-term (during construction) and long-term (permanent displacement of vegetation). These plans and projects in Yosemite include mitigation measures to protect special-status species, with emphasis on protection during prime denning and nesting periods. Construction-related impacts on special-status species would have a long-term moderate adverse impact on special-status species.

Changes in climate also pose a threat to several special-status species, including American pika, yellow-legged frog and bighorn sheep. These species, as well as a variety of amphibians, would be affected by warming temperatures through transitions in vegetation communities, changes in snow pack and runoff, and increasing competition from other species (including invasive species).

In summary, past impacts on special-status species in the region have been adverse. Some present and foreseeable future actions would contribute to reversing the adverse impacts of past actions in the region. Present and future impacts, in conjunction with the minor adverse impacts on special-status species under Alternative 1 (No Action), would result in a long-term minor adverse impact on special-status species in the Yosemite region.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would implement comprehensive ecological restoration actions, including removing the commercial tram operation, removing parking and restoring the lower Grove area to giant sequoia habitat, improving hydrologic flows that sustain the giant sequoia, and converting roads to trails. The South Entrance would be the primary departure point for visitors accessing the Grove.

Construction-related Impacts. Construction activities are not expected to result in direct impacts on special-status plants. Impacts on special-status plant species would be similar to those described in the "Vegetation" section. No special-status plants have been identified in the development footprint, although several species, including giant sequoia, occur in the vicinity and could result in indirect impacts similar to those identified in the "Vegetation" section. Construction pollutants in runoff that travels offsite could potentially affect special-status plant species that may occur along or near stream courses or associated wetland habitats, including the Lemmon's wild ginger, Yosemite sedge, Scribner woodreed, Sierra sweet-bay, and giant sequoia. Runoff of sediments and stormwater pollutants could degrade downstream habitat conditions. With application of mitigation measures, construction pollutants are not expected to result in a substantial reduction or degradation of downstream wetland habitats due to application of mitigation measures to capture sediments and stormwater pollutants.

In general, parking and development would be removed and reduced in the Mariposa Grove of giant sequoias, and new construction would take place at the South Entrance where the transportation hub and parking area would be relocated. The South Entrance area was heavily logged in the early 1900's by the Madera Sugar Pine Company and forested areas consist of smaller diameter trees than the giant sequoia grove, which has never been logged. The South Entrance is considered less valuable habitat for special-status wildlife habitat due to the intensity of road traffic at the site when compared to remote parts of the Grove, and because of the history of logging. Suitable habitat is present for several species including the Northern goshawk, California spotted owl, pallid bat, spotted bat, Western red bat, and Western mastiff bat. While suitable habitat is also present for the fisher and animals have been documented in the vicinity, moving parking and the transportation hub to the South Entrance would move this development farther away from the known fisher den site.

Construction activities would permanently disturb potential special-status habitat near the South Entrance. The net development footprint at the South Entrance would impact 4.72 acres of previously logged non-giant sequoia habitat, including installation of 4.08 acres of impervious

surfaces. Vegetation clearing would cause individuals within the habitats to scatter or relocate. Construction noise could disturb foraging behavior and compromise reproductive success. Vegetation removal for construction operations could result in the removal of important habitat elements such as snags, woody debris, canopy cover, and large trees. The expansion of the existing facility at the South Entrance would create a larger barrier to wildlife movement through the local area. However, the size of the expanded development footprint likely would not be sufficient to substantially alter existing movement patterns of wildlife and access to unique or key habitat areas. There would also be constructed-related impacts in the lower Grove area, though actions would ultimately enhance habitat in the grove. Injuries and mortalities would be prevented by mitigation measures that schedule construction activities with seasonal consideration of wildlife lifecycles to minimize impacts during sensitive periods (i.e. after bird nesting and fisher denning seasons, when bats are neither hibernating nor have young, etc.), establish construction buffer zones when fisher are detected in the area, and ensure education and enforcement to limit construction worker activities.

Construction actions proposed under Alternative 2 would decrease the size and continuity of special-status habitat at the South Entrance. However, this would not affect the abundance, diversity, or distribution of special-status species, as the size of the affected area is small in relation to the amount of habitat available for special-status species in the area. In addition, the South Entrance area is in close proximity to busy roads and the forest consists of previously logged second growth trees, which do not provide the quality of habitat characteristics as the pristine forest in the Grove. Relocation of the transportation hub out of the Mariposa Grove to the South Entrance likely would have a beneficial impact on the fisher because traffic would be reduced between the South Entrance and the Grove, which is prime denning habitat for the fisher. Overall, there would be a short-term, minor adverse impact as a result of construction activities in the Mariposa Grove.

Impact Significance. Construction activities may affect, but are not likely to adversely affect state-listed special-status species.

Restoration-related Impacts. Long-term beneficial impacts would occur from restoration-related activities. Beneficial impacts on special-status species would be similar to those described in the "Vegetation" and "Wildlife" sections.

Ecological restoration of the Mariposa Grove would restore hydrology processes and wetland ecosystems to natural conditions, removing infrastructure such as the road and parking lots, removing invasive species, and planting native vegetation. There would be a 1.44 acre reduction of impermeable surfaces within the lower Grove area due to removal of the lower Grove parking lot, gift shop, and commercial tram staging area and operations, restoration of 0.43 acre of giant sequoia habitat from the removal of trails with Mariposa Grove, and restoration of 2.11 acres of giant sequoia habitat from the narrowing of road or conversion of roads to trails within Mariposa Grove. Restoration of natural hydrologic flows would enhance habitat (currently over forty acres of surface water runoff is diverted from natural flow patterns within the Mariposa Grove). Restoration activities have the potential to disturb populations of the special-status plant species; however, reduced use of the Mariposa Grove would have beneficial impacts on special-status plant species populations. Mitigation measures already in place to protect resources and minimize impacts on sensitive species and habitats would continue.

The restoration of the Mariposa Grove would include enhancing habitat for special-status wildlife, such as the Pacific fisher, California spotted owl and pallid bat. Restoration activities have the potential to temporarily disturb populations of special-status wildlife; however, reduced use of the Mariposa Grove would have beneficial impacts on the populations of special-status species currently

found in at the site because human disturbance, including sound and noise pollution, would greatly decrease. Restoring native vegetation and hydrologic function would help preserve the unique natural features and potentially increase biodiversity of special-status wildlife using the habitats surrounding the Mariposa Grove. Mitigation measures already in place to protect resources and minimize impacts on sensitive species and habitats, such as reducing noise and light pollution, would continue.

Beneficial impacts on special-status species from Alternative 2 include a 1.44 acre reduction of impermeable surfaces within the Mariposa Grove which would provide for habitat restoration, soil decompaction, and greater water infiltration. Improvements to roadway drainage culverts with diminished function or capacity, and implementation of sustainable stormwater strategies would improve hydrologic connectivity, restore subsurface flows, and retain water within the Mariposa Grove which would restore special-status species habitat.

Restoration actions proposed under Alternative 2 would increase the size and continuity of prime special-status species habitat in the Mariposa Grove. The gift shop, the majority of the lower Grove parking lot, and commercial tram staging area and operations would be removed from the Grove. There would be a 1.44 acre reduction of impermeable surfaces within the lower Grove area, restoration of 0.43 acre of giant sequoia habitat from the removal of trails within the Mariposa Grove, and restoration of 2.11 acres of giant sequoia habitat from the narrowing of road or conversion of roads to trails. Restoration of natural hydrologic flows would enhance habitat (currently over forty acres of surface water runoff is diverted from natural flow patterns within the Mariposa Grove). Restoration of 1.0 acre of wetland would be restored.

Impact Significance. Overall, restoration activities under Alternative 2 would have a long-term major beneficial impact on special-status species. Alternative 2 may affect, but is not likely to adversely affect state-listed special-status species.

Operation-related Impacts. Operational use would result in similar types of impacts as described under Alternative 1 (No Action). Removal of road access and elimination of commercial tram service would reduce operational activities levels in the Mariposa Grove, but new facilities would increase operational activity at the South Entrance.

Operational activities could result in trampling or destruction of native vegetation, including special-status plants, and degradation of suitable habitat for special-status plants. Pedestrian traffic along trails would continue sheet erosion of litter, duff, and topsoil. Removal of this protective covering would continue to degrade special-status species habitat. Vandalism of giant sequoia could continue in high-use areas. These impacts would be minimized with proper fencing, educational programs and signage, and regular management and patrols of these areas. Additionally, removal of road access and elimination of tram service from the Mariposa Grove would reduce human-related activities that have the potential to disturb or injure giant sequoia compared to Alternative 1.

Reduced operations in the Mariposa Grove could decrease unregulated access into undisturbed habitats adjacent to the abandoned roads. With a reduction in the number of roads in the Mariposa Grove, the need to remove hazardous vegetation, such as large hollow trees, broken-top trees, snags, and downed logs that support special-status species wildlife would be reduced. Reducing operations in the Mariposa Grove and locating facilities to the South Entrance would move operations further from existing nests for California spotted owl, roost for pallid bats, and the fisher den site; thus reducing potential operations-related impacts on these species and protecting prime denning habitat.

Increased use of the South Entrance as a parking lot and for new visitor facilities could degrade habitat conditions and reduce the quality of the habitats for some special-status wildlife. Suitable habitat for several species is present including the Northern goshawk, California spotted owl, pallid bat, spotted bat, Western red bat, Western mastiff bat, and Pacific fisher. Locating facilities at the South Entrance would move operations farther from the known fisher den site. Vegetation and habitat elements that could potentially support special-status species, such as mature conifer and hardwood trees, large hollow trees, broken-top trees, snags, and downed logs, may be removed for the new parking lot and buildings and could reduce use of the habitats at the South Entrance by special-status birds and mammals. However, this area would be less valuable as special-status wildlife habitat due to the intensity of road traffic compared to remote parts of the Grove. Relocation of infrastructure and facilities and increasing the number of visitors under Alternative 2 would also increase the extent and intensity of these human-caused operational disturbances. These disturbances could reduce reproductive success of species breeding and nesting in the vicinity of the redevelopment area and cause short- or long-term abandonment of areas known or potentially used by several special-status wildlife species. Disturbances on the landscape that restrict wildlife movement and access to important habitats can affect dispersal, reproductive potential, and distribution of species. The expansion of the existing facility at the South Entrance would create a larger barrier to movement through the local area.

Removal of road access and elimination of commercial tram service would reduce operational activities levels in the Mariposa Grove, but new facilities would increase operational activity at the South Entrance. Overall, the impacts of operational activities would move from highly valued habitat in the Mariposa Grove, to less highly valued habitat at the South Entrance. Operational changes would result in a long-term, moderate beneficial impact in the Mariposa Grove, and a long- term minor adverse impact at the South Entrance area. These operational changes may affect, but are not likely to adversely affect state-listed special-status species.

Impact Significance. Alternative 2 may affect, but is not likely to adversely affect state-listed special-status species. There are no federal-listed species associated with the Mariposa Grove area. Should the Pacific fisher be proposed for federal listing under the Endangered Species Act during implementation of the Mariposa Grove project, the NPS would consult with USFWS to ensure adequate protection of the fisher.

Conclusion. There are no federal listed species in the Mariposa Grove project area, though a number of other special-status species are present including the giant sequoia, California spotted owl, pallid bat, and the Pacific fisher (a candidate for listing under the Endangered Species Act). Construction actions proposed under Alternative 2 would decrease the size and continuity of special-status habitat at the South Entrance. The size of the affected area would not affect the abundance, diversity, or distribution of special-status species, as the size of the affected area is small in relation to the amount of special-status habitat available for special-status species in the area. The ongoing construction of wildlife crossings under Wawona Road (an action that is separate from the actions evaluated in this EIS; see Appendix B) will mitigate the effects on wildlife corridors in this area. In addition, the area affected at the South Entrance is in close proximity to busy roads and the forest consists of second growth trees, which are not prime habitat for many species.

Relocation of the transportation hub out of the Mariposa Grove to the South Entrance is likely to have a beneficial impact on the fisher, as visitor use and vehicles would be concentrated farther away from prime fisher denning habitat. Restoration actions proposed under Alternative 2 would substantially increase the size and continuity of prime special-status species habitat in the Mariposa Grove. The majority of the lower Grove parking lot, gift shop, and commercial tram staging area and operations would be removed from the Grove. There would be a 1.44 acre reduction of impermeable

surfaces within the lower Grove area, restoration of 0.43 acre of giant sequoia habitat from the removal of trails within the Mariposa Grove, and restoration of 2.11 acres of giant sequoia habitat from the narrowing of road or conversion of roads to trails. Restoration of natural hydrologic flows would enhance habitat (currently over forty acres of surface water runoff is diverted from natural flow patterns within the Mariposa Grove). Overall, Alternative 2 would substantially increase the size and continuity of prime special-status species habitat in the Mariposa Grove, and reduce the integrity of less-valued habitat at the South Entrance, resulting in a long-term moderate beneficial impact on special-status species. Alternative 2 may affect, but is not likely to adversely affect federal- or state-listed special-status species.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting special-status species would be the same as those under Alternative 1 (No Action)—an overall long-term moderate adverse impact on special-status species in the Yosemite region. These impacts, in conjunction with the long-term moderate beneficial impacts of Alternative 2 on special-status species in the Mariposa Grove, would contribute to reversing the adverse impacts of past actions in the region, particularly within Yosemite. On a regional scale, long-term minor adverse impacts on special-status species in the Yosemite region would continue.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and construct a new bypass road to a new, larger parking lot at the Grizzly Giant. The new road would require construction of two new bridges. These new facilities would be located outside of giant sequoia habitat. The Grizzly Giant would be the primary arrival point for visitors to the Grove. The current South Entrance parking lot would remain as is, with 20 parking spaces, and the lower Grove parking lot would largely be removed. Rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, and soil decompaction would be similar to those in Alternative 2.

Construction-related Impacts. Impacts on special-status species would occur primarily at the new Grizzly Giant by-pass road and primary access facilities, in prime fisher denning habitat. Construction of the bypass road would impact about 2.2 acres of special-status species habitat in a pristine forest (not previously logged), including 0.33 acre through giant sequoia habitat and 0.10 of raised crossings over wetlands.

Construction equipment and activities would remove vegetation; create noise, lighting, and human disturbances; and reduce the quality of the area for use by wildlife. Although construction activities would be short-term in nature, the new road and parking area would be permanent. These facilities and traffic could affect reproductive success of birds nesting in the vicinity, such as the spotted owl or of bats roosting in trees. In addition, other special-status birds or mammals that are present in the vicinity at the time of construction may be forced to relocate or could be injured by construction equipment, particularly during grading and vegetation removal. The removal of large trees and snags would affect many cavity-dependent species, such as owls, fisher, and bats.

In particular, construction activities and the permanent bypass road and Grizzly Giant parking area would be moved to prime fisher denning habitat and/or known fisher occurrences. Construction noise would disturb movement patterns, and foraging or breeding behavior of fishers. Vegetation removal for construction operations could result in the removal of important habitat elements for fisher, such as snags, woody debris, canopy cover, and nesting and roosting sites for owls and bats. Fisher habitat within the proposed footprint of the Grizzly Giant parking area is an open mesa top with mature pines and little understory; habitat that is less suitable for fishers, although a fisher was

repeatedly documented in the proposed parking area during 2011 camera surveys (NPS 2013a). Habitat within the footprint of the proposed new access road would traverse prime fisher habitat.

Impact Significance. Overall, there would be a long-term, major, adverse impact on special-status species as a result of construction activities and permanent structures in the Mariposa Grove under Alternative 3. Construction activities and permanent structures proposed under Alternative 3 may affect, and are likely to adversely affect state-listed special-status species. There are no federal listed species in the Mariposa Grove area.

Restoration-related Impacts. Beneficial impacts on special-status species from Alternative 3 include (1) restoration of 0.58 acre of giant sequoia habitat from the removal of trails with Mariposa Grove, and (2) restoration of 2.79 acres of giant sequoia habitat from the narrowing of road or conversion of roads to trails within Mariposa Grove. Restoration after the removal of impermeable surfaces would provide for giant sequoia habitat restoration which would provide special-status species habitat. Alternative 3 would restore 1.0 acre of wetlands habitat within the lower Grove area. Project-wide, the net change in development under Alternative 3 would result in the addition of 0.50 acre in developed area which is comprised of 5.75 acre net reduction in of developed area within the Grove plus 6.25 acres of new development at the Grizzly Giant arrival area and new bypass road.

Impact Significance. Restoration activities proposed under Alternative 3 would have a long-term, major, beneficial impact on special-status species. Alternative 3 may affect, but is not likely to adversely affect, state-listed special-status species.

Operation-related Impacts. Operation-related impacts on special-status species are expected to be similar to those described in Alternative 2; however, the location of impacts would take place along the Grizzly Giant by-pass road and primary access facilities. Adverse impacts would occur in areas previously unaffected by roads, vehicle transportation and access facility operations. These impacts could affect the local populations of special-status species previously undisturbed by operation-related activities and could degrade suitable habitat, thus inhibiting species use of the area.

Operations at Grizzly Giant have potential to disturb special-status wildlife that rely on the habitats in the area for nesting, breeding, foraging, roosting, and other uses. The types of impacts from human disturbance and day-to-day activities would be similar to those described under Alternative 2, and impacts on species would be similar because the same species occur in the vicinity of Grizzly Giant. Impacts on special-status species in general would include general disturbance from noise and lighting, habitat loss, degradation or reduced quality of the habitat at and surrounding Grizzly Giant, potential injury or mortality to wildlife, and reduced reproductive success for birds and bats that have been using the area in the past.

Disturbances on the landscape that restrict wildlife movement and access to important habitats can affect dispersal, reproductive potential, and distribution of species. Establishment of the Grizzly Giant facilities would create a barrier to movement through the local area. However, the size of the development would likely not be sufficient to substantially alter existing movement patterns of wildlife and access to unique or key habitat areas. Riparian corridors provide important dispersal habitat or landscape linkages for Pacific fishers and provide important rest site elements, such as broken tops, snags, and coarse woody debris (Heinemeyer and Jones 1994; Seglund 1995). However, primary movement corridors following the drainages south of the Grizzly Giant are not anticipated to be directly affected by the construction of new facilities.

Of particular concern at the Grizzly Giant bypass road and facilities is the Pacific fisher (figure 3-10), which has documented occurrences near these features. Operations would introduce human disturbance, noise and light pollution at Grizzly Giant which would affect breeding and resting behavior of fisher using the site. More importantly, there is an increased potential for fisher road-kills with more than double the increase in private vehicle traffic. Increased vehicular traffic near occupied fisher habitat would have the potential to increase mortality through collisions with vehicles. A new by-pass road would fragment contiguous high quality fisher habitat in the Mariposa Grove.



Figure 3-10 – Pacific Fisher
Source: University of California Berkeley and National Park Service

Impact Significance. Overall, there would be long-term, moderate, adverse operational impacts on special-status species under Alternative 3. Operations activities under Alternative 3 may affect, and are likely to adversely affect state-listed special-status species.

Conclusion. While ecological restoration activities under Alternative 3 would have a major beneficial impact on special-status species, there would be major adverse impacts on special-status habitat as a result of construction of a new road in prime fisher denning habitat, and moderate adverse operational impacts. Construction activities, and the permanent bypass road and new parking lot proposed under Alternative 3 may affect, and are likely to adversely affect state-listed special-status species. There are no federal listed species in the Mariposa Grove area. Should the fisher (current Candidate Species) be proposed for federal listing under the Endangered Species Act during implementation of the Mariposa Grove project, the NPS would consult with USFWS to ensure adequate protection of the fisher.

Project-wide, the net change in development under Alternative 3 would result in the addition of 0.50 acre in developed area (comprised of 5.75 acre net reduction in developed area within the Grove and 6.25 acres of new development at the Grizzly Giant arrival area and new bypass road). In accordance with the Endangered Species Act, the park will consult with the U.S. Fish and Wildlife Service further regarding the potential for adverse effects resulting from the implementation of the proposed actions, and additional mitigation may be identified. Alternative 3 may affect, and is likely to adversely affect special-status species.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting special-status species would be the same as those under Alternative 1 (No Action)—an overall long-term moderate adverse impact on special-status species in the Yosemite region. These impacts, in conjunction with the long-term beneficial impacts of Alternative 3 in the Mariposa Grove, and the long-term moderate adverse impacts associated with construction of the Grizzly Giant hub and associated access road would result in long-term moderate adverse impacts on special-status species in the Yosemite region.

Alternative 4: South Entrance Hub with Modified Commercial Tram Service

Under Alternative 4, the South Entrance would be the primary departure point for visitors accessing the Grove. This alternative would maintain the commercial tram with a limited route and hours of operation. Comprehensive ecological restoration actions would take place; including removing

parking and restoring the lower Grove area to giant sequoia habitat, improving hydrologic flows that sustain the giant sequoia, and converting roads to trails. Project-specific prescribed fire and hazardous fuel reduction treatments and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction activities are not expected to result in direct impacts on special-status plants. Impacts on special-status plant species would be similar to those described in the "Vegetation" section for Alternatives 2 and 4. No special-status plants have been identified in the development footprint, although several species, including giant sequoia, occur in the vicinity and could result in indirect impacts from construction pollutants in runoff. With application of mitigation measures, construction pollutants are not expected to result in a substantial reduction or degradation of downstream wetland habitats due to application of mitigation measures to capture sediments and stormwater pollutants.

In general, parking and development would be removed and reduced in the Mariposa Grove of giant sequoias, and new construction would take place at the South Entrance where the transportation hub and parking area would be relocated. Suitable habitat is present for several species including the Northern goshawk, California spotted owl, pallid bat, spotted bat, Western red bat, Western mastiff bat, and fisher. Moving parking and the transportation hub to the South Entrance would move development farther away from the known fisher den site.

Construction activities would permanently disturb potential special-status habitat near the South Entrance. The net development footprint at the South Entrance would impact 4.72 acres of previously logged non-giant sequoia habitat, including installation of 4.08 acres of impervious surfaces. Vegetation clearing would cause individuals within the habitats to scatter or relocate. Construction noise could disturb foraging behavior and compromise reproductive success. Vegetation removal for construction operations could result in the removal of important habitat elements such as snags, woody debris, canopy cover, and large trees. The expansion of the existing facility at the South Entrance would create a larger barrier to wildlife movement through the local area. There would also be constructed-related impacts in the lower Grove area, though actions would ultimately enhance habitat in the grove. Injuries and mortalities would be prevented by mitigation measures that schedule construction activities with seasonal consideration of wildlife lifecycles to minimize impacts during sensitive periods (i.e. after bird nesting seasons, when bats are neither hibernating nor have young, etc.), establish construction buffer zones when fisher are detected in the area, and ensure education and enforcement to limit construction worker activities.

Construction actions proposed under Alternative 4 would decrease the size and continuity of special-status habitat at the South Entrance. However, this would not affect the abundance, diversity, or distribution of special-status species, as the size of the affected area is small in relation to the amount of habitat available for special-status species in the area. The ongoing construction of wildlife crossings under Wawona Road (an action that is separate from the actions evaluated in this EIS; see Appendix B) will mitigate the effects on wildlife corridors in this area. In addition, the South Entrance area is in close proximity to busy roads and the forest consists of previously logged second growth trees, which do not provide the quality of habitat characteristics as the pristine forest in the Grove. Relocation of the transportation hub out of the Mariposa Grove to the South Entrance likely would have a beneficial impact on the fisher because traffic would be reduced between the South Entrance and the Grove, which is prime denning habitat for the fisher.

Impact Significance. Overall, there would be a short-term, minor, adverse impact as a result of construction activities in the Mariposa Grove. Construction activities may affect, but are not likely to adversely affect state-listed special-status species.

Restoration-related Impacts. Similar to effects described under Alternatives 2 and 3, restoration-related impacts would result in beneficial impacts on special-status species from the restoration of giant sequoia habitat and hydrological function; and the resulting improvements to habitat quality and function from these restoration actions.

Impact Significance. Alternative 4 is expected to have site-specific, long-term, moderate, beneficial impacts on special-status species within the Mariposa Grove. Alternative 4 may affect, but is not likely to adversely affect state-listed special-status species. There are no known federal-listed species in the Mariposa Grove area.

Operation-related Impacts. Commercial tram traffic would run through special-status wildlife habitat on a daily basis. The Grove Road would continue to need maintenance to support tram tours. This would involve paving, road stabilization, and other maintenance. Commercial tram operations would be reduced in the upper Grove area. The South Entrance would experience an increase in visitation and operational use resulting in greater adverse impacts on special-status species, similar to that described in Alternative 2.

Operational activities would have the potential to disturb or injure special-status plants, specifically giant sequoia, in the vicinity of existing use areas such as parking lots, roads, and trails. The NPS would limit operational impacts to the extent possible and avoid known sensitive areas; however, individual plants may be trampled, and suitable habitat may be affected, which could affect local populations and would be a noticeable minor, impact. Natural hydrologic flow and processes that are currently impacted by inadequate drainage culverts would be improved to the extent possible, but special-status species habitat in the Mariposa Grove would continue to be affected by the presence of roads. Erosion and sedimentation form runoff would continue to impact nearby special-status species habitat.

Continued operations would disturb special-status wildlife in the vicinity of the Mariposa Grove and would continue to preclude species sensitive to human disturbance, such as the fisher. Operational activities that affect suitable habitat, such as giant sequoia forests, would continue to affect species that rely on the affected habitats for foraging, breeding, nesting and other uses by reducing the quality of the habitat and possibly forcing the species to relocate or find other suitable habitat in the region. Human disturbance from operational activities would continue to reduce the quality of the surrounding habitats and disturb special-status species. Disturbance during the breeding and nesting periods for special-status birds could result in effects on reproductive success, which could affect local populations.

In particular, the California spotted owl, pallid bat, and fisher have the highest potential to be affected by activities at the Mariposa Grove. Continued operations would disturb California spotted owl which nest within 2 kilometers of the current parking lot and paved road, and forage in high use areas (e.g., current parking lot). Operational and recreational activities can cause owls to abandon disturbed habitat, and reduce reproductive success. Human disturbance and noise pollution from operational activities and facilities would affect owls, which detect their prey primarily by sound, and would thus affect foraging and breeding success of these species. Disturbance during the breeding and nesting periods for California spotted owls (breed from approximately February to September) could result in impacts on reproductive success, which could affect local populations.

Pallid bats have reproductive roosts in the Mariposa Grove and could experience disruptive impacts from operational activities similar to that of the California spotted owl. Pallid bats use giant sequoia trees as their maternal roosts and colonial roost sites were recorded in the lower Grove area, near the commercial tram parking, and a pair of adjacent trees in the middle grove, west of the Grizzly Giant.

Pierson et al. (2006) concluded that giant sequoia trees provided important refugia for pallid bats in the Mariposa Grove.

Pacific fishers have been detected in the Mariposa Grove, including in the vicinity of high use areas, such as the South Entrance, Mariposa Grove Road, parking lot, trails within the Grove, and the paved road leading up to Wawona Point (2013d). Wildlife vehicle collisions have become a concern in Yosemite, with nine documented road-kill fishers (including two lactating females) along the Wawona Road over the past two decades (Cline 2013). A tenth road-kill fisher has been documented on the nearby Glacier Point Road, and an additional three road-kill fishers have been documented south of the park in Sierra National Forest along Highway 41 (Cline 2013). This stretch of road poses a significant threat for fishers and other wildlife because it bisects a very narrow corridor of suitable habitat (Cline 2013). Existing surface water impacts that affect hydrology and wetland ecosystems would have a negative effect on the condition of riparian habitat that the Pacific fisher relies on for foraging, dispersal, and resting. Impacts on riparian areas could further fragment corridor habitat and impede movement of individual fishers. Overall, there would be long-term, minor operations-related adverse impacts on special-status plants and wildlife.

Impact Significance. Overall, there would be long-term, minor, operations-related adverse impacts on special-status plants and wildlife as the result of operations under Alternative 4. Alternative 4 may affect, but is not likely to adversely affect special-status species. In accordance with the Endangered Species Act, the park will consult with the USFWS further regarding the potential for adverse effects resulting from the implementation of the proposed actions, and additional mitigation may be identified.

Conclusion. Under Alternative 4, there would be short-term, minor adverse impact as a result of construction activities in the Mariposa Grove. While operations would be limited in the upper Grove area, long-term, minor operations-related adverse impacts on special-status plants and wildlife they would continue in the lower Grove area. There would be a long-term moderate beneficial impacts on special-status species from restoration actions. Actions include 1.84 acres of potential habitat restoration within Mariposa Grove. Project-wide, the net change in development under Alternative 4 would result in the addition of 2.88 acres in developed area which is comprised of 1.84 acre net reduction in of developed area within the Grove plus 4.72 acres of new development at the South Entrance. Alternative 4 may affect, but is not likely to adversely affect, special-status species.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting special-status species would be the same as those under Alternative 1 (No Action)—an overall long-term moderate adverse impact on special-status species in the Yosemite region. These impacts in conjunction with the long-term moderate beneficial impacts of Alternative 4 on special-status species in the Mariposa Grove, would contribute to reversing the adverse impacts of past actions in the region, particularly within Yosemite. On a regional scale, long-term minor adverse impacts on special-status species in the Yosemite region would continue.

WETLANDS

Affected Environment

Wetlands are transitional areas between terrestrial and aquatic ecosystems, where water is usually at or near the surface or the land is covered by shallow waters. Wetlands have many distinguishing features, the most notable of which are the presence of standing water or soil saturation (for at least a portion of the growing season) and plants adapted to or tolerant of saturated soils (Mitsch and Gosselink 1993).Wetlands are considered highly valued resources because they perform a variety of hydrological and ecological functions vital to ecosystem integrity (NPS 2011f).

Wetlands and other waters of the United States are regulated under Section 404 of the Clean Water Act, Executive Order 11990: Protection of Wetlands (42 FR 26961), and NPS Director's Order #77-1: Wetland Protection. Wetland boundaries at the Mariposa Grove and the South Entrance were mapped following the U.S. Army Corps of Engineers (2008) *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*. Wetland habitats were classified using the USFWS guidance (Cowardin et al. 1979), which is the basis for wetland classification and protection used by the NPS.

The USFWS system classifies wetlands based on type of vegetative cover and life form, flooding regime, and substrate material (Cowardin et al. 1979). Jurisdictional wetlands are delineated and classified in accordance with Section 404 of the Clean Water Act. USFWS-defined wetlands include jurisdictional wetlands, but may also include certain nonvegetated sites, if they meet specific criteria.

Wetland investigations were performed at the Mariposa Grove and South Entrance during August, September, and October of 2011. Landscape position, soils, vegetation, and hydrology were evaluated in detail at sample points scattered across the project area, and wetland boundaries were delineated (NPS 2011f). A total of 102.7 acres of wetland were delineated in the Mariposa Grove; these were a mix of palustrine forested, palustrine scrub shrub, palustrine emergent, and riverine wetlands (NPS 2011f). A total of 1.4 acres of palustrine wetland were delineated in the South Entrance area (NPS 2011f).

Prior to construction of the road through the Mariposa Grove and the South Entrance areas, these wetlands formed what had been a continuous dendritic network. Currently, the Mariposa Grove Road fragments the former contiguous wetland, altering wetland hydrology and other functions. Incense cedar, white fir, giant sequoia and other trees rooted in wetlands provide over 30 percent cover throughout most of the area's wetlands, primarily in wide valleys where topography flattens out. Many wetlands have a thick understory of shrubs, such as Western azalea (*Rhododendron occidentalis*) and red-twig dogwood (*Cornus sericea*), forbs, and emergent vegetation. In these areas, soils are dark brown sandy loams along wetland edges, grading into deep black silt loams toward the wetland centers. Most wetland areas are saturated to the ground surface. Currently, infrastructure such as roads, parking areas, trails, and visitor facilities are within some of the identified wetland areas, and may be negatively affecting wetland and stream hydrology and function. In addition, the leaking water supply pipeline from Biledo Spring in the Sierra National Forest to the South Entrance loses an estimated 39,000 gallons of water per day within the Grove.

Mariposa Grove Setting

The Mariposa Grove and its wetlands are not only unique because of the presence of giant sequoias but also because of the great diversity of habitats, plants, and wildlife. Wetlands in the Grove make up a significant portion (12.3 percent) of the watershed. These wetlands provide important hydrologic support including aquifer recharge, storm runoff abatement, sediment retention, prevention of erosion through stream bank stabilization, and stream/river temperature moderation in the watershed.

Mariposa Grove wetlands have very high biotic functions and values. This area contains a rich mosaic of old growth forest (with trees of all age classes, standing snags, and large downed trees), streams, and wetlands. These habitats support a great variety of plant and wildlife species, including a number of special-status species. These wetlands have high native plant productivity, cover, and diversity. In addition, several fens, which have a limited distribution in the Sierra Nevada, are present. Within 200 feet of delineated wetlands are located roughly 82 percent of the giant sequoias (Kuhn 2011). This supports conclusions by Halpin (1995) on the importance of topographic flow accumulation, and further signifies the importance of soil water availability within the rooting zone

for giant sequoia. In the Mariposa Grove, 90.3 acres of palustrine forested wetland, 1.6 acres of palustrine scrub shrub wetland, 8.8 acres of palustrine emergent forested wetland, and 2.0 acres of riverine wetlands were delineated (figure 3-11). Although the National Wetland Inventory mapping of the area identifies five separate palustrine emergent wetlands totaling 7.1 acres in the area, an additional 1.6 acres were mapped during the field effort (NPS 2011f).These wetlands are continuous along the dendritic network of perennial (6.1 miles) and seasonal (2.8 miles) streams that drain the Grove, and which are incised in the gentle mountain topography (NPS 2011f). These features are shown in figure 3-11.

The Mariposa Grove is almost entirely within a single, 877-acre, watershed sub-basin. This watershed is within the mixed conifer forest zone. Soils are unglaciated residual and alluvial sandy and silt loams with poor profile development, and are derived from granite and metasedimentary bedrock.

South Entrance Setting

The South Entrance is within the same watershed sub-basin as the Mariposa Grove, but it is treated as an additional 21 acres beyond the 877 acres delineated for the Grove. The South Entrance is within the mixed conifer forest zone. Soils in the area are composed of sandy loam derived from granitic bedrock.

A total of 1.4 acres of palustrine-forested wetland were delineated in and near the South Entrance area (NPS 2011f), as shown in figure 3-12.

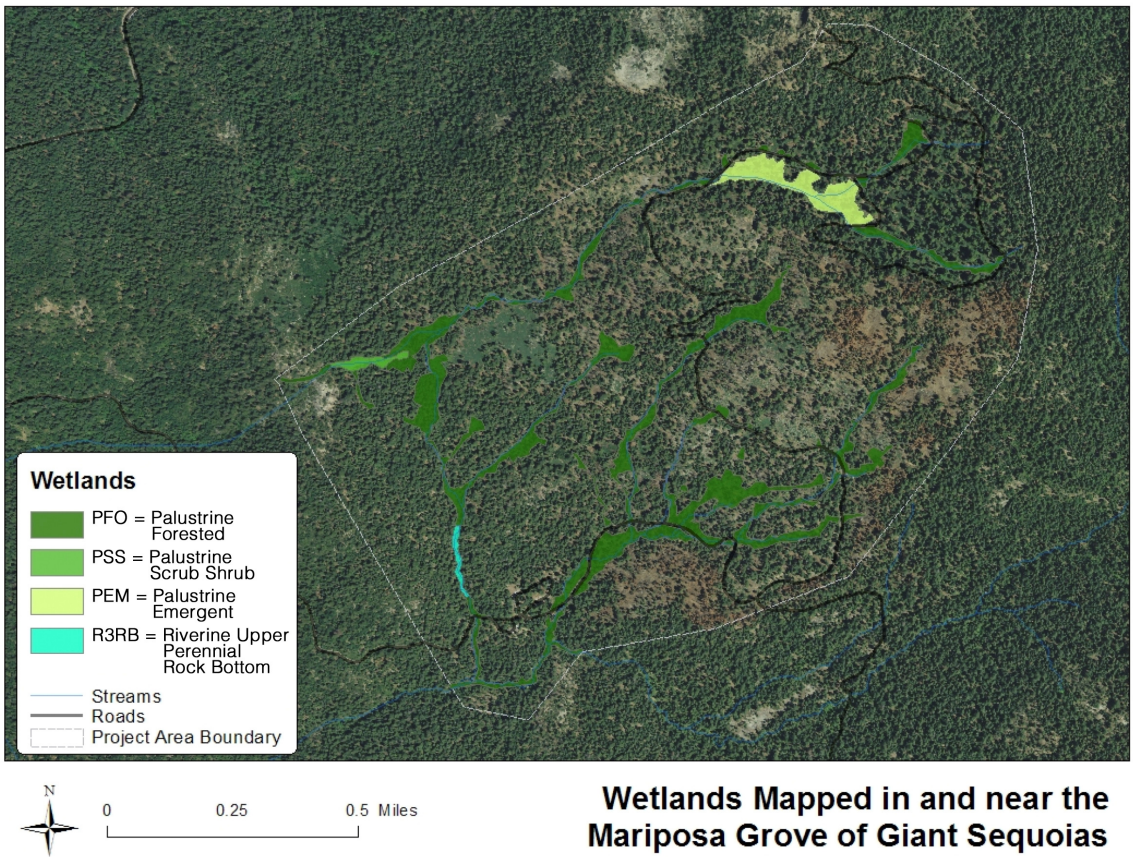


Figure 3-11 – Wetlands In and Near the Mariposa Grove

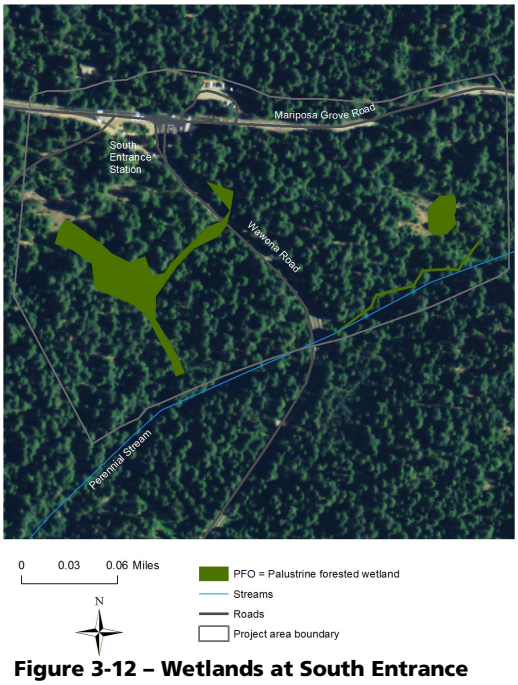


Figure 3-12 – Wetlands at South Entrance

Environmental Consequences

Impact Assessment Methodology

Determination of the significance of potential impacts on wetlands was based on the duration, type and intensity of impact. Actions that reduce the size or degrade the integrity or connectivity of wetlands were considered adverse impacts, whereas actions that preserve, enhance, or restore these qualities were considered beneficial impacts. For additional information on the assessment of wetlands, refer to Appendix F, Draft Statement of Findings for Protection of Wetlands.

Impact Intensity Level Definitions

Negligible – Wetlands are not affected, or impacts do not result in a detectable change of wetland function or value.

Minor – Impacts on wetlands are detectable and could result in a loss or gain of wetland function or value. If compensatory mitigation is needed to reduce or rectify adverse impacts, it would be relatively simple to implement and have a high probability of success.

Moderate – Impacts on wetlands are readily apparent and result in a loss or gain of wetland function or value. Compensatory mitigation is probably necessary to reduce or rectify adverse impacts and would have a high probability of success.

Major – Impacts on wetlands are readily apparent and substantially change the physical characteristics of wetlands or result in a significant net loss or gain of wetland function or value. Intensive compensatory mitigation is necessary to reduce or rectify adverse impacts, and its success is not guaranteed.

Alternative 1: No Action

Under Alternative 1 current infrastructure, concessioner services and maintenance, and park management would remain as is. No rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be implemented.

Operation-related Impacts. Continued use of the existing facilities at the Mariposa Grove could result in inadvertent impacts on wetlands in the area from pedestrian trampling and disturbance during recreational activities. These impacts would disturb the vegetation in the wetlands and could affect the quality of the wetlands, but operational activities would be controlled in and around these sensitive areas to minimize or prevent adverse impacts. With proper education and direction, operational users would have a local, long-term, minor, adverse impact on wetlands.

Existing road design and alignment, impermeable surfaces (including park facilities), and trails would continue to impair hydrologic connectivity, subsurface flow, and retention of available water within the Mariposa Grove and degrade wetland communities. Specific facilities and structures impacting hydrologic flow/process include: (1) forty-one roadway drainage culverts with diminished function or capacity, and (2) about 11.3 acres of impermeable surfaces within the Mariposa Grove. As a result, 48.6 acres of surface water runoff is diverted from natural flow patterns within the Mariposa Grove and 88.5 acres of surface water runoff is diverted from the Mariposa Grove. Road and parking area stormwater runoff would continue to discharge waterborne pollutants directly into wetland communities. In addition, the leaky water supply pipeline, which loses an estimated 39,000 gallons of water per day within the Grove, may disrupt normal water supply patterns.

Impact Significance. Local, long-term, minor to moderate, adverse impacts.

Conclusion. No construction-related impacts would occur. Operation-related impacts would include minor visitor impacts on wetlands and moderate adverse impacts to hydrologic flow and processes.

Cumulative Impacts. The cumulative impacts on wetlands discussed in this section are based on an analysis of past, present, and reasonably foreseeable future actions in the Yosemite region in conjunction with the potential effects of Alternative 1 (No Action). Wetlands are the most altered and impaired habitat of the Sierra Nevada, and, as a small proportion of the landscape, they are relatively rare (SNEP 1996). Dams, roads, and water diversions in the Sierra Nevada have had a profound effect on streamflow patterns and wetlands. Broad valleys with wide riparian wetlands were often used as reservoir sites. Much of the flatwater on the western slope of the Sierra Nevada below 5,000 feet in elevation is artificial. These past actions have had long-term, major adverse effects on regional wetland habitat.

Current and future regional plans and projects would have beneficial and adverse impacts on wetlands (Appendix B). Comprehensive Ecological Restoration Projects, the Wawona Meadow Restoration Project, and ecological restoration elements of the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans* would result in beneficial impacts on wetlands. The *Wilderness Stewardship Plan* could contribute watershed-scale protection to wetlands in much of the park, depending on the outcome of the final plans. These actions would have a long-term moderate beneficial effect on wetlands.

There would be adverse impacts on wetlands associated with the current South Entrance Station Kiosks Replacement project and future actions associated with new development proposed in the

Draft Merced and *Tuolumne Wild and Scenic River Comprehensive Management Plans*, due to the direct loss of wetlands. Site-specific adverse effects would be short-term (during construction) and long-term (direct displacement of wetlands). The NPS will compensate for impacts on wetlands associated with the South Entrance Station Kiosks Replacement project with wetland restoration in the *Mariposa Grove Plan/FEIS* (Appendix F). Wetland impacts associated with in the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans* would require compensation. The NPS will consult with the U.S. Army Corps of Engineers and Regional Water Quality Control Boards to ensure adequate compensation and no net loss of wetlands. The NPS will obtain required Clean Water Act Section 401 and 404 permits prior to implementing any actions regarding wetlands.

In summary, past impacts on wetlands in the region have been adverse, long-term, and major. Present and foreseeable future actions would contribute to reversing the adverse impacts of past actions in the region, particularly within Yosemite. Past, present, and future impacts, in conjunction with the minor impacts on wetlands and moderate impairments to hydrologic flows in the Mariposa Grove under Alternative 1 (No Action), would result in a long-term moderate adverse impact on wetlands in the Yosemite region.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the commercial tram operation and reduce the amount of lower Grove parking while expanding and relocating primary visitor parking to the South Entrance, making the South Entrance the departure point for visitors accessing the Grove. Rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, and soil decompaction would be components of this alternative.

Construction-related Impacts. Under Alternative 2 (preferred alternative), wetlands loss is estimated to total 0.37 acre. This total includes 0.24 acre of permanent wetland loss near the South Entrance due to construction activities and a very minor loss of wetlands (<0.01 acre) associated with restoration of impacted wetland and riparian habitat due to the installation of small piers to extend the existing footbridge in the lower Grove area to protect the wetland from trampling impacts, and replacement of drainage culverts with larger culverts to accommodate larger flows. Relocation of the water tank, which is designed with an overflow to prevent freezing, could dry up a small wetland area near the current tank location (0.10 acre). Artificially created roadside wetlands, resulting from berms and failed culverts, would potentially dry up once flows are restored to natural drainage patterns (<0.02 acre).

There would also be site-specific temporary impacts on wetlands during the construction phase. The removal of impervious surfaces associated with existing buildings could temporarily increase groundwater infiltration by exposing soils. A temporary change in surface runoff during construction would not be noticeable in the Mariposa Grove and would have a minimal effect on function or value of the wetlands in the Mariposa Grove.

There would be temporary minor adverse impacts in the lower Grove area during removal of infrastructure and in the upper Grove area during water line repair and/or replacement. The repair of leaking water pipes could have small local impacts on water tables, as it would eliminate unintended leakage. It is difficult to quantify or locate site-specific underground leaks in such a complex and large system, but overall, replacement of water lines could contribute to localized minor decreases in water levels, leading to restoration of natural water levels.

No construction equipment staging areas would be adjacent to or within any wetlands. Implementation of construction Best Management Practices would be employed to minimize impacts associated with erosion and sedimentation. These Best Management Practices would

include, but not be limited to, installation of silt fencing and sediment traps, application of water sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, where appropriate.

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

Restoration-related Impacts. Increasing the capacity of drainage culverts and implementation of sustainable stormwater strategies would improve hydrologic connectivity, restore subsurface flows, and retain water within the Mariposa Grove, which would restore processes that sustain wetland ecosystems. In the long term, removal of facilities and elimination of associated uses such as commercial tram service from the Mariposa Grove would protect and restore wetland habitat. Realignment of the Grove road northward out of the delineated wetland, and conversion of the original alignment to an accessible trail, would beneficially impact wetlands in that portion of the Grove. The conversion of much of the upper Grove loop road to a trail would also restore some palustrine forested wetland. Overall, about 1.0 acre of wetland restoration is anticipated under Alternative 2.

Impact Significance. Long-term, major, beneficial impact on wetlands.

Operation-related Impacts. Closing the existing road in the Mariposa Grove would reduce operation activities and reduce the potential for inadvertent impacts on wetlands from trampling, although some recreational foot traffic in nearby wetlands would continue. Discharge of waterborne pollutants from directly into wetland communities from road and parking areas would be reduced in the Mariposa Grove, but would increase at the South Entrance.

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

Conclusion. Alternative 2 is expected to have a local, short-term minor adverse impact from potential soil erosion associated with construction-related impacts. Construction activities would result in the loss of about 0.24 acre of wetland at the South Entrance. Alternative 2 is expected to have long-term major beneficial impacts on wetlands from the removal of facilities and subsequent ecological restoration (1.0 acre), vehicular traffic, and the improvement of water flows in the Grove that sustain wetlands. Overall, there would be a long-term, moderate beneficial impact on wetlands. Adherence to mitigation measures described in Chapter 2 and Appendix E and avoidance of wetlands where possible would minimize short-term impacts. Appendix F, Draft Statement of Findings for Protection of Wetlands, provides additional detail on potential impacts on wetlands and mitigation measures.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting wetlands would be the same as those under Alternative 1 (No Action)—an overall long-term major adverse impact on wetlands in the Yosemite region. These impacts, in conjunction with the long-term moderate beneficial impacts of Alternative 2 on wetlands in the Mariposa Grove, would contribute to reversing the adverse impacts of past actions in the region. On a regional scale, long-term moderate adverse impacts on wetlands in the Yosemite region would continue.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, including two new bridges, and a new larger parking lot near the Grizzly Giant, but outside of giant sequoia habitat. The Grizzly Giant would be the primary departure point for visitors to the Grove. The current number of parking spaces at the South Entrance would remain as is, and the lower Grove parking lot would be removed. A small lot of ABAAS-compliant parking spaces would be

constructed in the lower Grove area. Rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, and soil decompaction would be similar to those in Alternative 2 South Entrance.

Construction-related Impacts. Under Alternative 3, a total of about 0.03 acre in wetland loss would be anticipated. There would be a very minor loss of wetlands (<0.01 acre) associated with restoration of impacted wetland and riparian habitat due to the installation of small piers to extend the existing footbridge in the lower Grove area to protect the wetland from trampling impacts, and replacement of drainage culverts with larger culverts to accommodate larger flows. Artificially created roadside wetlands, resulting from berms and failed culverts, would potentially dry up once flows are restored (<0.02 acre).

There would also be site-specific temporary impacts on wetlands during the construction phase. The removal of impervious surfaces associated with existing buildings could temporarily increase groundwater infiltration by exposing soils. A temporary change in surface runoff during construction would not be noticeable in the Mariposa Grove and would have a minimal effect on function or value of the wetlands in the Mariposa Grove.

There would be temporary minor adverse impacts in the lower Grove area during removal of infrastructure and in the upper Grove area during water line repair and/or replacement. The repair of leaking water pipes could have small local impacts on water tables, as it would eliminate unintended leakage. It is difficult to quantify or locate site-specific underground leaks in such a complex and large system, but overall, replacement of water lines could contribute to localized minor decreases in water levels, leading to restoration of natural water levels. No construction equipment staging areas would be adjacent to or within any wetlands. Implementation of construction Best Management Practices would be employed to minimize impacts associated with erosion and sedimentation. These Best Management Practices would include, but not be limited to, installation of silt fencing and sediment traps, application of water sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, where appropriate.

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

Restoration-related Impacts. Increasing the capacity of drainage culverts and implementation of sustainable stormwater strategies would improve hydrologic connectivity, restore subsurface flows, and retain water within the Mariposa Grove, which would restore processes that sustain wetland ecosystems. In the long term, removal of facilities and elimination of associated uses such as commercial tram service from the Mariposa Grove would protect and restore wetland habitat. Removal of the Grove road out of the delineated wetland, and conversion of the original alignment to an accessible trail, would beneficially impact wetlands in that portion of the Grove. The conversion of much of the upper Grove loop road to a trail would also restore some palustrine forested wetland. Overall, about 1.0 acre of wetland restoration is anticipated under Alternative 3.

Impact Significance. Long-term, major, beneficial impact on wetlands.

Operation-related Impacts. Closing the existing road in the Mariposa Grove would reduce operation activities and reduce the potential for inadvertent impacts on wetlands from trampling, although some recreational foot traffic in nearby wetlands would continue. Discharge of waterborne pollutants from directly into wetland communities from road and parking areas would be reduced in the Mariposa Grove, but would increase near the Grizzly Giant.

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

Conclusion. Alternative 3 would be expected to have a local, short-term minor adverse impact from potential soil erosion associated with construction-related impacts. Alternative 3 is expected to have long-term major beneficial impacts on wetlands from the removal of facilities and subsequent ecological restoration (1.0 acre), vehicular traffic, and the improvement of water flows in the Grove that sustain wetlands. Overall, there would be a long-term, major beneficial impact on wetlands. Adherence to mitigation measures described in Chapter 2 and Appendix E and avoidance of wetlands where possible would minimize short-term impacts.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting wetlands would be the same as those under Alternative 1 (No Action)—an overall long-term major adverse impact on wetlands in the Yosemite region. These impacts, in conjunction with the long-term major beneficial impacts of Alternative 3 on wetlands in the Mariposa Grove, would contribute to reversing the adverse impacts of past actions in the region. On a regional scale, long-term moderate adverse impacts on wetlands in the Yosemite region would continue.

Alternative 4: South Entrance Hub with Modified Commercial Tram Service

Alternative 4 would maintain the commercial tram but with a limited route and hours of operation while also relocating the majority of the parking to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Under Alternative 4, wetlands loss is estimated to total 0.37 acre, the same as Alternative 2. This total includes 0.24 acre of permanent wetland loss near the South Entrance due to construction activities and a very minor loss of wetlands (<0.01 acre) associated with restoration of impacted wetland and riparian habitat due to the installation of small piers to extend the existing footbridge in the lower Grove area to protect the wetland from trampling impacts, and replacement of drainage culverts with larger culverts to accommodate larger flows. Relocation of the water tank, which is designed to overflow to prevent freezing, could dry up a small wetland area near the current tank location (0.10 acre). Artificially created roadside wetlands, resulting from berms and failed culverts, would potentially dry up once flows are restored (<0.02 acre).

There would also be site-specific temporary impacts on wetlands during the construction phase. The removal of impervious surfaces associated with existing buildings could temporarily increase groundwater infiltration by exposing soils. A temporary change in surface runoff during construction would not be noticeable in the Mariposa Grove and would have a minimal effect on function or value of the wetlands in the Mariposa Grove.

There would be temporary minor adverse impacts in the lower Grove area during removal of infrastructure and in the upper Grove area during water line repair and/or replacement. The repair of leaking water pipes could have small local impacts on water tables, as it would eliminate unintended leakage. It is difficult to quantify or locate site-specific underground leaks in such a complex and large system, but overall, replacement of water lines could contribute to localized minor decreases in water levels, leading to restoration of natural water levels.

No construction equipment staging areas would be adjacent to or within any wetlands. Implementation of construction Best Management Practices would be employed to minimize impacts associated with erosion and sedimentation. These Best Management Practices would include, but not be limited to, installation of silt fencing and sediment traps, application of water

sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, where appropriate.

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

Restoration-related Impacts. Increasing the capacity of drainage culverts and implementation of sustainable stormwater strategies would improve hydrologic connectivity, restore subsurface flows, and retain water within the Mariposa Grove, which would restore processes that sustain wetland ecosystems. In the long term, removal of facilities and elimination of associated uses such as commercial tram service from the Mariposa Grove would protect and restore wetland habitat. Realignment of the Grove road northward out of the delineated wetland, and conversion of the original alignment to an accessible trail, would beneficially impact wetlands in that portion of the Grove. The conversion of much of the upper Grove loop road to a trail would also restore some palustrine forested wetland. Overall, the area of wetland restoration would total 0.77 acre.

Impact Significance. Long-term, major, beneficial impact on wetlands.

Operation-related Impacts. Closing the existing road in the Mariposa Grove would reduce operation activities and reduce the potential for inadvertent impacts on wetlands from trampling, although some recreational foot traffic in nearby wetlands would continue. Discharge of waterborne pollutants from directly into wetland communities from road and parking areas would be reduced in the Mariposa Grove, but would increase at the South Entrance.

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

Conclusion. Alternative 4 is expected to have a local, short-term minor adverse impact from potential soil erosion associated with construction-related impacts. Construction activities would result in the loss of about 0.24 acre of wetland at the South Entrance. Alternative 4 is expected to have long-term major beneficial impacts on wetlands from the removal of facilities, vehicular traffic, and the improvement of water flows in the Grove that sustain wetlands (0.77 acre). Overall, there would be a long-term, moderate beneficial impact on wetlands. Adherence to mitigation measures described in Chapter 2 and Appendix E and avoidance of wetlands where possible would minimize short-term impacts.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting wetlands would be the same as those under Alternative 1 (No Action)—an overall long-term major adverse impact on wetlands in the Yosemite region. These impacts, in conjunction with the long-term moderate beneficial impacts of Alternative 4 on wetlands in the Mariposa Grove, would contribute to reversing the adverse impacts of past actions in the region. On a regional scale, long-term moderate adverse impacts on wetlands in the Yosemite region would continue.

HYDROLOGY AND WATER QUALITY

Affected Environment

The NPS Freshwater Resource Management Guidelines in *Natural Resource Management Reference Manual #77* requires the park service to "maintain, rehabilitate, and perpetuate the inherent integrity of water resources and aquatic ecosystems." Yosemite National Park has a variety of surface water features originating from snowmelt atop the High Sierra, some of which are major attractions for visitors, such as Yosemite Falls. Precipitation in the lower elevations occurs either as rain or snow, which melts quickly and flows into streams. At higher altitudes, precipitation usually occurs as snow, which melts more slowly and sustains surface water flows during the spring and early summer.

About 85 percent of the park's precipitation falls between November and April. December, January, and February have the highest average precipitation. Average annual precipitation is 25 inches in El Portal at 2,000 feet, 36.5 inches in Yosemite Valley at 4,000 feet, and increases to 70 inches at 6,000 to 8,000 feet (Eagan 1998).

Yosemite National Park is drained by two major watersheds: the Tuolumne and the Merced, both of which are sub-basins of the San Joaquin River Hydrologic Region. Both rivers are designated as National Wild and Scenic Rivers and are therefore administered with the goal of protecting and enhancing the outstandingly remarkable values that caused them to be designated. Federal support for actions such as the construction of dams or other in-stream activities that would harm the river's free-flowing condition, water quality, or outstandingly remarkable values is prohibited. The Tuolumne and Merced river systems originate along the crest of the Sierra Nevada, carving and occupying glacially excavated river canyons that are now 3,000 to 4,000 feet deep, on their paths to the Central Valley. The Tuolumne River drains the entire northern portion of the park, an area of approximately 435,000 acres (681 square miles). The Merced River basin begins in the southern region of the park and drains the southern one-third of the park, or 250,000 acres (391 square miles) within the boundaries of the park. The Mariposa Grove lies above and to the south of the South Fork of the Merced River. Yosemite National Park is within the Yosemite Valley Groundwater Basin of the San Joaquin River Hydrologic Region (California Department of Water Resources 2003).

Mariposa Grove Setting

The 704-acre (1.1-square-mile) Mariposa Grove is wholly within the South Fork Merced River drainage. The low point of the watershed within the Grove is near the main entrance to the Grove and is approximately 5,479 feet in elevation. The high point of the Grove is near the fallen Wawona Tunnel Tree and is 6,988 feet in elevation. The Grove is divided into two main watershed areas: the upper Grove and lower Grove (figure 3-13).



Figure 3-13 – Perennial Stream in Mariposa Grove

The topography of the Grove can be thought of as the back of a three-fingered hand with the ridges (fingers) pointing (and dipping) to the southwest. These three fingers are the dominant ridges of the Grove. Using this back-of-the-hand analogy, the upper Grove area is where two dominant "knuckles" (6,447-foot elevation knolls) and the lesser knuckle of the "forefinger" continue up to a flatter area at the 6,562-foot level. Here the upper loop road makes a circle in the flattened area of the "back of the hand." The upper Grove watershed is approximately 410 acres and includes Rattlesnake Creek, the two prominent knuckles described above, and the flat area containing upper Grove loop road. The lower Grove watershed is 315 acres, and the Clothespin Tree is a high point near its northwestern corner. The lower Grove area drains into an unnamed creek that joins with Rattlesnake Creek south of the Grove.

Surface features within the drainage area include approximately 6.1 miles of perennial and 2.8 miles of intermittent drainage channels (figure 3-14). Water regimes of the Grove tend to sustain perennial surface flow and shallow groundwater throughout much of the year. Riparian communities and floodplains are primarily linear features that are constricted to the stream corridor by steep upland slopes. Results from a generalized spatial analysis of percent-slope values in the upper and lower

portions of the Grove drainage area are presented in table 3-3. Topographic relief in the Grove is generally moderate, averaging 14 percent overall. Slope values within the upper and lower Grove areas are not substantially different, with mean values of 40 percent and 44 percent maximum slopes, respectively.

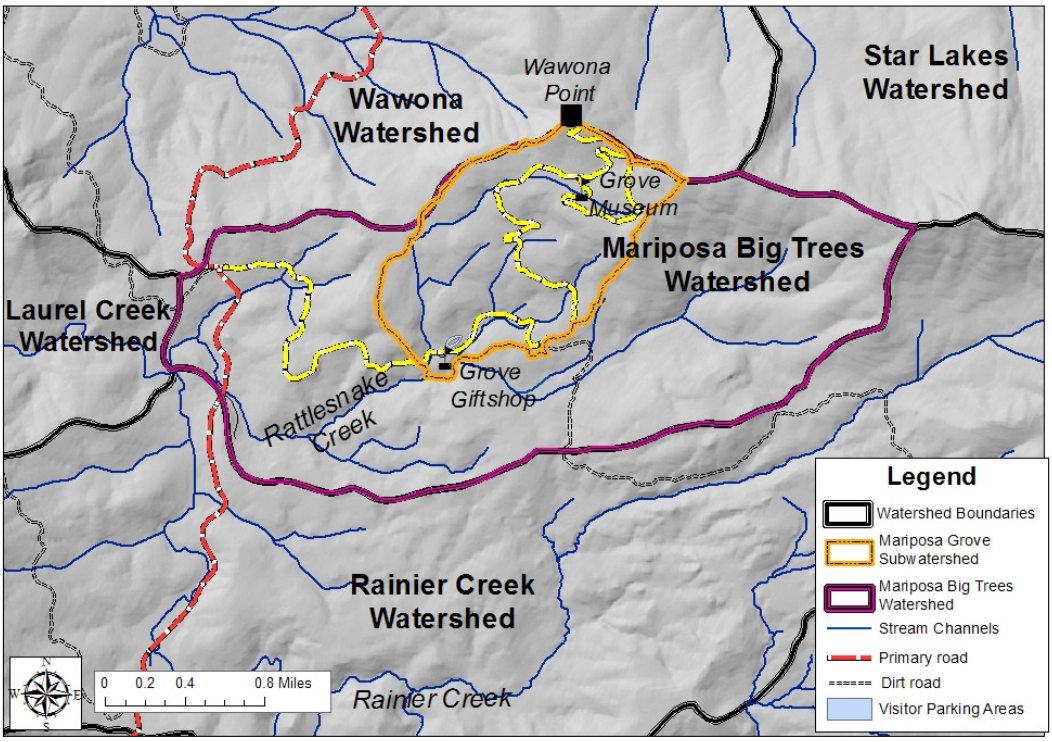


Figure 3-14 – Mariposa Big Trees Watershed and Surrounding Watersheds

Table 3-3 – Topographic Relief of the Mariposa Grove Area

	Observed Values		Summary Statistics		
	Minimum Slope (%)	Maximum Slope (%)	Minimum Slope Mean (%)	Maximum Slope Mean (%)	Mean Slope (Standard Deviation) (%)
Lower Grove	0.01	73.40	0.21	44.25	14.43 (1.64)
Upper Grove	0.01	64.88	0.17	40.34	13.61 (1.12)

The Grove is in a Mediterranean climate regime, where precipitation occurs primarily during the cool winter season. Summers are hot and dry with only occasional rainfall from orographic thunderstorms. The Grove's elevation lies in the transition zone between systems dominated by winter rain or snow (Stephenson et al. 1988). As such, aspects of the Grove's water regime may be vulnerable to climate change due to earlier timing of snow melt and a general increase in the elevation at which snow accumulates (NPS 2012b). Overlaying PRISM Climate Group (2011) data from 1971 to 2000 on the Grove drainage area indicates that mean annual precipitation ranges from 47 to 49 inches. These values are consistent with, though slightly greater than, those recorded at the South Entrance meteorological station; the differences are attributable to differences in elevation between the Grove and the South Entrance (see table 3-4).

Table 3-4 – Climate Summary for the South Entrance (Station 048380), 1941-2011

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Total Precipitation (in.)	8.56	7.22	6.58	3.72	1.74	0.58	0.12	0.1	0.65	2.32	5.13	7.04	43.76
Mean Max. Temperature (°F)	46.3	47.9	50.3	56.2	65	73.9	82	81.2	76	65.9	54.4	47.9	62.3
Mean Min. Temperature (°F)	25.7	26.4	27.8	31.1	37.3	43.7	49.4	48.5	44.5	37.2	30.3	26.4	35.7
Mean Total Snow Fall (in.)	20.7	20.3	23.5	11.1	1.2	0.1	0	0	0	0.4	6.5	16.7	100.5
Mean Snow Depth (in.)	8	9	7	2	0	0	0	0	0	0	1	4	3

Source: Western Regional Climate Center 2012

Surface hydrology in this area includes approximately 6.1 miles of perennial and 2.8 miles of intermittent drainage channels, and the occurrence of small emergent palustrine forested wetlands along channel floodplain areas (NPS 2011f). Runoff from rain or snowmelt originating from the Mariposa Grove is intercepted by several creeks flowing generally southwest and eventually discharging to the South Fork of the Merced River. The flatter topography and coarse granitic soils of the upper Grove area facilitate the percolation (infiltration) of stormwater and snowmelt to contribute to the groundwater. Infiltrating precipitation travels downward through the coarse, granitic soils to the saturated zone, where it flows along a topographically driven pressure gradient. Shallow groundwater discharges to the ground surface in low-lying creeks and wetlands, and as seeps along road cuts and natural embankments. Groundwater and surface water hydraulic gradients are toward Rattlesnake Creek and other tributaries, and then to the South Fork Merced River. Subsurface flow occasionally infiltrates deeper into the granite bedrock via fracture flow. Although depths to groundwater and bedrock have not been measured in the Mariposa Grove, seasonal fluctuations are likely. Soils mapped by the U.S. Department of Agriculture (2012) are described as having 80-inch or greater depths to the water table or restrictive feature.

The undisturbed (pre-development) hydrologic condition within the Mariposa Grove was characterized by widespread overland flow and infiltration into subsurface soil horizons. Soil moisture and shallow groundwater have likely been key factors in sustaining the Grove ecosystem over time. Pre-development, soil compaction was limited to natural processes, and duff/litter accumulation was regulated by the vegetative production and decomposition via natural processes such as microfloral and faunal activity, and the natural and prehistoric/proto-historic anthropogenic fire regimes. The high nutrient content and substantial water-retention capacity of a thick duff/litter layer provides slow release of nutrient-rich moisture to the plant root-zone. Wetlands and shallow groundwater seepage likely buffered surface erosion by reducing the magnitude and velocity of peak runoff flows.

Mariposa Grove hydrology has been modified as a result of historic logging and more recent development to accommodate park visitors. Construction of trails, roads, utilities, and other infrastructure resulted in the blockage and alteration of both surface runoff and shallow groundwater flow patterns (figure 3-15).

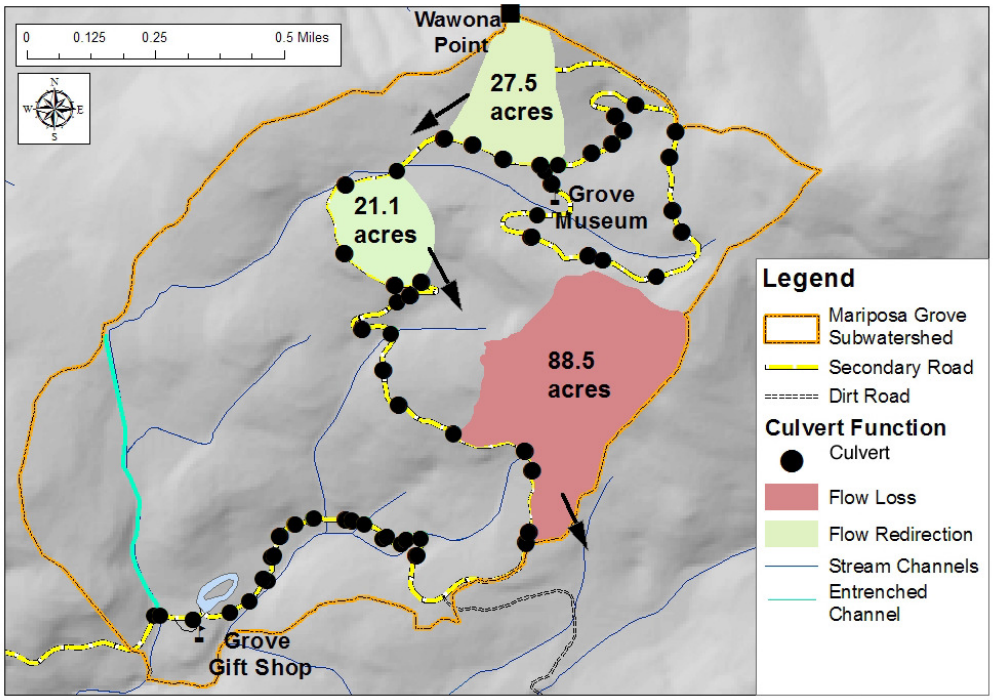


Figure 3-15 – Culvert Function Status and Redirected and Lost Flow within the Mariposa Grove

Contemporary hydrologic conditions are highly disturbed by soil compaction and the road/trail drainage system and largely dominated by rapid surface runoff and channelized flows (figure 3-16) (Entrix 2007). Travel times for water moving through the watershed are substantially reduced (Entrix 2007) from pre-development values. As a result, soil moisture and shallow groundwater availability may be reduced. A leaking pipeline system that conveys drinking water from Biledo Spring on U.S. Forest Service land to the Grove and the South Entrance loses an estimated 39,500 gallons per day (44 acre-feet per year) within the upper Grove area, and likely percolates to the upper Grove wetland. An additional 500 to 1,500 gallons per day (0.6 to 1.7 acre-feet per year), depending upon level of use, is also contributed to the upper Grove wetland from water percolation through the upper Grove leach field. In addition, fire suppression practices may have altered plant composition and structure within the Mariposa Grove, and may have affected the water balance by increasing evapotranspiration and changing the distribution, volume, and persistence of snowpack accumulation and runoff infiltration (NPS 2012b).



Figure 3-16 – Drainage Channel along the Mariposa Grove Road within the Grove

Infrastructure Affecting Hydrology

The Mariposa Grove contains roughly 6.8 miles of developed (paved) secondary roadways, 0.3 mile of compacted dirt road, and 1.6 acres of paved parking areas (NPS 2012b). The paved road network extends throughout the drainage area for the Grove—extending from the watershed outlet to its highest elevation at Wawona Point. This road network is used for administrative access and concessioner-based transport of visitors via commercial tram throughout the Grove. The roadways are generally 20 to 25 feet wide, with the single-lane segments that comprise the upper Grove loop averaging roughly 10 feet wide. In addition, three abandoned unnamed roads are within the Grove (Entrix 2007). The first abandoned road is south of the Grizzly Giant parking lot and extends roughly 150 feet from the main road. This road leads into the Rainer Creek watershed. Another abandoned road is approximately 200 feet long and is a former parking area west of the Grove museum; this section is now used as part of the pedestrian trail system. A third abandoned road is roughly 100 feet in length and is east of the fallen Wawona Tunnel Tree along the upper Grove loop.

Roughly 10 miles of unpaved pedestrian hiking trails have been established throughout the Grove; notably, many of these trails are former road grades that have since been restricted to foot traffic (NPS 2012b). Heavily used formal trails range in length and are typically 9 to 14 feet wide with base rock or compacted native soil; lesser-used interior and outer loop trails are extensive in length but typically range from 2 to 3 feet in width. Soil compaction has been exacerbated by repeated use of informal social trails throughout the Grove and at the bases of many adult giant sequoia trees. The use of off-road parking areas for administrative and concessioner staff vehicles, such as the commercial tram parking/storage area in the lower Grove area, further contributes to soil compaction.

Additional hardscape features (i.e. impermeable surfaces) within the drainage area for the Grove include lower Grove facilities—restrooms, information kiosk, and gift shop; upper Grove facilities—a small museum and associated restrooms (both vault and flush toilets); and a communications tower (cellular tower and radio repeater) and equipment enclosure positioned at Wawona Point in the uppermost area of the watershed (NPS 2012b). Supporting infrastructure for these facilities includes roughly 1,300 feet of pipeline associated with the septic system and leach field for the flush toilets in the upper Grove area, water tanks, and roughly 4,800 feet of water pipeline associated with water supply from Biledo Springs (on U.S. Forest Service land within the Rainer Creek watershed) to the Mariposa Grove and the South Entrance facilities (NPS 2012b).

Spring water from Biledo Springs is pumped into the water storage tanks, where it is treated by an onsite chlorination unit, and then distributed to the Mariposa Grove and South Entrance facilities via the distribution pipeline system. The water tanks are overfilled during the winter to induce overflow conditions that prevent freezing. This overflow discharges onto the ground surface. The water distribution system piping currently is leaking at a rate of approximately 39,500 gallons per day within the upper Grove area (NPS 2012b). The leaking, chlorinated water discharges to the upper Grove wetland and into the subsurface in the drainage course that the piping follows.

Luce and Wemple (2001) note that the influence of the linear design of road systems on watershed-scale hydrologic processes is disproportionately greater than the small percentage of land area that roads occupy would suggest. Most road prisms bisect hill slopes and act as networks that block overland sheet flow and redirect it into roadside ditches. In-sloped roads with associated cut- and fill-slopes are particularly disruptive of the natural surface flow regime; intercepted surface runoff is redirected as channelized flow along road surfaces and in road drainage ditches. In this manner, road networks effectively extend surface channel networks and increase drainage density, thereby increasing the routing efficiency of water out of a given watershed (Wemple et al. 1996) and decreasing opportunities for groundwater recharge.

There are 6.1 miles of perennial streams and 2.8 miles of intermittent drainage channels within the Grove (NPS 2012b). Sixty-four culverts (Entrix 2007) are on these streams to convey surface flow under or around the road and trail network to facilitate visitor use while controlling erosion and sedimentation. Comprehensive mapping and evaluation of these culverts were completed in 2007. This study revealed that many of the culverts needed replacing for a variety of reasons. Some were undersized for their water and sediment loads; some were undersized solely from a water-volume standpoint; and some were structurally failing. Many were plugged, primarily due to some of the deficiencies noted above, and possibly because they were not set on a gradient steep enough to transport the sediment delivered to the inlet. The lengths of channels formed by discharge from these culverts have increased considerably, and channelization has effectively divided the primary Grove watersheds into 53 sub-drainage basins (Entrix 2007). Surface runoff from approximately 50 acres is diverted from its natural flow pattern within the upper Grove area, and surface runoff from approximately 90 acres (12 percent of Grove drainage area) is diverted from the Grove entirely. Approximately 10 percent of the drainage area's precipitation is currently lost because of poor culvert function and diversion of flow out of the Grove via the roadway ditches. Approximately 90 acres of the watershed no longer contribute runoff to giant sequoia habitat within the Grove.

South Entrance Setting

The South Entrance is downstream of the Grove at an elevation of approximately 5,100 feet. Infrastructure at the South Entrance includes the paved Wawona Road, the South Entrance kiosks, restroom, and ranger housing facilities. Abandoned wagon and logging roads are evident through portions of the South Entrance area. A generalized spatial analysis of percent-slope indicates that grades in the area are less steep than in the Grove and range from 3 to 17 percent, with an average of roughly 8.5 percent (NPS 2012b). This area receives drinking water from Biledo Spring via a distribution pipeline. A leach field that serves the South Entrance comfort station and ranger residence likely contributes to local shallow groundwater mounding.

Water Quality

Water quality studies within the drainage areas of the Mariposa Grove and South Entrance are limited. Table 3-5 presents data collected near the Grizzly Giant from 1981-1983 (NPS 1994).

Table 3-5 – Water Quality Data for Station YOSE007 near Grizzly Giant, 1981-1983

Parameter	Mean	Maximum	Minimum
Temperature (°C)	15.0	15.0	15.0
Stream Flow (cfs)	0.09	0.09	0.09
Specific Conductance (µmhos/cm @ 25°C)	79.0	98.0	60.0
Dissolved Oxygen (mg/L)	8.0	9.0	7.0
pH	7.1	7.9	6.3
Carbon Dioxide (mg/L)	24.0	24.0	24.0
Alkalinity (mg/L of $CACO_3$)	28.5	30.0	27.0
Nitrite and Nitrate (mg/L)	0.018	0.03	0.005
Phosphorus (mg/L)	0.013	0.024	0.003
Fecal Coliform, 0.7-µm MF (col./mL)	4.25	8.0	0.5
Log Fecal Coliform, 0.7-µm MF (col./mL)	0.301	0.903	0.301

Vehicle use and the diesel-fueled gift shop generator may release metals and petroleum-based hydrocarbons into the environment. There currently are no engineered stormwater treatment best management practices (BMPs) such as bioswales or water quality basins at parking areas or along roads; however, most pollutants are likely absorbed into the soil or taken up by vegetation along the way to receiving waters. The septic system and leach fields in the upper Grove area and at the South Entrance may percolate water with elevated nutrient (e.g., nitrogen) concentrations into the subsurface; and storage tank overflow and leaking water distribution lines release chlorinated water into wetlands and shallow groundwater. Pedestrian and vehicle traffic and poorly designed and deteriorating culverts contribute to erosion and the resulting increased sediment loading in streams.

The Mariposa Grove drains to the South Fork of the Merced River, where surface water quality is generally good. Similarly, the Merced River watershed is considered to have high-quality surface water, with reportedly low dissolved solids, near-neutral pH, low alkalinity, low nutrient concentration, and low microbial counts (Clow et al. 2011).

Environmental Consequences

Impact Assessment Methodology

Water resources analysis was based on a qualitative assessment of water resources and impacts likely caused by construction, rehabilitation, operations, and maintenance activities at the Mariposa Grove and the South Entrance.

Types of water resources impacts include adding constituents to water, such as sediment; loss of or additions to the amount of water; changes in the flow rate or discharge of water; and impacts on water-related resources, such as floodplains. Beneficial impacts would protect or improve natural flow conditions, water quality, and/or water quantity. Beneficial impacts may include restoration, such as elimination or containment of pollutant sources or removing impediments to flow (e.g., inefficient or blocked culverts). Adverse impacts would disrupt natural flow, degrade water quality, and/or alter water quantity.

Impact Intensity Level Definitions

Negligible – Hydrology of the area would not be affected, or impacts would not be measurable. Any impacts on the hydrologic regime would be slight and short-term. Water quality would not be affected, or impacts would not be measurable and would not affect beneficial uses of receiving waters.

Minor – Impacts on hydrology, such as an increase or decrease in surface or groundwater flow, would be detectable. If mitigation were needed to offset adverse impacts, it would be relatively simple to implement. Impacts on water quality would be detectable and could affect beneficial uses of receiving waters. If mitigation is needed to offset adverse impacts, it would be relatively simple to implement.

Moderate – Impacts on hydrology would be readily apparent. Mitigation would probably be necessary to offset adverse impacts. Impacts on water quality would be readily apparent and would affect beneficial uses of receiving waters. Mitigation would probably be necessary to offset adverse impacts.

Major – Impacts on hydrology would be readily apparent and would substantially change the hydrologic regime over the area. Similarly, impacts on water quality would be readily apparent and would substantially change beneficial uses of surface or groundwater. Substantial mitigation would probably be necessary to offset adverse impacts, and its success could not be guaranteed.

Alternative 1: No Action

Under Alternative 1, current infrastructure, concessioner services and maintenance, and park management would remain as is. No rehabilitation or restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be implemented.

Operations-related Impacts. Under Alternative 1, existing trends in water quality improvement or degradation would continue. There would continue to be direct and indirect increase in flow rates and water quality degradation due to redirected and lost flow caused by blocked culverts and in-sloped roads and trails. Parking areas and roads would continue to contribute metals and petroleum-based hydrocarbons to stormwater runoff, although most of these pollutants would be absorbed by soil or vegetation along the way to receiving waters. The septic systems and leach fields in the upper Grove area and at the South Entrance would continue to contribute nutrient-enriched water to the shallow groundwater system. The water supply pipeline would continue to leak 39,500 gallons per day of chlorinated water in the upper Grove area. Maintenance, repair, and management of resource impacts associated with the existing road drainage system, septic systems and leach fields, and water supply pipelines would presumably occur as problem areas are identified, and treatment mitigations would likely vary on a case-by-case basis.

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

Conclusion. No construction-related impacts would occur. Operations-related impacts would include moderate erosion caused by a poorly designed road drainage system, and minor impacts on water quality caused by failing leach fields and leaking chlorinated water pipelines. Diversion of approximately 10 percent of Grove runoff to areas outside of the Grove would continue. Overall, there would be a long-term moderate adverse impact on hydrology and water quality.

Cumulative Impacts. Cumulative impacts on hydrology and water quality are based on an analysis of past, present, and reasonably foreseeable future actions in the Yosemite region in conjunction with the potential effects of Alternative 1 (No Action). Dams, roads, and diversions in the Sierra Nevada have had a profound effect on stream-flow patterns and wetlands in the region. Broad valleys with wide riparian wetlands were often used as reservoir sites. These past actions have had long-term, major adverse effects on regional hydrology; past impacts on water quality have been negligible. Surface water quality in Yosemite is exceptionally high, and far superior to federal and state standards.

Current and future regional plans and projects would have beneficial and adverse impacts on hydrology or water quality (Appendix B). Comprehensive Ecological Restoration Projects, the Wawona Meadow Restoration Project, and ecological restoration elements of the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans* would result in beneficial impacts on hydrology and water quality by improving natural flow conditions, removal of pollutant sources, and improving floodplain conditions. The *Wilderness Stewardship Plan* could contribute watershed-scale protection to hydrology and water quality, depending on the outcome of the final plan. These actions would have a long-term moderate beneficial effect on hydrology and water quality.

There could be adverse impacts on hydrology and water quality associated with the current South Entrance Station Kiosks Replacement project and future actions associated with new development proposed in the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans*, due to the direct loss of wetlands, which serve as natural water filters. Site-specific adverse effects could be short-term (during construction). The NPS will consult with the Regional Water

Quality Control Board to maintain the highest possible water quality standards during implementation of these projects. The NPS will obtain required Water Quality Certifications prior to implementing related actions.

In summary, past impacts on hydrology in the region have been adverse, long-term, and major; impacts on water quality have been negligible. Present and foreseeable future actions would contribute to reversing the adverse impacts of past actions in the region. The impacts of Alternative 1 (No Action) on hydrology and water quality would be moderate adverse due to erosion associated with the road system, failing leach fields, and leaking chlorinated pipes. Past, present, and future impacts, in conjunction with the moderate adverse impacts on hydrologic flows and water quality in the Mariposa Grove under Alternative 1 (No Action), would result in a long-term moderate adverse impact on hydrology and water quality in the Yosemite region.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the commercial tram operation and gift shop from the lower Grove area, replace the existing comfort station with a smaller facility, and reduce the amount of lower Grove area parking. Primary visitor parking would be expanded and relocated to the South Entrance, making the South Entrance a transfer hub for visitors accessing the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow and removal of impervious surfaces, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction-related impacts from Alternative 2 including the development of the new parking lot, transfer area, and other infrastructure would be temporary. Soil-disturbing activity during construction (i.e. excavation and grading) can lead to erosion and sedimentation resulting from the exposure of bare soils to stormwater, which are more likely to erode than vegetated areas that provide infiltration, retention, and dispersion. Construction activities also involve transportation, storage, and use of hazardous materials such as fuels and solvents. These materials could find their way to receiving waters via stormwater runoff or spills. Stream channels and existing drainage patterns would be temporarily disrupted during culvert replacement/repair and construction of the road new alignment and vehicular bridge in the lower Grove area. Drainage crossings at culverts and the new vehicular bridge at the Three Sentinels near the lower Grove area would be particularly vulnerable to degraded water quality because construction could occur in the channel, and contaminants would have a direct path to surface water. If shallow groundwater is encountered during construction, dewatering may be necessary.

Construction BMPs, such as good site management, erosion control (e.g., dust suppression, soil cover, etc.), sediment controls (e.g., silt fences, gravel bag berms, etc.), and cofferdams to re-route channels during in-stream work, would be used to minimize or avoid discharge of sediment and other pollutants from the construction site.

Impact Significance. Local, short-term, minor, adverse impact on hydrology and water quality.

Restoration-related Impacts. Restoration of giant sequoia habitat at the Mariposa Grove under Alternative 2 would result in a net reduction of 3.98 acres of impermeable surface area in the Grove, with an overall net addition of developed area of 0.74 acre due to new development at the South Entrance. Hydrologic connectivity (surface flow and shallow groundwater) would be restored by cleaning, repairing, and replacing dysfunctional culverts and regrading road and trail surfaces (outsloping) where feasible. Watersheds would be restored more toward their natural configuration, infiltration on the site would increase, and stormwater runoff would decrease, resulting in beneficial

impacts on surface water quality. Leaky water pipes in the upper Grove area would be repaired and monitored. Stormwater BMPs would be implemented at the South Entrance Hub and lower Grove shuttle area to intercept runoff from roads and parking areas, filter pollutants and sediment, and redistribute, rather than channelize, runoff. Repair of septic systems and leach fields at the upper Grove area and South Entrance would reduce the potential to introduce nutrients to shallow groundwater.

Impact Significance. Local, long-term, moderate beneficial impact on water quality and Grove hydrology.

Operation-related Impacts. Elimination of the commercial tram and fewer vehicle trips in the Grove would reduce the amount of vehicle-related pollutants (e.g., dust, metals, petroleum-based hydrocarbons, etc.) introduced into the Grove. Monitoring of the water supply pipeline would reduce the likelihood that future leaks go undetected and unrepaired. Maintenance of sediment traps and culverts would avoid discharge of pollutants from parking areas and promote improved drainage.

New septic tanks and leach fields at the South Entrance and lower Grove area could increase use and the subsequent potential to introduce nutrients to shallow groundwater; however, the new systems would be superior to the current failing South Entrance and upper Grove septic systems and leach fields.

Impact Significance. Local, long-term, negligible, adverse and minor, beneficial impacts.

Conclusion. Construction-related impacts would include minor but temporary increased pollutants in stormwater runoff discharged to surface water. Restoration-related impacts would improve flow patterns and water quality. Operations-related activities would have minor beneficial impact on water quality due to decreased vehicle use, potentially offset by negligible adverse impacts from a new leach field at the lower Grove area and a larger leach field at the South Entrance. Overall, there would be a long-term moderate beneficial impact on hydrology and water quality.

Cumulative Impacts. The regional past, present and reasonably foreseeable projects affecting hydrology and water quality would be the same as those under Alternative 1 (No Action)—an overall long-term major adverse impact on hydrology and negligible impacts on water quality in the Yosemite region. These impacts, in conjunction with the long-term moderate beneficial impacts of Alternative 2 on hydrology and water quality in the Mariposa Grove, from culvert installation, repair, or replacement and wetland habitat restoration, would contribute to reversing the adverse impacts of past actions in the region. On a regional scale, long-term moderate adverse impacts on hydrology and negligible impacts on water quality in the Yosemite region would continue.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, including two new bridges, and a new larger parking lot near the Grizzly Giant, but outside of giant sequoia habitat. This alternative would make the Grizzly Giant the primary departure point for visitors to the Grove. The current South Entrance parking lot would remain as is, and the lower Grove parking lot would be replaced with a small lot of only ABAAS-compliant spaces. The gift shop also would be removed from the lower Grove area, and the lower Grove comfort stations would be replaced with a new, smaller restroom. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction-related impacts from Alternative 3 would be temporary. Soil-disturbing activity during construction (i.e. excavation and grading) can lead to erosion and sedimentation resulting from the exposure of bare soils, which are more likely to erode during precipitation events than vegetated areas that provide infiltration, retention, and dispersion. Construction activities also involve transportation, storage, and use of hazardous materials such as fuels and solvents. These eroded materials could find their way to receiving waters via stormwater runoff or spills. Stream channels and existing drainage patterns would be temporarily disturbed during culvert replacement/repair and construction of the two new vehicular bridges in the lower Grove area. Leaky water pipes in the upper Grove would be excavated for repair or replacement, which would eliminate the discharge of chlorinated water into the upper Grove wetland and to groundwater. Stream crossings at culverts and the new bridges would be particularly vulnerable to degraded water quality because construction could occur in the channel, and contaminants would have a direct path to surface water. If shallow groundwater is encountered during construction, dewatering may be necessary.

Construction BMPs, such as good site management, erosion control (e.g., dust suppression, soil cover, etc.), sediment controls (e.g., silt fences, gravel bag berms, etc.), and cofferdams to re-route channels during in-stream work, would be used to minimize or avoid discharge of sediment and other pollutants from the construction site.

Impact Significance. Local, short-term, minor, adverse impact on water quality and hydrology.

Restoration-related Impacts. Restoration of the Grove under Alternative 3 would result in a net reduction of 5.75-acres of impermeable surface area and compacted soils in the Grove, and an overall net addition of 0.5-acre of developed area project-wide due to the new development of the Grizzly Giant arrival area and the bypass road. Hydrologic connectivity (surface flow and shallow groundwater) would be restored by cleaning, repairing, and replacing dysfunctional culverts and regrading road and trail surfaces (outsloping) where feasible. Watersheds would be restored more toward their natural configuration, infiltration on the site would increase, and stormwater runoff would decrease, resulting in beneficial impacts on surface water quality.

Impact Significance. Regional, long-term, moderate, beneficial impact on hydrology and water quality.

Operation-related Impacts. Fewer vehicles and removal of commercial tram trips in the upper Grove area would reduce the amount of vehicle-related pollutants (e.g., dust, metals, petroleum-based hydrocarbons, etc.) introduced into the area. Monitoring of the water supply pipeline would reduce the likelihood that leaks are undetected and unrepaired.

The new bridges could involve placement of footings or abutments within the channels or on the banks that could constrict the cross-sectional area during high flow events, potentially causing local increased velocities and corresponding scour and erosion. These potential impacts could be avoided by appropriate design (i.e. minimal piers, longer span, maintenance of existing cross sectional shape). Stormwater BMPs would be installed at the new parking area at Grizzly Giant Hub to intercept runoff, filter pollutants, and redistribute flow.

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

Conclusion. Construction-related impacts would include minor but temporary increased pollutants in stormwater runoff discharged to surface water. Restoration-related impacts would improve flow patterns and water quality. Operation-related impacts would have minor improvements in water

quality due to decreased vehicle use in the upper Grove area. Overall, there would be a long-term moderate beneficial impact on hydrology and water quality.

Cumulative Impacts. The regional past, present and reasonably foreseeable projects affecting hydrology and water quality would be the same as those under Alternative 1 (No Action)—an overall long-term major adverse impact on hydrology and negligible impacts on water quality in the Yosemite region. These impacts, in conjunction with the long-term moderate beneficial impacts of Alternative 3 on hydrology and water quality in the Mariposa Grove from culvert installation, repair, or replacement and wetland habitat restoration, would contribute to reversing the adverse impacts of past actions in the region. On a regional scale, long-term moderate adverse impacts on hydrology and negligible impacts on water quality in the Yosemite region would continue.

Alternative 4: South Entrance Hub with Modified Commercial Tram Access

Alternative 4 would maintain the commercial tram but with a limited route and hours of operation while also relocating the majority of the parking to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction-related impacts from Alternative 4 are temporary. Soil-disturbing activity during construction (i.e. excavation and grading) can lead to erosion and sedimentation resulting from the exposure of bare soils to stormwater, which are more likely to erode than vegetated areas that provide infiltration, retention, and dispersion. Construction activities also involve transportation, storage, and use of hazardous materials such as fuels and solvents. These materials could find their way to receiving waters via stormwater runoff or spills. Stream channels and existing drainage patterns would be temporarily disturbed during culvert replacement/repair. Stream crossings at culverts would be particularly vulnerable to degraded water quality because construction could occur in the channel, and contaminants would have a direct path to surface water. If shallow groundwater is encountered during construction, dewatering may be necessary.

Construction BMPs, such as good site management, erosion control (e.g., dust suppression, soil cover, etc.), sediment controls (e.g., street sweeping, silt fences, gravel bag berms, etc.), and cofferdams to re-route channels during in-stream work, would be used to minimize or avoid discharge of sediment and other pollutants from the construction site.

Impact Significance. Local, short-term, minor (with mitigation), adverse impact.

Restoration-related Impacts. Restoration of the Grove under Alternative 4 would result in a 1.85 acre removal of impermeable surface area and compacted soils in the Grove, and an overall net addition of 2.88 acres project-wide due to new development at the South Entrance. Hydrologic connectivity (surface flow and shallow groundwater) would be restored by cleaning, repairing, and replacing dysfunctional culverts and regrading road and trail surfaces (outsloping) where feasible. Watersheds would be restored to their natural configuration, infiltration on the site would increase, and stormwater runoff would decrease, resulting in beneficial impacts on surface water quality. Leaky water pipes in the upper Grove area would be repaired and monitored. Stormwater BMPs would be installed at the South Entrance Hub and lower Grove shuttle area to intercept runoff from roads and parking areas filter pollutants, and redistribute flow rather than channelize runoff. Repair of septic systems and leach fields at the upper Grove and South Entrance would reduce the potential to introduce nutrients to shallow groundwater.

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

Operation-related Impacts. Fewer vehicle and commercial tram trips in the Grove would reduce the amount of vehicle-related pollutants (e.g., dust, metals, petroleum-based hydrocarbons, etc.) introduced into the Grove. Monitoring of the water supply pipeline would reduce the likelihood that leaks are undetected and unrepaired.

New septic systems and leach fields at the South Entrance and lower Grove area could increase use and the subsequent potential to introduce nutrients to shallow groundwater; however, the new systems would be superior to the current failing septic systems and leach fields.

Impact Significance. Regional, long-term, minor, beneficial and minor, adverse impacts.

Conclusion. Construction-related impacts would include minor but temporary increased pollutants in stormwater runoff discharged to surface water. Restoration-related impacts would improve flow patterns and water quality. Operation-related impacts would have minor improvements in water quality due to decreased vehicle use potentially offset by negligible adverse impacts on groundwater from larger leach fields. Overall, there would be a long-term moderate beneficial impact on hydrology and water quality.

Cumulative Impacts. The regional past, present and reasonably foreseeable projects affecting hydrology and water quality would be the same as those under Alternative 1 (No Action)—an overall long-term major adverse impact on hydrology and negligible impacts on water quality in the Yosemite region. These impacts, in conjunction with the long-term moderate beneficial impacts of Alternative 4 on hydrology and water quality in the Mariposa Grove from culvert installation, repair, or replacement and wetland habitat restoration, would contribute to reversing the adverse impacts of past actions in the region. On a regional scale, long-term moderate adverse impacts on hydrology and negligible impacts on water quality in the Yosemite region would continue.

Soils

Affected Environment

Mariposa Grove Setting

Soils along the far eastern edge of the Mariposa Grove are of the Xeric Dystrocryepts-Vitrandic Dystrocryepts association (Natural Resources Conservation Service [NRCS] soil survey type 293), which occur on 0 percent to 25 percent mountain slopes and summits at elevations of 6065 feet to 8960 feet (NRCS 2007). The association is 70 percent Xeric Dystrocryepts, 18 percent Vitrandic Dystrocryepts, and 12 percent minor components. Mean annual precipitation for this soil type in the park is 37 to 51 inches and the frost-free period is from 15 to 45 days. Soil profiles in Xeric Dystrocryepts are largely loamy fine sands that become stony with depth. The surface area of Xeric Dystrocryepts is covered by coarse fragments of decomposed bedrock, and there is no flooding potential, low surface runoff, and somewhat excessive drainage. Soil profiles in Vitrandic Dystrocryepts are largely sandy loams that become cobbly with depth. The surface area of Vitrandic Dystrocryepts is also covered by coarse fragments, with no flooding potential, moderate surface runoff, and somewhat excessive drainage. The types of rock in this map unit are largely granitic with metavolcanic and metasedimentary rock in some areas. Erosion factors range from 0.10 to 0.28 indicating low to moderate erosion potential. Frost action potential is moderate for this association (NRCS 2007).

Soils in the upper Grove are of the Clarkslodge-rock outcrop complex (NRCS soil survey type 304), which occur on level to 30 percent slopes on metavolcanic rock at elevations of 4,885 feet to 6,755 feet throughout the park (NRCS 2007). The complex is 60 percent Clarkslodge soil, 15 percent rock outcrop, and 25 percent minor components. Mean annual precipitation for this soil type in the park is 35 to 45 inches and the frost-free period is from 20 to 60 days. Soil profiles of Clarkslodge are largely decomposed plant materials near the surface, coarse sandy loam at intermediate depths, and gravelly sandy loam at depth. The surface area of the Clarkslodge soil is covered by coarse fragments and there is no flooding potential and medium surface runoff. The soil is well drained. The types of rock in the upper Grove area are metavolcanic with minor amounts of granitic rock. Erosion factors range from 0.17 to 0.37 indicating low to moderate erosion potential. Frost action potential is moderate (NRCS 2007).

Soils in the lower Grove area and underlying the eastern portion of the Mariposa Grove Road are of the Dystric Xeropsamments-Typic Dystoxerepts Badgerpass-Rock outcrop association (NRCS soil survey type 261), which occur on 5 percent to 35 percent mountain slopes and in valleys at elevations of 5,235 feet to 8,180 feet throughout the park (NRCS 2007). The association is 25 percent Dystric Xeropsamments, 25 percent Typic Dystroxerepts, 15 percent Badgerpass soil, 15 percent Rock outcrop, and 20 percent minor components. Mean annual precipitation for this soil type in the park is 39 to 47 inches and the frost-free period is from 20 to 60 days. Soil profiles in Dystric Xeropsamments are largely loamy sand. The surface area of the Dystric Xeropsamments soil is covered by coarse fragments of decomposed bedrock and there is no flooding potential and low surface runoff. The soil is somewhat excessively drained. Soil profiles in Typic Dystoxerepts are largely fine loamy sand with numerous cobbles in deeper profiles. Typic Dystoxerepts is covered by coarse fragments and some subangular gravel and cobbles. Soil profiles in Badgerpass soil are largely gravelly loamy sand. The Badgerpass soil is covered by coarse fragments and some subangular gravel. These two soil types have no flooding potential and moderate surface runoff. They are somewhat excessively drained. Colluvium on mountain footslopes and toeslopes in this association extends into mountain valleys. The majority of mountain valley areas are forested. Erosion factors range from 0.15 to 0.37 indicating low to moderate erosion potential. Frost action potential is moderate (NRCS 2007).

The presence of the relatively large number of special-status plant species in the Grove and the richness of the plant community overall can be attributed in part to the presence of metasedimentary bedrock and the consequent presence of metasedimentary soils and mineralized water. The soil and water of the Grove have added nutrients and the soils retain water better than if typical Sierra Nevada granitic bedrock was present alone. The perennial water flow, soils derived from decomposed metasedimentary and granitic bedrock, and special-status plants including the giant sequoias makes this a unique landscape.



Figure 3-17 – Denuded Vegetation and Soil Compaction Along Mariposa Grove Trail

Current issues in the Grove include soil compaction along trails and the Mariposa Grove Road and soil erosion due to this compaction and channelization of sheet flow. Sheet flow channelization is a result of an inadequate drainage system along Mariposa Grove Road. Many culverts are blocked, and overall there are not enough. Heavy visitor use has resulted in denuded vegetation and dramatic widening of trails (figure 3-17). The paved lower Grove parking lot and the Mariposa Grove Road

are impermeable surfaces covering soils, decreasing available areas for giant sequoia regeneration and disturbing natural sheet flow and infiltration.

South Entrance Setting

Soils beneath the western portion of the Mariposa Grove Road and at the South Entrance are Typic Halpoxerults-Ultic Haploxerifs complex (NRCS soil survey type 302), which occur on 0 percent to 30 percent mountain slopes at elevations of 4,155 feet to 5,465 feet throughout the park (NRCS 2007). The complex is 45 percent Typic Haploxerults, 41 percent Ultic Haploxeralfs, and 14 percent Minor components. Mean annual precipitation for this complex in the park is 33 to 43 inches. The annual frost-free period ranges from 100 to 150 days. Soil profiles of Typic Halpoxerults are largely decomposed plant materials near the surface, loam at intermediate depths, and clay loam and sandy clay loam at depth. The surface area of Typic Halpoxerults is covered by coarse fragments and there is no flooding potential and moderate surface runoff. It is a well-drained soil. Soil profiles of Ultic Haploxerifs are largely decomposed plant materials near the surface and cobbly sandy loam with some clay at depth. The surface area of Ultic Haploxerifs is also covered by coarse fragments. It has no flooding potential, high surface runoff, and is somewhat excessively drained. Mountain slopes in this map unit are mantled by hummocky, deeply weathered deposits of ancient landslide debris. Erosion factors range from 0.20 to 0.32 indicating low to moderate erosion potential. Frost action potential is moderate (NRCS 2007).

There are areas of impermeable surface covering soils at the South Entrance, including Wawona Road and Mariposa Grove Road, the comfort station parking, and the small parking lot on the north side of the Mariposa Grove Road. These surfaces decrease available areas for plant regeneration and also disturb natural sheet flow and infiltration, though they are outside the current distribution of the giant sequoia at the Mariposa Grove.

Environmental Consequences

Soils analysis was based on a qualitative assessment of generalized soil types. Types of soil impacts include those resulting from soil removal, profile mixing, compaction, erosion, contamination, and restoration.

Beneficial impacts would protect soils from erosion or restore natural soil conditions; adverse impacts would degrade chemical or physical properties of soils or result in the loss or temporary removal of soils. Impact threshold definitions for soils are as follows.

Intensity Level Definitions

Negligible – Impacts on soils, such as removal of topsoil, would not occur or would be so slight as to be immeasurable.

Minor – Impacts on soils, such as removal of topsoil, would occur but would be barely measurable or perceptible.

Moderate – Impacts on soils would be readily apparent. Mitigation would probably be necessary to offset adverse impacts.

Major – Impacts on soils would be readily apparent and would substantially change the soil characteristics of the area. Extensive mitigation would probably be necessary to offset adverse impacts, and its success could not be guaranteed.

Alternative 1: No Action

Under Alternative 1 current infrastructure and park management would remain as is. No rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be implemented.

Operation-related Impacts. Ongoing impacts from erosion due to poor drainage and deteriorated road conditions would continue. Ongoing compaction of soils along the Mariposa Grove Road from the lower Grove area to the upper Grove area would also continue as maintenance vehicles and the commercial tram consistently use the road. Routine ongoing maintenance of the road surface would involve shoulder work and ditch maintenance and result in some soils being mixed, removed, moved, and/or replaced. In the event of road or slope failure, soils would be disturbed and erosion and sedimentation would occur and could affect areas downslope. Overall, under Alternative 1 there would be local long-term moderate adverse impacts on soils.

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

Conclusion. Ongoing impacts from erosion due to poor drainage and deteriorated road conditions and compaction would continue, resulting in local long-term moderate adverse impacts on soils.

Cumulative Impacts. The cumulative impacts on soils discussed in this section are based on an analysis of past, present, and reasonably foreseeable future actions in the Yosemite region in conjunction with the potential effects of Alternative 1 (No Action). Beneficial actions on soils would protect areas from erosion or restore natural soils conditions; adverse actions would degrade physical or chemical properties of soils, or result in the loss of soils. Other actions could decrease water infiltration, with hardening of surfaces such as roads, walkways, or buildings. In the past 150 years, some activities associated with urbanization and regional population growth contributed to the loss of soils or water infiltration in the Yosemite though much of the Yosemite region and surrounding rural landscape is undisturbed by human impacts. The area affected by past and possible future projects is not substantial and soil impacts would be minor when considered in a regional context.

Current and future plans and projects in the region would have beneficial and adverse impacts on soils (Appendix B). Comprehensive Ecological Restoration Projects, Wawona Meadow Restoration Project, and ecological restoration elements of the *Draft Merced* and *Tuolumne Wild and Scenic River Comprehensive Management Plans* would result in long-term beneficial impacts on soils. Activities associated with the *Fire Management Plan/Operational Fire Management Plan* and U.S. Forest Service fuels reduction projects would greatly reduce the threat of large high-severity catastrophic fires, and reduce the potential for accelerated fire-related erosion. The *Wilderness Stewardship Plan* could contribute watershed-scale protection to native landscapes and associated soils, depending on the outcome of the final plan. These actions would have a long-term minor beneficial effect on soils.

There would be local adverse impacts on soils associated with the current South Entrance Station Kiosks Replacement project, the *Scenic Vista Management Plan*, the Environmental Education Center, and future actions associated with new development proposed in the *Draft Merced River Plan* and *Draft Tuolumne River Plan* due to potential soil compaction, mixing, soil loss, and an overall decrease in soil infiltration. Site-specific adverse effects on soils could be short-term (during construction) and long-term (direct displacement of soils). These plans include mitigation measures to prevent construction-related erosion. These actions would have a localized long-term negligible adverse effect on soils.

In summary, past impacts on soils in the region have been long-term, minor, and adverse. Some present and foreseeable future actions would contribute to reversing the adverse impacts of past actions in the region, and others would have localized negligible effects. Past, present, and future impacts, in conjunction with the local, long-term moderate adverse impacts on soils under Alternative 1 (No Action), would result in a long-term minor adverse impacts on soils in the Yosemite region.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the commercial tram operation and expand parking and relocate it to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. During excavation and grading for the new parking lot at the South Entrance and optional new bridge near the Three Sentinels, soils would be mixed, moved, and replaced, affecting the area's soil profiles, with the greater degree of impact occurring in the areas not previously disturbed by construction. In the limited areas previously disturbed by construction, these impacts would also occur, but would result in negligible to minor additional impacts on soils, given the compaction and disturbance that has already taken place. Installation and/or replacement of septic systems and leach fields at the South Entrance, lower Grove area, and upper Grove area would result in additional soil disturbance. Possible construction of a roundabout at the Wawona Road – Mariposa Grove Road intersection would result in disturbance of soils and covering of some by an impervious surface. Clearing of vegetation and grading would occur along the existing Washburn Road and in an undisturbed area south of the Mariposa Grove Road and east of the picnic area during construction of the proposed South Entrance to lower Grove area pedestrian trail.

Moving, covering, trampling, and compaction of soils by equipment and workers within the construction work zone would also occur. Local soil compaction would temporarily decrease soil permeability, change soil moisture content, and lessen its water storage capacity.

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

Restoration-related Impacts. Culverts slated for cleaning, headwall installation, or repair would result in some impacts on soils. There would also be excavation of soils at culvert ends to ensure clear passage for water flow during rain or snowmelt. The installation of new culverts and replaced culverts would also result in limited soil excavation. These actions would constitute a minor to moderate local adverse impact on soils.

Because of planned decompaction during restoration in areas of the upper Grove area (loop and along margin of road) and lower Grove area (where current road exists near parking lot) where exposed soils remain, decompaction in these areas would constitute a negligible to minor, short-term adverse impact on soils. Giant sequoia root systems are typically shallow and extensive. As a result, decompaction would occur only at the very surface and park managers would monitor for exposed root systems.

Upon successful seeding and/or replanting, there would also be a long-term minor to moderate beneficial impact as the growth of plants and their return of nutrients and water holding capacity to soils in restored areas resulted in less erosion and more stable roadsides. There would be additional beneficial impacts from the use of native plants in restoration and from decreasing the erosion potential of alongside the road.

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

Operation-related Impacts. Impacts from erosion due to poor drainage and deteriorated road conditions would discontinue. Less channelization of water would result in better infiltration and reduced erosion of soils. Ongoing compaction of soils along the Mariposa Grove Road from the lower Grove area to the upper Grove area would continue as maintenance vehicles periodically use the road but would be confined to a narrower road and would not include the upper Grove loop. Routine ongoing maintenance of the road surface would involve shoulder work and ditch maintenance and result in some soils being mixed, removed, moved, and/or replaced. Overall, under Alternative 2 there would be local long-term moderate beneficial impacts on soils.

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

Conclusion. Current impacts from erosion due to poor drainage and deteriorated road conditions and compaction of soils would be alleviated but somewhat offset by new infrastructure outside the Grove, resulting in a long-term moderate beneficial impact.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting soils would be the same as those under Alternative 1 (No Action)—an overall long-term minor adverse impact on soils in the Yosemite region. There would be a long-term moderate beneficial impact under Alternative 2 due to decreased erosion and soil compaction in the Mariposa Grove, which is partially offset by new construction at the South Entrance. Past, present, and future projects, in conjunction with the impacts of Alternative 2 would result in long-term minor adverse impacts on soils in the Yosemite region.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, including two new bridges, and a new larger parking lot near the Grizzly Giant, but outside giant sequoia habitat. This alternative would make the Grizzly Giant the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. During excavation and grading for construction of the new access road, associated bridges, and parking lot, soils would be mixed, moved, and replaced, affecting the area's soil profiles, with the greater degree of impact occurring in the limited areas not previously disturbed by construction. In limited areas previously disturbed by construction, these impacts would also occur, but would result in negligible to minor additional impacts on soils. Installation and/or replacement of septic systems and leach fields at the South Entrance, lower Grove area, and upper Grove area would result in additional soil disturbance.

Moving, covering, trampling, and compaction of soils by equipment and workers within the construction work zone would also occur; however, a majority of soils that would be affected in the project corridor have been previously disturbed by road-related development activities (e.g., maintenance and construction). Local soil compaction would temporarily decrease soil permeability, change soil moisture content, and lessen its water storage capacity. Because the Mariposa Grove Road would be converted to a hardened surface and its width decreased, there would be a decrease in surface area covered by impermeable materials.

Impact Significance. Local, long- and short-term, moderate and adverse.

Restoration-related Impacts. Culverts slated for cleaning, headwall installation, or repair would result in some impacts on soils. There would also be excavation of soils at culvert ends to ensure clear passage for water flow during rain or snowmelt. The installation of new culverts and replaced culverts would also result in limited soil excavation. These actions would constitute a minor to moderate local adverse impact on soils.

Because of planned decompaction during restoration in areas of the upper Grove (loop and along margin of road) and lower Grove area (where current road exists near parking lot) where exposed soils remain, decompaction in these areas would constitute a negligible to minor, short-term beneficial impact on soils. Giant sequoia root systems are typically shallow and extensive. As a result, decompaction would occur only at the very surface and park managers would monitor for exposed root systems.

Upon successful seeding and/or replanting, there would also be a long-term minor to moderate beneficial impact as the growth of plants and their return of nutrients and water holding capacity to soils in restored areas resulted in less erosion and more stable roadsides. There would be additional beneficial impacts from the use of native plants in restoration and from decreasing the erosion potential of alongside the road.

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

Operation-related Impacts. Ongoing impacts from erosion due to poor drainage and deteriorated road conditions would be reduced in areas in the lower Grove area where impervious surfaces would be removed. The road in the lower Grove area and fill materials would be removed and soils would be restored. Ongoing compaction of soils along the Mariposa Grove Road from the lower Grove area to the upper Grove area would continue as maintenance vehicles periodically use the road but would be confined to a narrower road and would not include the upper Grove loop. Routine ongoing maintenance of the road surface would involve shoulder work and ditch maintenance and result in some soils being mixed, removed, moved, and/or replaced.

Impact Significance. Local, long-term, minor to moderate, and beneficial.

Conclusion. Current impacts from erosion due to poor drainage and deteriorated road conditions and compaction of soils would be alleviated but partially offset by disturbance of new infrastructure, resulting in a long-term minor beneficial impact, due to the impacts of road construction on soils.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting soils would be the same as those under Alternative 1 (No Action)—an overall long-term minor adverse impact on soils in the Yosemite region. There would be a long-term moderate beneficial impact under Alternative 3 due to decreased erosion and soil compaction and increased soil infiltration in the Mariposa Grove, which is partially offset by new road construction to the Grizzly Giant hub. Past, present, and future projects, in conjunction with the impacts of Alternative 3 would result in long-term minor adverse impacts on soils in the Yosemite region.

Alternative 4: South Entrance Hub with Modified Commercial Tram Access

Alternative 4 would maintain the commercial tram but with a limited route and hours of operation while also relocating the majority of the parking to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. During excavation and grading, soils would be mixed, moved, and replaced, affecting the area's soil profiles, with the greater degree of impact occurring in the limited areas not previously disturbed by construction. In areas previously disturbed by construction, these impacts would also occur, but would result in negligible to minor additional impacts on soils, given the compaction and disturbance that has already taken place. Installation and/or replacement of septic systems and leach fields at the South Entrance, lower Grove area, and upper Grove area would result in additional soil disturbance. Construction of the modified T at the Wawona Road – Mariposa Grove Road intersection would result in disturbance of soils and covering of some by an impervious surface.

Moving, covering, trampling, and compaction of soils by equipment and workers within the construction work zone would also occur; however, a majority of soils that would be affected in the project corridor have been previously disturbed by road-related development activities (e.g., maintenance and construction). Local soil compaction would temporarily decrease soil permeability, change soil moisture content, and lessen its water storage capacity. Because of planned decompaction during restoration in areas of the upper Grove (loop and along margin of road) and lower Grove area (where current road exists near parking lot) where exposed soils remain, decompaction in these areas would constitute a negligible to minor, short-term adverse impact on soils. Giant sequoia root systems are typically shallow and extensive. As a result, decompaction would occur only at the very surface and park managers would monitor for exposed root systems. Although the lower Grove parking area would decrease in size and the Mariposa Grove Road would remain the same width, there would be an increase in surface area covered by impermeable materials due to the construction of the parking lot at the South Entrance.

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

Restoration-related Impacts. Culverts slated for cleaning, headwall installation, or repair would result in some impacts on soils. There would also be excavation of soils at culvert ends to ensure clear passage for water flow during rain or snowmelt. The installation of new culverts and replaced culverts would also result in limited soil excavation. These actions would constitute a minor to moderate local adverse impact on soils.

Upon successful seeding and/or replanting, there would also be a long-term minor to moderate beneficial impact as the growth of plants and their return of nutrients and water holding capacity to soils in restored areas resulted in less erosion and more stable roadsides. There would be additional beneficial impacts from the use of native plants in restoration and from decreasing the erosion potential of cut-slopes alongside the road by removing some overhanging vegetation and loose rocks.

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

Operation-related Impacts. Ongoing impacts from erosion due to poor drainage and deteriorated road conditions would continue. Ongoing compaction of soils along the Mariposa Grove Road from the lower Grove area to the upper Grove area would also continue as maintenance vehicles and the commercial tram consistently use the road. Routine ongoing maintenance of the road surface would involve shoulder work and ditch maintenance and result in some soils being mixed, removed, moved, and/or replaced. In the event of road or slope failure, soils would be disturbed and erosion and sedimentation would occur and could affect areas downslope.

Impact Significance. Local, long-term, minor to moderate, and beneficial.

Conclusion. Current impacts from erosion due to poor drainage and deteriorated road conditions and compaction of soils would be alleviated but partially offset by disturbance of new infrastructure and continued commercial tram use, resulting in a long-term minor to moderate beneficial impact.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting vegetation would be the same as those under Alternative 1 (No Action)—an overall long-term minor adverse impact on soils in the Yosemite region. There would be a long-term moderate beneficial impact under Alternative 4 due to decreased erosion and soil compaction in the Mariposa Grove, which is slightly offset by new construction at the South Entrance. Past, present, and future projects, in conjunction with the impacts of Alternative 4 would result in long-term minor adverse impacts on soils in the Yosemite region.

AIR QUALITY AND CLIMATE CHANGE

Affected Environment

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 pollution impacts, including effects on visibility, plants, animals, soils, water quality, visitor health, and cultural resources and historic structures and objects.

The United States Environmental Protection Agency (EPA) and the California Air Resources Board designate whether or not counties in California are in attainment of federal and state ambient air quality standards for criteria pollutants. As table 3-6 shows, the criteria pollutants include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter greater than 10 microns and greater than 2.5 microns in diameter (PM_{10} and $PM_{2.5}$), and lead. The project is within 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. The portion of Mariposa County within Yosemite National Park is designated nonattainment for the national and state ozone standards and for the state PM_{10} standards. Mariposa County is designated as either attainment or unclassified for the remaining national and state air quality standards.

Table 3-6 – Mariposa County Attainment/Nonattainment Designations

Criteria Pollutant	National	State
Ozone	Nonattainment	Nonattainment
PM_{10}	Unclassified	Nonattainment
$PM_{2.5}$	Attainment/Unclassified	Unclassified
Carbon Monoxide	Attainment/Unclassified	Unclassified
Nitrogen Dioxide	Attainment/Unclassified	Attainment
Sulfur Dioxide	Unclassified	Attainment
Lead	No Designation	Attainment

Source: U.S. Environmental Protection Agency, 2011; California Air Resources Board, 2011

National nonattainment areas are subject to conformity under Section 176 of the federal Clean Air Act as applicable. The conformity rule prevents federal funding of a project unless it can be demonstrated that the project would not cause or contribute to violations of the federal ambient air quality standards. Since Mariposa County is nonattainment for the federal ozone standard, a conformity evaluation for the Mariposa Grove Ecological Restoration Project is required.

Criteria pollutant emissions that affect Yosemite National Park are caused by sources both within and outside of the park. Emissions from various sources within the San Joaquin Valley—mobile sources, power plants, food processors, and industrial facilities—are transported to the park. Emissions from these sources include PM_{10}, sulfur dioxide, volatile organic compounds, carbon monoxide, and nitrogen dioxide. Natural and prescribed fires that occur in the Sierra during dry summer months occasionally impair Yosemite's air quality as well, though the impacts are usually local. Large wild fires outside Yosemite, such as in Southern California, commonly impact Yosemite, too, and often affect the entire park. Westerly winds blow pollution into Yosemite on a regular basis, especially during the summer. Yosemite National Park, in cooperation with state and other federal agencies, monitors the effects caused by air pollution with a comprehensive, science-based air resources program. This program targets major air pollutants and the effects on Yosemite's visitors and ecology.

Air quality in the park is also affected by emission sources within Yosemite National Park. Air pollution sources include motor vehicles and stationary sources, such as furnaces, boilers, wood stoves, campfires, generators, barbecues, and prescribed fires. Most of the stationary sources are associated with park operations (NPS and concessioner). Campfires and associated emissions, however, are typically generated by visitors. Private, NPS, and concessioner vehicles and tour buses constitute the largest sources of mobile source emissions in Yosemite Valley and in the Mariposa Grove area.

Mariposa Grove and South Entrance Settings

Air quality in the Mariposa Grove and at the South Entrance is generally good, with few major emission sources. On-road motor vehicles represent the primary source of emissions in the area. The closest air quality monitoring station is at Turtleback Dome, which is approximately 16 miles north northwest of the Mariposa Grove at approximately 5,300 feet. At the Turtleback Dome station, ozone monitoring data recorded between 2006 and 2010 exceeded both the state and federal ozone standards (table 3-7). The Yosemite Village Visitor Center monitoring station is approximately 18 miles north-northeast of the Mariposa Grove. At the Yosemite Village Visitor Center, PM_{10} data recorded exceeded the California PM_{10} standard, but not the national standard.

There are few people with sensitivity to air quality in the immediate vicinity of the Mariposa Grove or the South Entrance. Although the Mariposa Grove may draw both adolescent and elderly visitors— population groups sensitive to air quality— their exposure to the ambient air quality in Yosemite National Park is temporary, and consequently visitors are not considered "sensitive receptors" to local air quality.

Table 3-7 – Air Quality Monitoring Data for Yosemite National Park

Pollutant	National Standard	State Standard	Monitoring Data by Year				
			2006	2007	2008	2009	2010
Ozone Monitoring Data* Station: Yosemite National Park – Turtleback Dome							
Highest 1-hour average, ppm	NA	0.09	0.100	0.100	0.108	0.096	0.091
Days over state standard			4	3	11	1	0
Highest 8-hour average, ppm	0.08	0.07	0.084	0.09	0.102	0.086	0.085
Days over national standard			20	25	33	8	5
Particulate Matter (PM_{10}) Monitoring Data Station: Yosemite Village – Visitor Center							
Highest 24-hour average µg/m^3 (national/state)**	150	50	104//97	127/116	136/118	90/82	81/74
Days over state standard (measured)***			3	1	2	3	2
Days over national standard (measured)***			0	0	0	0	0

*"Days over standard" refers to the number of days in a given year during which the ozone concentration exceeded the hourly state or national standard for at least one hour.
** State and national statistics may differ due to variations in sampling equipment, locations, references, and equivalent methods.
***PM_{10} is usually measured every sixth day (rather than continuously as is the case for other pollutants). Measured days are based on the days that measurement was greater than the standard.
NA = not applicable
ppm = parts per million by volume
µg/m^3 = micrograms per cubic meter
Source: The monitoring stations are operated by the National Park Service. Monitoring results are reported on the California Air Resources Board's iADAM air quality data statistics web pages (California Air Resources Board, 2012).

Climate Change

In addition to criteria pollutant emissions, greenhouse gas emissions threaten the natural identity and unique resources of national parks such as Yosemite through contributions to climate change. Accordingly, Yosemite National Park participates in the Climate Friendly Parks Program implemented by EPA and NPS, and has been designated a "Climate Friendly Park." To obtain this designation, Yosemite conducted a baseline greenhouse gas emissions inventory, developed a Climate Action Plan, and committed to educating park staff, visitors, and community members about climate change (Yosemite National Park 2006).

Global climate change is already affecting ecosystems in the Sierra Nevada. These changes include shifted plant growth cycles and changes in stream flow peaks due to snowmelt. Global warming is likely to shift habitats to higher elevations. Increasing temperatures and more frequent drought will likely affect fire regimes and pest/disease outbreaks (Davey et al. 2007).

The environmental factors most likely to influence giant sequoia ecology as a result of climate change include decreases in snow-dominated precipitation, decreases in overall precipitation (including a longer summer drought period), and climate change interactions with other stressors (such as insects, pathogens, and air pollution). All phases of giant sequoia growth will likely be influenced by climate change, but effects on the regeneration phase—dispersal, germination, and early establishment—have the greatest potential to be detectable in the near term (York 2011).

Environmental Consequences

Intensity Level Definitions

Beneficial – Air emissions would decrease as a result of the alternative relative to baseline (no action) conditions.

Negligible – Air emissions would not increase as a result of the alternative relative to baseline (no action) conditions.

Minor – Air emissions would increase slightly as a result of the alternative relative to baseline (no action) conditions, but would not be noticeable to sensitive individuals. Mitigation measures would likely not be necessary due to the low level of emissions.

Moderate – Air emissions would increase moderately as a result of the alternative relative to baseline (no action) conditions, and would be noticeable to sensitive individuals. Mitigation would be needed to offset adverse effects.

Major – Air emissions would increase substantially as a result of the alternative relative to baseline (no action) conditions, and would potentially affect the health of sensitive individuals. Extensive mitigation would be necessary to offset adverse effects.

Alternative 1: No Action

Under Alternative 1, current infrastructure would be maintained and current park/concessioner operations, maintenance, and management practices would continue. Several existing sources of criteria pollutant and greenhouse gas emissions would continue to operate. These include the gift shop diesel-powered generator in the lower Grove area, the tour tram, commercial tram traffic on unpaved sections of the roads, idling buses/circling visitor vehicles searching for a parking spot in the lower Grove area, and the propane-powered generator at the Wawona Point communications shed.

Operations-related Impacts. Under Alternative 1, air and greenhouse gas emissions would continue to be generated by on-going activities at the Mariposa Grove. Existing emission sources consist of mobile and stationary sources. Mobile sources include visitor vehicles, tour buses, shuttle buses (from Wawona and the South Entrance), employee vehicles (concessioner and park employees), and commercial trams. Two stationary sources, a diesel generator that provides power to the lower Grove gift shop, and a propane-powered generator at the communications structure at Wawona Point, would be retained. The existing vault toilets in the lower Grove area would continue to be a source of nuisance odors.

Continued operations at the Mariposa Grove would generate vehicle emissions from these mobile and stationary sources. Although these emissions contribute to the overall air emissions in the park, they represent a small portion of the park's total daily emissions. Also, the nuisance odors associated with vault toilets would continue to affect visitors. The vehicle and stationary source emissions have the potential to affect sensitive individuals visiting the Mariposa Grove. Over time, vehicle emissions are expected to decrease as newer, lower-emitting commercial trams, buses, and passenger vehicles replace older, higher-emitting vehicles. This reduction would be offset somewhat by increases in the number of visitors. In addition, visitor exposure to pollutants from emission sources in the Mariposa Grove would be limited to the time spent visiting the Grove. These two factors would minimize the impacts on sensitive individuals who visit the Mariposa Grove.

Nuisance odors associated with vault toilet operations would continue to affect visitors in the lower Grove area, and could become increasingly noticeable as the number of Grove visitors continues to increase. This represents a moderate adverse impact on sensitive individuals.

Impact Significance. Site-specific, long-term, moderate, adverse impact.

Conclusion. No project construction or Grove restoration-related impacts would occur. The impact of volatile organic compounds, particulate matter, and greenhouse gas emissions related to continued Grove operations, maintenance, and visitor access on regional air quality and on visitors to Yosemite National Park and the Mariposa Grove would be negligible. Nuisance odors from vault toilets, however, would continue to worsen as visitation increases and would have a moderately adverse impact on sensitive individuals.

Cumulative Impacts. Cumulative impacts on air quality are based on analysis of past, present, and reasonably foreseeable future actions in the Yosemite region in conjunction with the potential effects of each alternative. Since 1950, the population of California has tripled, and the number of vehicle-miles-traveled has increased six-fold. Air quality conditions within the park have been influenced by this surge in population growth and associated emissions from industrial, commercial, and vehicle sources in upwind areas, especially within the San Joaquin Valley. Since the 1970s, emissions sources within the park, as well as California as a whole, have been subject to local stationary-source controls and state and federal mobile-source controls. With the passage of time, such controls have been applied to an increasing number of sources, and the associated requirements have become dramatically more stringent and complex, which has helped to offset air quality problems resulting from population growth, increased industrial activity, and the greater number of vehicles in use. These past impacts have resulted in a long-term, moderate adverse impact on air quality and climate change in the region.

Present and future regional, state, and federal activities would have beneficial and adverse impacts on air quality and climate change. Regional, state, and federal regulatory programs tightening emissions standards have been adopted and will likely produce beneficial impacts on air quality and climate change (through reduced greenhouse gas emissions). Although cumulative growth in the Central Valley region will tend to adversely affect air quality within the park including the Mariposa Grove, implementation of ongoing state and federal mobile-source control programs would ameliorate this effect to a degree. The potential effects of additional increases in California's population, particularly in the Central Valley, additional state and federal regulations of greenhouse gases (GHGs) and other air pollutants such as particulate matter, are difficult to predict, but would likely have offsetting adverse and beneficial effects. State and federal efforts to address climate change including regulations requiring greenhouse gas (GHG) emissions reductions are by nature global and cumulative, but would have long-term beneficial effects.

The Yosemite Area Regional Transportation System (YARTS) is a multi-agency effort to provide public transportation options, reduce reliance on automobiles, and improve regional air quality. On-going operation of the YARTS is expected to result in long-term, beneficial impacts on air quality throughout the region. By providing expanded levels of service (more frequent runs and additional destinations) during peak visitation and reducing service during the quieter months, YARTS maximizes its potential to reduce use of personal vehicles, while minimizing unnecessary emissions associated with its own operation.

At a park level, the NPS is developing the *Draft Merced River Wild and Scenic River Comprehensive Management Plan*. The plan proposes an expansion of transit regional options, which would have

beneficial effects on air quality by providing visitors with public transportation to the South Entrance, the busiest entrance in the park, and into the park.

The *Fire Management Plan/Operational Fire Management Plan* would have short-term but moderate adverse impacts on air quality. Other reasonably foreseeable future NPS projects are not anticipated to have a net adverse or beneficial effect on air quality except for short-term, localized impacts.

Federal agencies and installations are required to comply with federal climate change policy including Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, which instructs federal agencies to conduct their environmental, transportation, and energy-related activities in an environmentally, economically, and fiscally sound, integrated, continuously improving, efficient, and sustainable manner. Executive Order (EO) 13423 also directs federal agencies to implement sustainable practices for energy efficiency and reductions in GHG emissions, and for the use of renewable energy.

In summary, past impacts on the air quality in the Mariposa region have been long-term, adverse, and moderate. Present and foreseeable future actions, would have negligible cumulative effects on air quality. Alternative 1 (No Action) would have long-term negligible impacts on air quality. Past, present, and future impacts, in conjunction with the long-term negligible impacts on air quality under Alternative 1 (No Action), would result in long-term moderate impacts on air quality in the Yosemite region.

In terms of climate change, particularly because the effects from greenhouse gas emissions are global in nature and cumulative on world-wide basis, individual sources of greenhouse gases related to past, present, and future plans and projects are not large enough to have an appreciable effect. Alternatives 1-4, in conjunction with past, present, and future actions and projects in the region, would have a negligible, long-term adverse cumulative effect on climate change.

Alternative 2: South Entrance Hub (Preferred Alternative)

Under Alternative 2, the in-Grove commercial tram operation would be discontinued; the in-Grove access road pavement would be replaced with a hardened surface; the gift shop would be removed; and the capacity of the lower Grove parking lot would be reduced, and restricted to off-season visitor use. The lower Grove comfort station would be remodeled as a smaller facility, and the water tank and chlorination unit would be relocated to a site down gradient from the museum in the upper Grove. A new, 295-space parking area and visitor facilities would be built at the South Entrance, making the South Entrance the primary source of visitor information and the main departure point ("hub") for visitors to the Grove. During peak and shoulder seasons, shuttle service would replace access to the Grove via privately owned vehicles (POVs). Numerous other rehabilitation and restoration actions would be components of this alternative, such as rehabilitation of Wawona Point, giant sequoia habitat restoration; improvement of hydrologic flows in the Grove; updated prescribed fire treatment; soil decompaction; and improvement of visitor orientation, way finding, and interpretation.

Construction-related Impacts. Construction of parking areas and associated support infrastructure at the South Entrance would generate short-term air and greenhouse gas emissions that include exhaust from construction vehicles, heavy equipment, and gas-powered hand tools (e.g., chain saws); and generation of fugitive dust during ground disturbance New parking lot construction at the South Entrance also would generate reactive organic compound (ROG) emissions from asphalt off-gassing as it cools and hardens. Parking lot striping and painting or staining of new or refurbished structures would also generate short-term ROG emissions associated with evaporation of volatile organic compounds in paints and solvents.

Lower Grove area modifications, including removal of the parking lot, gift shop, commercial tram staging, fueling, comfort station, and ticketing areas, and repaving of a smaller lower Grove parking area would also generate short-term, site-specific emissions from construction activities. These emissions would include exhaust from construction vehicles and heavy equipment, and dust from equipment operating on exposed earth.

Construction activities associated with implementation of Alternative 2 restoration of the Mariposa Grove and development of a new South Entrance transit hub would generate criteria pollutants, toxic air contaminants, and greenhouse gases. PM_{10} and $PM_{2.5}$ would occur as fugitive dust from disturbed soil and demolition activities and from exhaust of heavy-duty and hand-held equipment. Particulate emissions would vary during the construction period depending on the level and type of activity, silt content of the soil, and weather conditions.

Emissions generated from construction and removal activities would include tailpipe emissions from heavy-duty equipment, worker commute trips, and truck trips to haul debris to appropriate disposal or reuse sites, and to supply the site with construction materials. Both mobile and stationary equipment would generate emissions of criteria pollutants, (toxic air contaminants, and greenhouse gases from the use of diesel- and gasoline- powered equipment. Toxic air contaminants are less pervasive in the atmosphere than criteria air pollutants, but they are linked to short-term (acute) and long-term (chronic and/or carcinogenic) adverse human health effects. Neither toxic air contaminants nor greenhouse gases have corresponding ambient air quality standards.

The temporary duration of the construction period, expected to be implemented in phases over several years, would limit the potential for tailpipe emissions of criteria pollutants and toxic air contaminants to adversely affect local air quality. In addition, visitors would be exposed to construction emissions for the limited period of time associated with their visit. Visitor use of and access to construction zones would be restricted.

Impact Significance. Short-term, site-specific, minor, adverse impact.

Restoration-related Impacts. Short-term increases in criteria pollutant, toxic air contaminants and greenhouse gas emissions would result from restoration activities similar to those described above for construction-related impacts. Restoration-related air emissions would be generated by activities requiring the use of off-road construction equipment (typically powered by gasoline or diesel fuel), by worker trips, and by hauling of materials to and from the site. Restoration activities may also generate dust that could be a nuisance to workers or visitors.

Impact Significance. Short-term, site-specific, minor, adverse impact.

Operations-related Impacts. Moving the hub to the South Entrance and removing the trams would improve long term air quality within Mariposa Grove. Under Alternative 2, POV use would be reduced substantially between the South Entrance Hub and the lower Grove area as POV access to the grove during peak and shoulder seasons would be replaced by shuttle service from a new South Entrance Hub. Consequently, exhaust and dust emissions from visitor vehicles traveling on the South Entrance to lower Grove road segment would be replaced by shuttle bus emissions, which would substantially reduce vehicle emissions along this road segment. This would reduce the exposure of Grove visitors to exhaust and dust emissions.

The generator used to power the lower Grove gift shop would be moved to the South Entrance Hub area where electrical power would be the primary power source and the generator used as back up. This switch would eliminate the air and greenhouse gas emissions produced by the generator.

However, there would still be indirect air and greenhouse gas emissions associated with the electrical generation used to supply the gift shop, though such emissions would be produced outside of the Park, and would be less than emissions produced by the generator. Use of the propane generator at the Wawona Point communications shed would continue under Alternative 2, resulting in no change in air or greenhouse gas emissions from this source. If a generator is needed for a lift station, it would be operated using best management practices to reduce greenhouse gas emissions, utilizing alternative power sources, if feasible.

Alternative 2 includes the replacement of the vault toilets in the lower Grove area with flush toilets, contingent upon the determination of feasibility for a septic system in this area. This replacement would eliminate the existing odor impacts associated with the lower Grove vault toilets.

Impact Significance. Long-term, site-specific, moderate, beneficial impact.

Conclusion. Construction activity would generate short-term minor increases in air and greenhouse gas emissions at the Mariposa Grove and the South Entrance. Operation-related activities would generate beneficial air and greenhouse gas impacts within the Grove due to removal of most privately owned vehicle travel within this area. The nuisance odors associated with the existing lower Grove vault toilets would be eliminated if replaced with flush toilets. Emissions from prescribed burns in and near the Mariposa Grove would result in moderate, short-term adverse effects during burn events. Overall effects of Alternative 2 construction, restoration, and operations on air and greenhouse gas emissions would be long-term, moderate, and beneficial.

Cumulative Impacts. Regional past, present, and reasonably foreseeable future projects would be the same as under Alternative 1 (No Action)—long-term, adverse, and moderate. The primary source of restoration-related air and greenhouse gas emissions are prescribed fires used to reduce hazardous fuels in the Grove vicinity. These controlled burns are used to reduce the likelihood of catastrophic, uncontrolled fires that could damage or destroy the Grove. These controlled fires are limited to times when meteorological conditions favor dispersion of air pollutants while minimizing impacts on individuals. However, even under controlled conditions, these fires can dramatically worsen air quality during and after burns, and can affect sensitive individuals in the vicinity of the fire.

Overall under Alternative 2, there would be short-term, site-specific, minor adverse impacts on air quality through minor additional emissions during construction activities and restoration-related projects. There would be long-term moderate beneficial impacts on overall air quality under Alternative 2 due to removal of most privately owned vehicle travel and the commercial tram in the Mariposa Grove. Regional past, present, and future impacts, in conjunction with the local, moderate beneficial impacts on air quality under Alternative 2, would result in a long-term minor adverse impact on air quality in the Yosemite region.

Alternative 3: Grizzly Giant Hub

Under Alternative 3, the lower Grove parking lot and gift shop would be removed, the lower Grove comfort station would be replaced with a smaller vault toilet facility, the asphalt in-Grove access road would be replaced with a hardened surface, the water line from the upper Grove tank to the South Entrance would be upgraded, commercial tram staging and operations would be eliminated, and a new bypass road would be constructed, (including two new bridges), to serve new visitor facilities. A new larger parking lot near the Grizzly Giant, but outside giant sequoia habitat, would be constructed, making the Grizzly Giant the primary departure point for visitors to the Grove. Numerous other rehabilitation and Grove restoration actions, such as improvement of hydrologic flow, prescribed fire treatment, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction of a new bypass road, two new bridges, and a new parking area at the Grizzly Giant would generate short-term air and greenhouse gas emissions. This includes fugitive dust and exhaust emissions from construction vehicles and equipment. Paving would generate ROG emissions associated with off-gassing of asphalt as it cools and hardens, while parking lot striping and painting of new and refurbished structures also would generate short-term ROG emissions associated with evaporation of the volatile organic compounds included in paints and stains.

Also, modifications to the lower Grove area that include removing the commercial tram staging, fueling, and ticketing facilities would generate short-term, site-specific emissions from construction activities. These would include exhaust emissions from construction equipment and dust from equipment operating on exposed earth.

Removal of existing structures and construction of new facilities would generate dust, including PM_{10} and $PM_{2.5}$ (primarily fugitive dust from demolition activities and tailpipe emissions from the operation of heavy-duty and hand-held equipment). Dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and weather conditions.

Emissions generated from construction and demolition activities would also include tailpipe emissions from heavy-duty equipment, worker commute trips, and truck trips to haul debris to appropriate disposal or reuse sites, and to supply the site with construction materials. Both mobile and stationary equipment would generate emissions of criteria pollutants (i.e. ozone precursors, carbon monoxide, PM_{10}, and $PM_{2.5}$), and toxic air contaminants and greenhouse gases from the use of diesel- and gasoline- powered equipment. Toxic air contaminants are less pervasive in the atmosphere than criteria air pollutants, but they are linked to short-term (acute) and long-term (chronic and/or carcinogenic) adverse human health effects. Neither toxic air contaminants nor greenhouse gases have corresponding ambient air quality standards.

The temporary duration of the construction period would limit the potential for tailpipe emissions of criteria pollutants and toxic air contaminants to adversely affect local air quality. In addition, visitors would be exposed to construction emissions for the limited period of time associated with their visit. Visitor use of and access to construction zones would be restricted.

Impact Significance. Short-term, site-specific, minor, adverse impact.

Restoration-related Impacts. Short-term increases in criteria pollutants, toxic air contaminants, and greenhouse gas emissions would result from restoration activities similar to those described above under construction-related impacts. Restoration-related air emissions would be generated by activities requiring the use of off-road construction equipment (typically powered by gasoline or diesel fuel), by worker trips, and by hauling of materials to and from the site. Restoration activities may also generate dust that could be a nuisance to workers or visitors.

Impact Significance. Short-term, site-specific, minor, adverse impact.

Operations-related Impacts. Overall emissions associated with vehicle trips within the Mariposa Grove area would increase as compared to Alternative 1. This is because, compared to Alternative 1, Alternative 3 would result in a substantial increase in visitors parking at Grizzly Giant, as compared to visitors parking in the lower Grove area (under Alternative 1). Alternative 3 would also slightly increase the number of tour buses parking at Grizzly Giant, as compared to the number that currently park in the lower Grove area. Alternative 3 would also eliminate shuttles from the Wawona Store and the South Entrance. By increasing the number of visitor vehicles traveling to Grizzly Giant

while decreasing the number of shuttle buses, exhaust and dust emissions from vehicles traveling on this road segment would increase as compared to Alternative 1.

The generator used to power the lower Grove gift shop would be moved to the Grizzly Giant Hub area. However, there would be no change in the emissions associated with the generator. Use of the propane generator at the Wawona Point communications shed would continue under Alternative 2, resulting in no change in air or greenhouse gas emissions from this source.

Alternative 3 includes the replacement of the 8 vault toilets in the lower Grove area with 2 vault toilets. This would reduce but not eliminate the odor impacts associated with these facilities. Alternative 3 also includes replacing 1 vault toilet at Grizzly Giant with 18 vault toilets. This change would increase odor impacts at Grizzly Giant.

Impact Significance. Long-term, site-specific, moderate, beneficial impact.

Conclusion. Construction activities would generate short-term minor increases in air and greenhouse gas emissions at the Mariposa Grove and the South Entrance. Operations-related activities would generate a moderate increase in air emission impacts within the South Entrance to Grizzly Giant Hub area because visitor vehicle travel would increase on Mariposa Grove Road. Nuisance odors associated with the existing lower Grove vault toilets would be reduced by reducing the number of vault toilets. However, nuisance odors would increase at Grizzly Giant due to increases in the number of vault toilets at this location. Emissions from prescribed burns in and near the Mariposa Grove would result in moderate, short-term adverse effects during burn events. Overall effects of Alternative 3 construction, restoration, and operations on air and greenhouse gas emissions would be long-term, moderate, and adverse.

Cumulative Impacts. Regional past, present, and reasonably foreseeable future projects would be the same as under Alternative 1 (No Action)—long-term, adverse, and moderate. The primary source of restoration-related air and greenhouse gas emissions are prescribed fires used to reduce hazardous fuels in the Grove vicinity. These controlled burns are used to reduce the likelihood of catastrophic, uncontrolled fires that could damage or destroy the Grove. These controlled fires are limited to times when meteorological conditions favor dispersion of air pollutants while minimizing impacts on individuals. However, even under controlled conditions, these fires can dramatically worsen air quality during and after burns, and can affect sensitive individuals in the vicinity of the fire.

Under Alternative 3, there would be long-term, site-specific, moderate adverse impacts on air quality because of increased private vehicle emissions in the Grove area. Regional past, present, and future impacts, in conjunction with the local, moderate adverse impacts on air quality under Alternative 3, would result in a long-term moderate adverse impact on air quality in the Yosemite region.

Alternative 4: South Entrance Hub with Modified Commercial Tram Access

Alternative 4 would maintain the commercial tram but with a limited route and hours of operation while also relocating the majority of the parking to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Though the existing trams are fairly new, the park would replace the existing trams with a more energy-efficient hybrid vehicles as the units approach the end of their useful life and require replacement. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction of parking areas and associated support infrastructure at the South Entrance would generate air and greenhouse gas emissions that include site grading and paving activities. These activities would generate air and greenhouse gas emissions from off-road construction vehicles. Parking lot paving would also generate ROG emissions associated with off-gassing of asphalt as it cools and hardens. Parking lot striping would generate short-term ROG emissions from evaporation of volatile organic compounds included in paints.

Demolition and removal of existing structures and construction of relocated and new facilities would generate dust, including PM_{10} and $PM_{2.5}$ (primarily fugitive dust from demolition activities and tailpipe emissions from the operation of heavy-duty and hand-held equipment). Dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and weather conditions.

Emissions generated from construction and demolition activities would also include tailpipe emissions from heavy-duty equipment, worker commute trips, and truck trips to haul debris to appropriate disposal or reuse sites, and to supply the site with construction materials. Both mobile and stationary equipment would generate emissions of criteria pollutants (ozone precursors, carbon monoxide, PM_{10}, and $PM_{2.5}$), toxic air contaminants from the use of diesel- and gasoline-powered equipment, and greenhouse gases. Toxic air contaminants are less pervasive in the atmosphere than criteria air pollutants, but they are linked to short-term (acute) and long-term (chronic and/or carcinogenic) adverse human health effects. Neither toxic air contaminants nor greenhouse gases have corresponding ambient air quality standards.

The temporary duration of the construction period would limit the potential for tailpipe emissions of criteria pollutants, toxic air contaminants, and greenhouse gases to adversely affect local air quality. In addition, visitors would be exposed to construction emissions for the limited period of time associated with their visit.

Impact Significance. Short-term, site-specific, minor, adverse impact.

Restoration-related Impacts. Short-term increases in air emissions would result from restoration activities similar to those described above under construction-related impacts. Restoration-related air emissions would be generated by activities requiring the use of off-road construction equipment (typically powered by gasoline or diesel fuel), by employee trips, and by hauling of materials to and from the site. Restoration activities may also generate dust that could be a nuisance to workers or visitors.

Impact Significance. Short-term, site-specific, minor, adverse impact.

Operation-related Impacts. Compared to existing conditions, commercial tram emissions would be reduced because commercial trams would operate for a fewer number of hours between the South Entrance and the lower Grove area. Visitor vehicle travel, except for private vehicles with placards, would be eliminated between the South Entrance Hub and the lower Grove area, while the number of shuttles would increase. The majority of those shuttles would be trips from the South Entrance to the lower Grove area, while the remaining shuttles would be trips from the Wawona Store to the Mariposa Grove. Consequently, exhaust and dust emissions from vehicles traveling on this road segment would be reduced, as visitor vehicle trips are replaced by shuttles.

The generator used to power the lower Grove gift shop would be moved to the South Entrance Hub area where electrical power would be used in lieu of the generator. This switch would eliminate the criteria pollutant, toxic air contaminant, and greenhouse gas emissions produced by the generator.

However, there would still be indirect criteria pollutant, toxic air contaminant, and greenhouse gas emissions associated with the electrical generation used to supply the gift shop, though such emissions would be produced outside of the Park, and would be less than emissions produced by the generator. Use of the propane generator at the Wawona Point communications shed would continue under Alternative 4, resulting in no change in criteria pollutant, toxic air contaminant or greenhouse gas emissions from this source. If a generator is needed for a lift station, it would be operated using best management practices to reduce greenhouse gas emissions, utilizing alternative power sources, if feasible.

Alternative 4 includes the replacement of the vault toilets in the lower Grove area with flush toilets, contingent upon the determination of feasibility for a septic system in this area. This replacement would eliminate the existing odor impacts associated with the lower Grove vault toilets.

Impact Significance. Long-term, site-specific, minor, beneficial impact.

Conclusion. Construction would generate short-term minor increases in criteria pollutant, toxic air contaminant, and greenhouse gas emissions. Operation-related activities would generate a beneficial reduction in air emissions within the South Entrance to lower Grove area because visitor vehicle travel would be eliminated on Mariposa Grove Road and commercial tram activity would be reduced. The nuisance odors associated with the existing lower Grove vault toilets would be eliminated by replacement with flush toilets. Overall effects of Alternative 4 construction, restoration, and operations on criteria pollutant, toxic air contaminant, and greenhouse gas emissions would be long-term, minor, and beneficial.

Cumulative Impacts. Regional past, present, and reasonably foreseeable future projects would be the same as under Alternative 1 (No Action)—long-term, adverse, and moderate. The primary source of restoration-related air and greenhouse gas emissions are prescribed fires used to reduce hazardous fuels in the Grove vicinity. These controlled burns are used to reduce the likelihood of catastrophic, uncontrolled fires that could damage or destroy the Grove. These controlled fires are limited to times when meteorological conditions favor dispersion of air pollutants while minimizing impacts on individuals. However, even under controlled conditions, these fires can dramatically worsen air quality during and after burns, and can affect sensitive individuals in the vicinity of the fire.

Under Alternative 4, there would be short-term, site-specific, minor adverse impacts on air quality through minor additional emissions during construction activities and restoration-related projects. There would be long-term minor beneficial impacts on overall air quality under Alternative 4 due to removal of most privately owned vehicle travel in the Mariposa Grove. Regional past, present, and future impacts, in conjunction with local, minor beneficial impacts under Alternative 4, would result in a long-term minor adverse impact on air quality in the Yosemite region.

SOUNDSCAPES

Affected Environment

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and interferes with or disrupts other activities. The responses of individuals to similar noise events are diverse and influenced by many factors, including the type of noise, the perceived importance of the noise, its appropriateness to the setting, the time of day and the type of activity during which the noise occurs, and noise sensitivity of the individual. Wildlife species may have different sensitivities to sound, and these sensitivities may vary based on activity and/or season (e.g., nesting birds or denning mammals may be more sensitive to noise intrusion than

animals engaged in more transitory activities such as foraging). Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human and wildlife response to typical environmental noise exposure levels is annoyance.

The standard unit of sound measurement is the decibel (dB). The range of audible sound levels for humans is generally considered from 0-130 dBA. Table 3-8 presents approximate decibel levels of commonly known outdoor sound sources.

Table 3-8 – Approximate Decibel Levels of Common Sound Sources (NPS 2006)

dBA	Perception	Outdoor Sounds
90	Very noisy	Lawn mower
80		Diesel truck 50 mph at 50 feet
70	Noisy	2-stroke snowmobile 30 mph at 50 feet
60		4-stroke snowmobile 30 mph at 50 feet
50	Moderate	Croaking raven flyover at 100 feet
40		River at 100 feet
30	Quiet	Summer wilderness
20	Very quiet	Winter wilderness
10	Barely audible	Below standard noise floor
0	Limit of audibility	Quiet winter wilderness

Applicable Laws, Ordinances, Regulations, and Standards

There are a number of laws and guidelines at the federal level that direct the consideration of a broad range of noise issues, including the Noise Control Act of 1972, EPA recommendations regarding environmental noise levels (EPA 1974), and NPS recommendations (NPS 2006). The EPA recommends a 55 L_{dn} exterior and 45 L_{dn} interior noise threshold for noise-sensitive receptors. The NPS states that the "type, magnitude, duration, and frequency of occurrence of noise that is compatible or incompatible with protecting the resources or the visitor experience for which the park was established and planned" are all factors to be taken into account when assessing noise impacts, including determining whether certain noise sources are necessary or appropriate.

Existing Noise Sources. Noise types and levels in the study area vary based on the number of vehicles, visitors, proximity to vehicle traffic and stationary noise sources, natural sounds topography, weather, and other site-specific conditions. Although natural sounds contribute to ambient noise levels, NPS considers these as part of a web of natural and cultural resources. Mechanical sources of noise within Yosemite National Park include construction equipment, generators, radios, and park maintenance equipment. Noise from these sources varies by season and by distance from source.

Within the study area, motor vehicle noise is most noticeable along Wawona Road at the South Entrance, where there is a concentration of park visitors, vehicle traffic is heavy, and the topography places visitors near roads. However, the existing noise environment changes throughout the year directly in proportion to the level of use (i.e. the number of cars and buses that travel the various roadways in the park); therefore, noise levels are generally lower during the winter than during the summer months when there are the most visitors to the park. Noise from motor vehicles is loudest adjacent to the roadways, but due to generally low background sound levels, can be audible a long distance from the roads. Atmospheric effects such as wind, temperature, humidity, topography, rain, fog, and snow can affect the presence or absence of motor vehicle noise.

Over the last two years Yosemite National Park has been collaborating with the NPS Natural Sounds Program and the Sierra Nevada Network—a network of national parks in the area—to establish a baseline for sounds in the park.

Mariposa Grove Setting

Ambient noise levels vary among the upper Grove area, lower Grove area, Wawona Point, and the South Entrance. Natural sounds within the Mariposa Grove are not considered to be noise. These sounds result from natural sources such as flowing water, birds and other wildlife, wind, and rustling tree leaves. The existing noise within the Grove results from mechanical sources such as the commercial tram, other motor vehicles, generators and aircraft, and from human activities, such as talking and yelling.

Due to the number of motor vehicles, visitors and road location, the lower Grove parking lot is the noisiest area of the Mariposa Grove. The soundscapes are increasingly quiet as one travels from the lower Grove parking lot toward the Grizzly Giant as vehicular traffic is confined largely to occasional commercial trams and the number of visitors decreases. From the Grizzly Giant to the upper Grove area noise again decreases as visitation decreases and the upper Grove area is generally quiet except for noise from the tram, which occurs about every 20 minutes during peak use periods. The commercial tram recording has also been noted as a distracting noise element for those visiting the Grove near the tram's route. Noise measurements conducted by the NPS at the Mariposa Grove near the museum in the upper Grove area showed the background noise levels ranged from 21 to 27 dBA L_{90} during the fall, and from 20 to 26 dBA L_{90} during the summer. These are largely within summer wilderness levels (see table 3-8). Wawona Point is situated further from the commercial tram traffic of the upper Grove area and visitation is low, therefore it is among the quietest portions of the study area.

South Entrance Setting

The South Entrance is the noisiest soundscape due to the amount of vehicle traffic and visitors. Noise data are not available for the South Entrance, but noise levels likely vary from the 20 to 60 dBA L_{90} depending on time of day and the season.

Environmental Consequences

Impacts related to soundscapes were assessed in terms of duration, type, and intensity of impact. 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.

Type of Impact. Beneficial impacts are those impacts that decrease noise, and adverse impacts are those impacts that increase noise.

Intensity of Impact. The level of impact (negligible, minor, moderate, or major) of sound changes from the no action alternative to the action alternatives was evaluated using the following definitions. A negligible impact indicates the change in sound levels would not be perceptible to normal human hearing. A minor impact indicates the change in sound levels would be perceptible, but not likely to have a substantial annoyance effect on visitors or residents in the area. A moderate impact indicates the change in sound levels would be easily perceptible and likely to result in annoyance to some park visitors and residents. A major impact indicates the change in sound levels would be perceptible and likely to annoy most park visitors and residents who experience it.

Alternative 1: No Action

Under Alternative 1 current infrastructure, concessioner services and maintenance, and park management would remain as is. No rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be implemented.

Operation-related Impacts. Alternative 1 does not change to the current park operations. Noise levels from park operations would remain the same and noise levels relating to long-term operations would be unchanged from existing conditions. Negligible seasonal/daily fluctuations in noise levels would occur based on visitor and motor vehicle volume. Noise levels would increase if there are more visitors due to the generation of more vehicular-related traffic and conversation.

Impact Significance. The anticipated impacts on noise under Alternative 1 would be local, long-term, moderate, and adverse.

Conclusion. The continued use of the commercial tram and motor vehicles would result in moderate long-term adverse impacts on visitors to the Grove

Cumulative Impacts. Cumulative impacts on the soundscape are based on analysis of past, present, and reasonably foreseeable future actions in the Mariposa Grove area in conjunction with the potential effects of each alternative. Past, present, and reasonably foreseeable future actions affecting soundscapes include numerous small-scale construction and rehabilitation projects at the South Entrance and the Mariposa Grove (Appendix B). These projects would have minor to moderate short-term, site-specific adverse impacts in the Mariposa Grove area. Alternative 1 would result in moderate, long-term adverse impacts on the soundscape of the Grove from the continued use of the commercial tram and motor vehicles. Past, present, and future actions in conjunction with the impacts of Alternative 1 would have a long-term, moderate adverse impacts on soundscapes in the Mariposa Grove area.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the commercial tram operation and replace the 115-space parking lot in the lower Grove area with 8 accessible and 25-50 standard spaces while expanding and relocating primary visitor parking to the South Entrance, making the South Entrance the departure point for visitors accessing the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction activities would generate the most noise of all the activities under Alternative 2. The construction activities at the South Entrance would include the construction of a new parking area; construction of the visitor contact area and related bathroom facilities; construction of shuttle boarding and tour bus transfer area; construction of a new leach field and replacement of an existing leach field (if feasible); and construction of a new chlorination/water tank. The noise-generating construction activities in the lower Grove area would be the removal of the commercial tram staging area; construction of the new roadway alignment and vehicular bridge at the entrance curve; reduction of the parking area; construction of new hardened road for service access using old road alignments; extension of the footbridge; construction of new bathroom facilities; construction of a new leach field (if feasible); and removal of the gift shop. The major noise-generating construction activity near the Grizzly Giant would be the removal of the

existing vault toilets and installation of new vault toilets at the accessible drop-off area. The noise-generating construction activities in the upper Grove area would be the relocation of the water tank, removal of the existing vault toilets; and rehabilitation and repair of the water pipeline. Conversion of the Mariposa Grove Road from pavement to a hardened surface and conversion of the loop road in the upper Grove area to a pedestrian trail would involve heavy equipment and resultant noise. A conservative estimate of noise generated by construction activities is 89 dBA L_{eq} at a distance of 50 feet. Expected construction activities include minor excavation, grading, clearing, and paving. Construction activities would generate temporary increases in noise exposure in the vicinity of project construction when heavy machinery and equipment is used.

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

Restoration-related Impacts. Restoration activities would include a 50 percent reduction of impermeable surface within the lower Grove area. The surface would be made available for giant sequoia habitat restoration, soil decompaction, and water infiltration. Insufficient culverts and/or cross drains would be cleaned, repaired, or replaced. Mariposa Grove Road, or the trail, would be outsloped where site-specific conditions allow. Implementing fire management activities to thin trees and remove understory vegetation and fuels would result in local increases in noise. Construction to implement sustainable stormwater strategies and repair the waterline would also increase noise. Similar to noise from construction activities, a conservative estimate of noise generated by restoration activities is 89 dBA L_{eq} at a distance of 50 feet. Expected restoration activities include minor excavation, grading, and clearing activities. Restoration activities would generate temporary major increases in noise exposure in the vicinity of restoration areas when heavy machinery and equipment is used.

Impact Significance. Impacts from construction noise would be local, short-term, moderate, and adverse.

Operation-related Impacts. Implementation of Alternative 2 would reduce the number of motor vehicle using the Mariposa Grove Road. Equipment and infrastructure associated with the Visitor Contact Area would be moved from the Grove to the South Entrance. Shuttles and buses would continue drop-offs in the lower Grove area, but the circular shuttle drop-off in the lower Grove area would reduce backing alert noise. Removal of the commercial tram from the Grove would reduce vehicle noise. Removal of the parking lot in the lower Grove area would result in a lower level of noise generated by vehicular traffic. Removal of the generator associated with the gift shop would reduce noise in the lower grove area. However, a new generator may be needed for a lift station but would be enclosed with acoustic panels to deaden the sound. Removal of the gift shop will also remove noise associated with delivery trucks arriving, unloading supplies, and backing up within the lower Grove area.

Impact Significance. Impacts from operation related noise would be local, long-term, major, and beneficial.

Conclusion. The reduction in the number of vehicles using the Mariposa Grove Road, removal of the commercial tram tour, and minimization would reduce noise levels generated by operations. Experience in the lower portion of the Grove would now be more like that in more isolated areas of Mariposa Grove and allows visitors to experience natural quiet and sounds.

Cumulative Impacts. The impacts of regional past, present, and reasonably foreseeable future projects would be the same as under Alternative 1 (No Action)—minor to moderate short-term, site-specific adverse impacts in the Mariposa Grove area. The long-term impacts of Alternative 2 would

result in major, long-term beneficial impacts on the soundscape of the Grove from reductions in motor vehicle use, elimination of the commercial tram, and reduced operations in the Grove. Past, present, and future actions in conjunction with the impacts of Alternative 2 would have a long-term, major beneficial impact on soundscapes in the Mariposa Grove area.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, including two new bridges, and a new larger parking lot near the Grizzly Giant, but outside of giant sequoia habitat. This alternative would make the Grizzly Giant the primary departure point for visitors to the Grove. The current South Entrance parking lot would remain as is, and the lower Grove parking lot would be replaced with a smaller lot of ABAAS-compliant parking spaces. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. The major noise-generating construction activities at the lower Grove area related to the implementation of Alternative 3 would be the removal of the commercial tram; removal of the parking area and the addition of 10 ABAAS parking spaces; construction of 2 new vault bathrooms; construction of two vehicular bridges and the new grove bypass road; removal of the commercial tram staging, fueling and ticketing area, gift shop, visitor information kiosks, and shuttle/bus parking area; and extension of the footbridge. The greatest noise-generating construction activities at Grizzly Giant would be the removal of the commercial tram; construction of the visitor contact area that includes the museum and information center; construction of 18 space bathroom; construction of a parking area that includes about 233 available spots, construction of the new grove bypass road that originates from the lower Grove area; and construction of a tour bus parking area. The main noise-generating construction activity near the Grizzly Giant would be the removal of the existing vault toilets. The major noise-generating construction activities in the upper Grove area would be the removal of the commercial tram; removal of the vault toilet area; and rehabilitation and repair activities at the comfort station. The conservative estimate level of noise generated by construction activities is expected to be the same as Alternative 2. Expected construction activities include minor excavation, grading, clearing, and paving activities. Construction activities would generate temporary increases in noise exposure in the vicinity of project construction when heavy machinery and equipment is used.

Impact Significance. Impacts from construction activities would be local, short-term, moderate, and adverse.

Restoration-related Impacts. Restoration activities related to the implementation of Alternative 3 would be along the road in between the lower Grove area and the Grizzly Giant Hub, east of the hardened narrow road in between Grizzly Giant and the upper Grove area, and throughout a majority of the northern loop in the upper Grove near the roadways. Restoration activities include a 82 percent reduction of impermeable surface within the lower Grove area made available for giant sequoia habitat restoration, soil decompaction, and water infiltration. Similar to Alternative 2, restoration activities would generate temporary increases in noise exposure in the vicinity of restoration areas when heavy machinery and equipment is used.

Impact Significance. Impacts from restoration activities would be local, short-term, moderate, and adverse.

Operation-related Impacts. Implementation of Alternative 3 would introduce new traffic along the new Grove Bypass Road. Equipment and infrastructure associated with the Visitor Contact Area

would be moved from the Grove to the Grizzly Giant Hub, but an effort would be made to specify quiet and sustainable equipment. The lack of existing facilities at the Grizzly Giant Hub may call for the need for generators for concessioner operations. Generators may potentially generate noise levels that range from 73 to 81 dBA L_{eq} at a distance of 50 feet. Noise levels may be reduced through the use of acoustic panels or enclosures. Shuttles and buses would now have drop-offs at the Grizzly Giant hub, but a circular tour bus drop-off would minimize backing alert noises. The commercial tram would be removed from the Grove which results in the elimination of engine/vehicular noise. Parking relocation from the Grove to the Grizzly Giant hub would reduce traffic noise in the lower Grove area if all vehicles parking at the Grizzly Giant hub travel at low speeds along Grove Bypass Road.

Impact Significance. Impacts from operations would be local, long-term, moderate, and beneficial to the lower Grove area and local, long-term, moderate, and adverse in the mid-Grove area of the Grizzly Giant.

Conclusion. For Alternative 3, noise levels would increase temporarily when construction and restoration activities are being conducted. The removal of the commercial tram would reduce the operational noise level, but this would be partially offset by noise from vehicles traveling along the new access road and at the new parking lot and the influx of visitors at the Grizzly Giant, roughly the middle of the Grove in terms of elevational gradient.

Cumulative Impacts. The impacts of regional past, present, and reasonably foreseeable future projects would be the same as under Alternative 1 (No Action)—minor to moderate short-term, site-specific adverse impacts in the Mariposa Grove area. Long-term impacts under Alternative 3 on the soundscape would be moderate and beneficial from removal of the commercial tram. This would be offset in part by noise from vehicles traveling along the new access road and the Grizzly Giant hub. Past, present, and future actions in conjunction with the impacts of Alternative 3 would have a long-term, moderate beneficial impact on soundscapes in the Mariposa Grove area.

Alternative 4: South Entrance Hub with Modified Commercial Tram Access

Alternative 4 would maintain the commercial tram but with a limited route and hours of operation while also relocating the majority of the parking to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. The major noise-generating construction activities at the South Entrance related to the implementation of Alternative 4 would be the construction of the visitor contact area that includes new visitor services such as visitor information, educational and other sales items, and bathroom facilities; construction of a new parking area; construction of shuttle boarding and tour bus transfer area; construction of a new leach field and replacement of an existing leach field (if feasible); and construction of new chlorination/water tank. The major noise-generating construction activities near the lower Grove area would be the construction of the new narrow paved road for commercial tram and service access using the old road alignment; extension of the footbridge; removal of current parking area; construction of seasonal parking area; construction of new bathroom facilities; construction of a new leach field (if feasible); removal of the gift shop; and construction of a commercial tram ticket and waiting area. The major noise-generating construction activities near the upper Grove area would be the removal of the commercial tram from that area; removal of the water tank; removal of the vault toilets; and rehabilitation and repair activities at the comfort station. A conservative estimate of noise generated by construction activities is 89 dBA L_{eq} at

a distance of 50 feet. Expected construction activities include minor excavation, grading, clearing, and paving activities. Construction activities would generate temporary increases in noise exposure in the vicinity of project construction when heavy machinery and equipment is used.

Impact Significance. Impacts from construction activities would be local, short-term, moderate, and adverse.

Restoration-related Impacts. Restoration activities related to the implementation of Alternative 4 would be south of the Mariposa Grove Road immediately east and adjacent to the lower Grove Hub and throughout a majority of the upper Grove area near the roadways. Restoration activities include a 55 percent reduction of impermeable surface within the lower Grove area made available for giant sequoia habitat restoration, soil decompaction, and water infiltration. Dysfunctional culverts and/or cross drains would be cleaned, repaired, or replaced. Mariposa Grove Road, or the trail, would be outsloped where site-specific conditions allow. The fire management program would continue and would be adapted to measures necessary in order to prevent spread of future fires. Sustainable stormwater strategies would be implemented to intercept runoff, filter pollutants, and redistribute rather than channelize hydrologic flow. Leaky water pipes in the upper Grove area would be repaired and monitored. A conservative and approximate estimate of noise generated by restoration activities is 89 dBA L_{eq} at a distance of 50 feet. Expected restoration activities include minor excavation, grading, and clearing activities. Restoration activities would generate temporary increases in noise exposure in the vicinity of restoration areas when heavy machinery and equipment is used.

Impact Significance. Impacts from restoration activities would be local, short-term, moderate, and adverse.

Operation-related Impacts. Implementation of Alternative 4 would relocate a majority of parking to the South Entrance, reduce the number of commercial tram operating hours, remove commercial tram operations from a majority of the upper Grove area, and relocate commercial tram and related infrastructure within the lower Grove area. commercial tram operations would be restricted. Two commercial trams, at a maximum, would share a one-lane road with periodic turnouts. Vehicular noise would be reduced within the lower Grove area due to the relocation of parking to the South Entrance. Alternative 4 would reduce vehicle trips along Wawona Road and the Mariposa Grove Road. Equipment and infrastructure associated with the Visitor Contact Area would be moved from the Grove to the South Entrance. Shuttles and buses would continue drop-offs in the lower Grove Hub, but the lower Grove Hub would now have a circular shuttle drop-off that results in the minimization of backing alert noise. Removal of the generator associated with the gift shop would reduce noise in the lower grove area. However, a new generator may be needed for a lift station but would be enclosed with acoustic panels to deaden the sound. Removal of the gift shop will also remove noise associated with delivery trucks arriving, unloading supplies, and backing up within the lower Grove area.

Impact Significance. Impacts from operations would be local, long-term, minor, and beneficial.

Conclusion. A reduction in commercial tram operations and restricted commercial tram operational hours, along with the removal of a portion of the commercial tram throughout the upper Grove area, would reduce operational noise levels long-term. Removal of the generator associated with the gift shop will also reduce noise levels in the lower Grove area. Overall, there would be a long-term minor beneficial impact on the soundscape.

Cumulative Impacts. The impacts of regional past, present, and reasonably foreseeable future projects would be the same as under Alternative 1 (No Action)—minor to moderate short-term, site-specific adverse impacts in the Mariposa Grove area. The long-term impacts of Alternative 4 would

result in minor, long-term beneficial impacts on the soundscape of the Grove from reductions in motor vehicle use, and reduced operations in the Grove. Past, present, and future actions in conjunction with the impacts of Alternative 4 would have a long-term, minor adverse impact on soundscapes in the Mariposa Grove area.

CULTURAL RESOURCES

HISTORIC STRUCTURES

Affected Environment

The cultural resources area of potential effect (APE) is presented in figure 3-18, and includes the combined boundaries of the Mariposa Grove and South Entrance Station historic districts, and the individually listed Mariposa Grove Museum. The Mariposa Grove Historic District includes the approximately 4-square-mile area described in the original 1864 Yosemite Grant and includes the addition of the Mariposa Grove Road between the western grant boundary and the South Entrance Station Historic District (NPS 2004b, 2012c; California Office of Historic Preservation 2013). The Mariposa Grove Historic District also encompasses the Mariposa Grove Archeological District (see separate discussion under the Archeology section in this chapter). The South Entrance Station Historic District includes "the cleared area for the housing unit on the north side of Wawona Road and the area in the vicinity of the T-shaped intersection of the Wawona Road and Wawona Road, sufficient to include the comfort station and check station" (NPS 2004c). The Mariposa Grove and the South Entrance Station historic districts were previously determined eligible for listing in the National Register (Hart 1975; NPS 2004b and 2004c), and the expansion of the Mariposa Grove district boundary to include Mariposa Grove Road received concurrence from the California State Historic Preservation Officer (SHPO) in February 2013.

Building upon the initial listing on the Mariposa Grove Museum in the National Register (Hart 1975), the entire Grove was determined eligible for listing in the National Register as a historic district (NPS 2004b). Additional information, including a description of the setting, history, important characteristics, and National Register status and eligibility of the Mariposa Grove Historic District is provided in the Mariposa Grove Historic District subsection below.

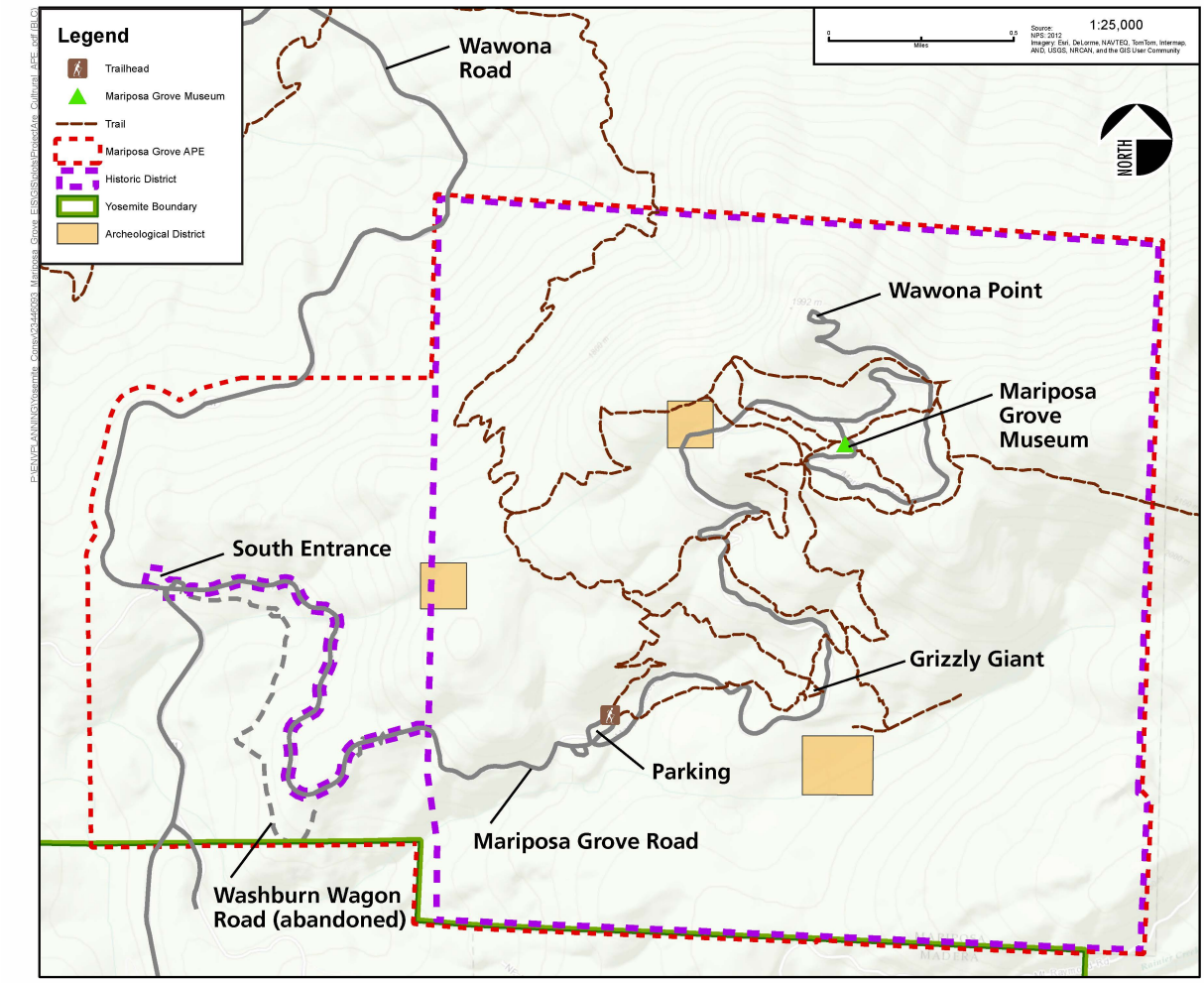


Figure 3-18 – Cultural Resources Area of Potential Effects

Note: The Mariposa Grove Historic District Boundary encompasses the Mariposa Grove Archeological District resources.

The Mariposa Grove and Yosemite Valley were the first public lands in American history set aside for the preservation of its natural and scenic values (Kirk and Palmer 2004; Greene 1987; NPS 2004b). In 1864, Congress passed landmark legislation to preserve Yosemite Valley and the Mariposa Big Tree Grove (Mariposa Grove of Giant Sequoias) (13 Stat. 325). This legislation granted the land to the state of California to "be held for public use, resort, and recreation" to be "inalienable for all time."



Figure 3-19 – Mariposa Grove Road in Upper Grove Area

The State of California accepted the property in 1866, establishing the first state park and beginning the California State Park System, and state parks nationwide (Greene 1987). In the fall of 1890, Congress established Yosemite National Park (26 Stat. 650). The act excluded Yosemite Valley and the Mariposa Big Tree Grove, leaving them under the jurisdiction of the state of California. A Joint Resolution of Congress in June 1906 accepted the transfer of Yosemite Valley and the Mariposa Big Tree Grove from the state of California to the federal government, subject to the provisions in the 1890 act.

The management of the Grove through the years demonstrates a long tradition of balancing visitor use and nature. The State of California, and subsequently the United States Army and the NPS, have managed the Grove to achieve the dual—and sometimes conflicting—objectives of preservation and access. The Sierra Club, which was established in 1892, also influenced management of the Grove. In the early 1900s, a consortium of landscape architects, architects, and engineers led by Sierra Club President John Muir conceived a cohesive landscape design for the Mariposa Grove to fulfill the demands for national park development, while preserving the notable natural qualities (McClelland 1993). The intention was to maintain the natural quality of the park as best as possible while also providing infrastructure for lodging, camping, and supplies for park visitors. These objectives formed the foundation of future park policy and evolved into the creation of park development outlines and general development plans (McClelland 1993). Continued visitation to the Mariposa Grove of Giant Sequoias in increasing numbers has resulted in the construction and maintenance of roads and trails throughout the Grove. Increased visitation over the years also raised concerns over possible negative impacts on the trees and led to the decision in 1969 to prohibit private vehicles from entering the upper Grove area. Lodges and campgrounds also have been removed from the Grove to reduce visitor impact. The Mariposa Grove Museum, in the upper Grove area, continues to serve as a seasonal interpretive center for the Grove, and has been listed in the National Register since 1978 (figure 3-20). Additional information, including a description of the setting, history, and important characteristics of the museum, is included in the Mariposa Grove Museum subsection below.



Figure 3-20 – Mariposa Grove Museum

The South Entrance Station Historic District was determined eligible for listing in the National Register in 2004 for "expressing cultural values" through its architecture and landscape architecture (NPS 2004c). In 1932, President Herbert Hoover issued a proclamation to add 8,785 acres of the Wawona Basin to Yosemite National Park, which included lands surrounding the South Entrance area. A year earlier, Congress had approved this addition in the Interior Department Appropriations Act (Proclamation 2005, Aug. 13, 1932; Act of Feb. 14, 1931, 46 Stat. 1115, 1154). One of the reasons for approving the acquisition was to protect lands adjacent to Wawona Road, a road constructed in 1875 as a toll road to connect the Wawona Hotel area with Yosemite Valley, 30 miles to the northwest. Reconstruction of Wawona Road began in 1929, and was largely completed by 1932. The Mariposa Grove Road, between South Entrance and the Grove, was built in 1879 and reconstructed by 1933. The road was paved to facilitate snow removal plow and provide year-round access. In 1934, the South Entrance area was realigned, and new parking was added.

The number of visitors entering Yosemite National Park through the South Entrance station in 1933 exceeded 42,000, second only to the more than 197,000 visitors who entered the park via the Arch Rock Entrance station that year. A lack of funding necessitated temporary use of a checking kiosk that had been relocated to South Entrance from Alder Creek. By July 1934, federal relief funds became available to construct the South Entrance checking and comfort stations, as well as nearby housing for the rangers employed in the Wawona District of the park. A sanitary sewer system also was constructed for the South Entrance between 1933 and 1934. By 1937, a pipeline from Mariposa Grove supplemented the South Entrance Station water system, which resolved issues with insufficient water flow (NPS 2004b). Additional information, including a description of the setting, history, important characteristics, as well as the National Register status and eligibility of the South Entrance Station Historic District, is provided in the 'South Entrance Setting' subsection below.

Mariposa Grove Setting

The setting for the Mariposa Grove of Giant Sequoias encompasses the Mariposa Grove Historic District and the Mariposa Grove Museum, which is individually listed in the National Register and eligible as a contributor to the National Register-eligible Mariposa Grove Historic District. The following discussion reviews the setting, history, important characteristics, and National Register status and eligibility of these resources

Mariposa Grove Historic District

The Mariposa Grove Historic District was determined eligible for listing in the National Register in 2004 per the *Mariposa Grove Cultural Landscape Inventory* prepared by the NPS Pacific West Office, which received SHPO concurrence in August 2004 (NPS 2004b). In February 2013, the expansion of the Mariposa Grove Historic District boundary to include the length of the Mariposa Grove Road between South Entrance and the lower Grove area received concurrence from the California State Historic Preservation Officer (NPS 2004b, SHPO 2013). In addition, abandoned roads within the Mariposa Grove were added as contributing elements, and detailed site plans clearly illustrating the extent and location of the district's contributing and noncontributing resources were provided (NPS 2012b).

The district is located on the western slope of the Sierra Nevada, approximately 2 miles from the South Entrance to Yosemite National Park. When the district was determined eligible for listing in the National Register in 2004, the period of significance was defined as 1864 (when the land was withdrawn from the public domain) to 1950; however, many of the historic features date to the 1930s. The district is considered significant under National Register Criterion A for its association with the "Conservation" and "Recreation" areas of significance. Specifically, the Grove embodies the birth of the American ideal that the best use of lands distinguished for their great scenic beauty is preservation, and that the best choice an enlightened federal government can make is to reserve such lands for all time for the enjoyment of the people. The district also is considered significant under National Register Criterion C under the "Architecture" and "Landscape Architecture" areas of significance. The design of the museum and the comfort station are representative of Park Rustic architecture, and Wawona Point embodies the work of the park service's early "naturalistic" landscape design, which successfully balanced the need for development with the need to preserve the natural landscape The Mariposa Grove Historic District is in fair condition and, with a few exceptions, retains its historical integrity of setting and design (NPS 2004b).

The most important landscape characteristics associated with the Grove are the natural systems and features of the district, and the site-specific ecology that continues to sustain the giant sequoias. Superimposed upon the natural landscape is a transportation system that represents a continuum of use dating to the nineteenth century, reflecting the presence of American Indians, entrepreneurs, the State of California, the U.S. Army, and the NPS in the area, and contributing buildings and structures that are collectively representative of NPS landscape design of the 1930s, much of it implemented by the Civilian Conservation Corps (figures 3-20 through 3-22).



Figure 3-21 – Wawona Point



Figure 3-22 – Comfort Station in Upper Grove

Contributing Elements of the Mariposa Grove Historic District:

- Mariposa Grove Comfort Station (WA04726) – A log building built in 1931 in the Park Rustic style and consisting of men's and women's lavatories, located in the upper part of the Grove. The building is an excellent example of the application of site-specific materials standards to a generally accepted "standard plan" building (NPS 2004b).
- Mariposa Grove Museum (WA04725) – A one-story, rectangular log building built in 1930 and rebuilt in 1980 in the Park Rustic style. The building is unique within the park service system because it was designed to mirror the design of the previous buildings at the site (Hart 1975 and NPS 2004b). Refer to the subsection 'Mariposa Grove Museum' below for additional descriptive information as an individually listed property.
- Mariposa Grove Road – The road that extends from its intersection with Wawona Road at South Entrance into the western edge of the land grant boundary all the way to Wawona Point). The road was constructed in 1931 and 1932 (NPS 2012c) and paved in 1933 and 1934.
- Other Roads – Within the Grove, there is a system of one- and two-lane historic paved roads. These additional roads include a spur road to the former construction camp and a one-way loop road in the upper Grove area that begins near Wawona Point and extends to the museum. The loop road was built in 1931/32 and was paved in 1933/34 to allow for year-round use. A spur road (non-contributing), that extends from the Mariposa Grove Road in the vicinity of the Grizzly Giant to the site of a former construction camp, is all that remains of the camp which was built circa 1931 and since demolished. (NPS 2004b and 2012).

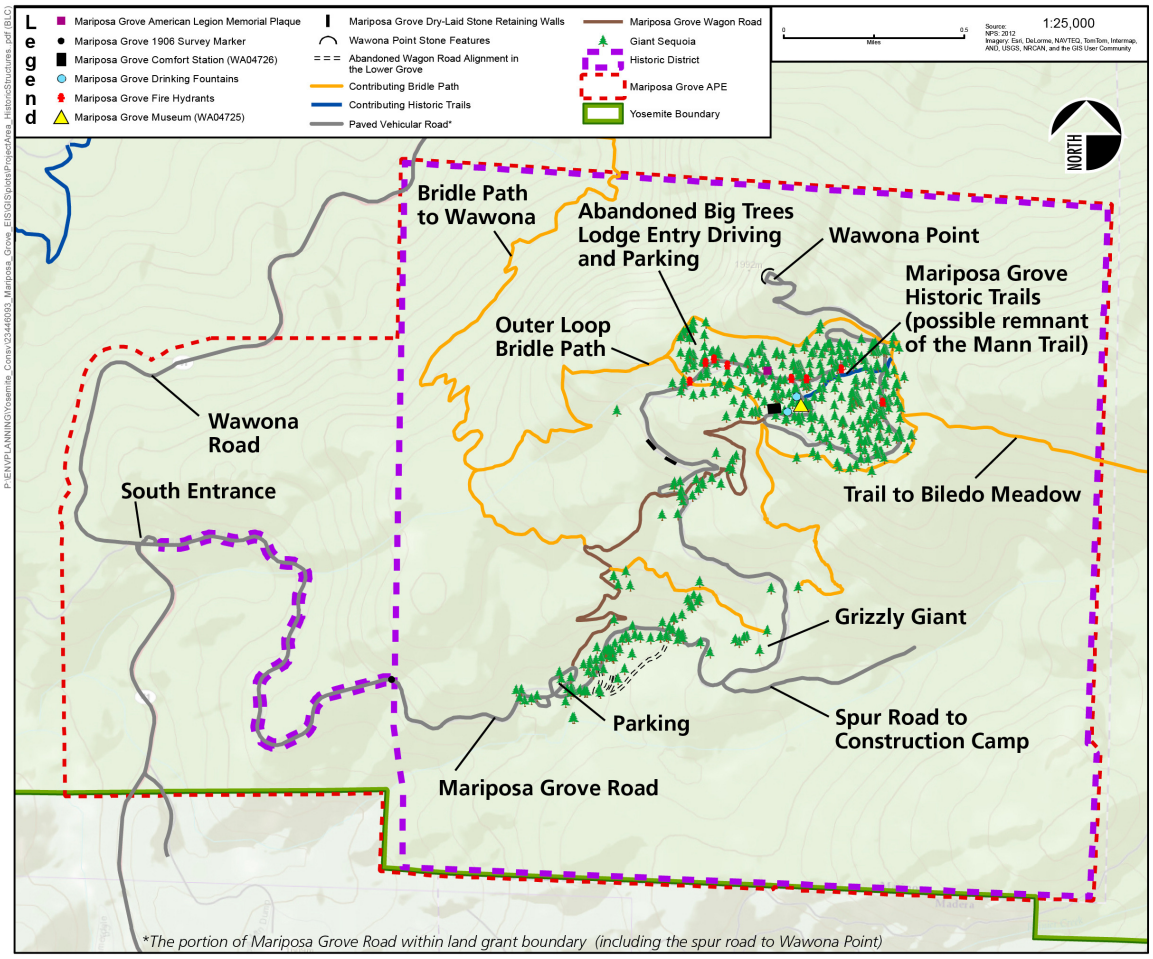


Figure 3-23 – Mariposa Grove Historic District

- Mariposa Grove Dry-Laid Stone Retaining Walls – Two sections of dry-laid stone retaining wall were built circa 1925 and incorporated into the road system between the Clothespin Tree and the Mariposa Tree (NPS 2004b).
- Mariposa Grove Bridle Paths – A group of circulation paths including the bridle path to Wawona, the outer loop bridle path, and the trail to Biledo Meadow. The bridle path to Wawona is a 3- to 6-foot-wide, natural-surface path built in 1933 and 1934 that enters the district from the north and ascends near Sunset Point, where it connects with the outer loop bridle path. The outer loop bridle path, a 3-to-6-foot-wide, natural-surface path built in 1933 and 1934, encircles the upper portion of the Grove. The trail to Biledo Meadow, built in 1931 and 1932, is a 6-foot-wide trail constructed during the installation of the water system for the upper Grove, and extends from the vicinity of the fallen Wawona Tunnel Tree east to the outtake point in Biledo Meadow (NPS 2004b).
- Mariposa Grove Historic Trail – A possible remnant of the Mann Trail, dating to 1870, that extends from the vicinity of the museum east to meet with the northeast section of the Mariposa Grove Road in the upper Grove area (NPS 2004b and 2012).

- Mariposa Grove Wagon Road – A one-way wagon road abandoned for vehicle use in 1925, and currently used as pedestrian path. The path dates from 1879, 1892, and 1925, and passes in the vicinity of the giant sequoia Diamond Group (southwest of the Comfort Station) and descends southwest past the Clothespin Tree, continuing to the lower Grove parking area via series of switchbacks (NPS 2004b).
- Abandoned Roads within Mariposa Grove – Abandoned roads in the Grove include the Big Trees Lodge entry drive and parking area, constructed in 1932, and a wagon road alignment in the lower Grove area, dating to 1879, 1897, and 1925. The wagon road alignment was abandoned in the mid-1930s when the road was rerouted away from the Grizzly Giant to reduce damage to the tree (NPS 2012c).
- Wawona Point Stone Features – A system of stone retaining walls, stairs, and overlook platforms at Wawona Point Lookout built in 1931 of mortared, battered, and rubble masonry (NPS 2004b).
- Mariposa Grove 1906 Survey Marker – A brass-cap boundary marker, dating to the 1906 survey of the grant boundary. The marker is adjacent to the north side of the Mariposa Grove Road next to a large granite boulder above the road (NPS 2004b).
- Mariposa Grove Drinking Fountains – Two drinking fountains near the Mariposa Grove Museum, constructed in 1931, consist of small basins atop pedestals of granite boulders with granite slab bases (NPS 2004b).
- Mariposa Grove American Legion Memorial Plaque – A 1921 plaque mounted on a large granite boulder, set between the American Legion Tree and the edge of the road, that bears the American Legion seal and the words, "To the unknown dead of the World War/the American Legion, Department of California/Dedicates this Tree/August 26, 1921/Presented by Yosemite Post 258" (NPS 2004b).
- Mariposa Grove Fire Hydrants – The fire hydrants of the upper Grove area are red miniature versions of a standard city hydrant that were installed in 1931, and are located in the upper Grove area (NPS 2004b).

Overall, circulation is an important cultural landscape characteristic of the Mariposa Grove Historic District, and many of the roads and trails within the district boundaries are contributing elements of the district. Within the Grove, the Mariposa Grove Road materials and routes were poorly documented prior to 1925, though together they were described as a "vernacular" wagon road. In 1925, the NPS made minor modifications to the roads to create a 25-foot-wide, oiled grade in the two-way segments, and a 10-foot-wide, oiled travel-way in the one-way loop in the upper Grove area. The improvements were intended to address drainage problems and protect the roots of the trees in the upper Grove area. In the 1930s, the Mariposa Grove Road was first paved and slightly realigned in two locations: near the base of the Grizzly Giant to reroute the road away from the roots, and in the lower Grove area to provide better access to the Big Trees Lodge. The differences in the width of the road between the two-way and one-way segments reflect the historical pattern of development during the 1930s. The roads have been regularly repaved, and some sections have been reconstructed as part of routine maintenance. Modifications to the roads made during and prior to the 1930s are considered character-defining features of the historic district.

The following are the character-defining features of the Mariposa Grove Historic District:

- Giant Sequoias –Mariposa Grove consists of approximately 500 mature giant sequoia trees divided into two clusters generally referred to as the upper and lower Grove areas, which are significant collectively. Three trees are distinct because of their size or character: California Tunnel Tree, Grizzly Giant, and the fallen Wawona Tunnel Tree. The California Tunnel Tree and the Wawona Tunnel Tree have been culturally modified. The Grizzly Giant features prominently in the iconography of the Grove (NPS 2004b).
- Views and Vistas – Several important views, including first view of the Sentinels, from the west, view of lands outside the Grove from Wawona Point, and vista of the Grizzly Giant, are character-defining features of the district. The first view of the Sentinels is the first glimpse of the big trees that one encounters when entering the Grove on the Mariposa Grove Road from the west. Wawona Point is the only formally designed overlook within the Grove, completed in 1932, with extensive views over the Wawona basin and the South Fork of the Merced River, with additional panoramas of the east and south (now somewhat obscured by forest canopy). The vista of the Grizzly Giant is an interior Grove view of the Grizzly Giant looking down the access trail from the current commercial tram stop east of the tree (NPS 2004b).
- Native Roadside Landscaping – Roadside landscaping, consisting of plantings of native species by Civilian Conservation Corps crews, was accomplished along the road corridor in 1934 and contributes to the natural setting of the road within the Grove. There are no overhanging banks, no protruding root systems or stumps, and the slopes adjacent to the road have been reshaped to conform to the surrounding scenery.

The Mariposa Grove Historic District retains the following landscape characteristics: natural systems and features, vegetation, spatial organization, views and vistas, circulation, and buildings/structures. Clustering, or the grouping of buildings within the landscape, was once an important characteristic of the later, designed landscape of the Grove. However, the principal building clusters have been removed or altered and no longer retain historic integrity. For the most part, these changes are due to the elimination of some land uses, such as overnight guest accommodations, from the Grove. Similarly, the Grove once contained a wealth of small-scale features, including name signs affixed to certain trees and log benches constructed by the Civilian Conservation Corps. The majority of the tree name signs have been removed (NPS 2004b).

Mariposa Grove Museum

The Mariposa Grove Museum, constructed in 1930 and rebuilt in 1980, is in the upper Grove area within the historic district (figure 3-20). The building was designed to mirror the design of the previous buildings at the site (Hart 1975, NPS 2004b). The museum was individually listed in the National Register in 1978 (NPS 2004b), and also is considered eligible as a contributor to the Mariposa Grove Historic District under National Register Criteria A and C for its regional significance in the categories of exploration/settlement and social/humanitarian, and for its local significance in architecture. The museum is a one-story log building situated in the upper Grove area. The periods of significance for this property are 1864, 1881, and 1930, which correlate to the years when major construction occurred (Hart 1975 and NPS 2004b).

The museum building continues the tradition established at its location by Galen Clark and the State of California. Galen Clark, the first appointed guardian of the Grove, built the first shelter at the location in 1864 as an office/information center to assist visitors. In 1881, the State of California replaced the shelter with a one-room cabin "for the comfort and convenience of the visitor." In 1930, the NPS replaced the unstable log cabin with a new museum building, which was described as a "guardian's hospice", and included exhibits that were devoted exclusively to the story of the giant sequoia. The building and its furnishings were designed to harmonize with the surrounding Grove. The Mariposa Grove Museum continues to function as an interpretive center as well as a rest area for visitors, and retains integrity of location and use initiated with the 1864 information center. It retains its 1930 historic integrity of design and workmanship (Hart 1975, NPS 2004b).

South Entrance Setting

The South Entrance Station Historic District encompasses the South Entrance site, and was determined eligible for listing in the National Register in 2004 (NPS 2004c). The district is eligible for listing in the National Register at the local level under Criterion C for embodying the theme of "expressing cultural values" through its architecture and landscape architecture. The South Entrance Station Historic District, depicted in figure 3-24, consists of a cluster of four historic buildings at the intersection of the Wawona Road and the Mariposa Grove Road: the ranger residence, a garage, a comfort station, and a checking station, all constructed in the early 1930s. The site is in a clearing of about 2 acres surrounded by steep forested slopes.

The period of significance for this property spans the years from 1934 through 1938, the era of public works. In 1934, the South Entrance area was realigned, and parking was added. Associated land uses include a housing area for NPS personnel, a checking station for visitors entering and leaving the park, a comfort station for the use of visitors and park employees, and a garage/service area. The housing area and garage are on the north side of Wawona Road, and the checking station and comfort station are south of the road. This entrance is the principal entry point for people entering the park via Wawona Road from the south. The historic district is in fair condition and, with a few exceptions, retains historical integrity (NPS 2004c).

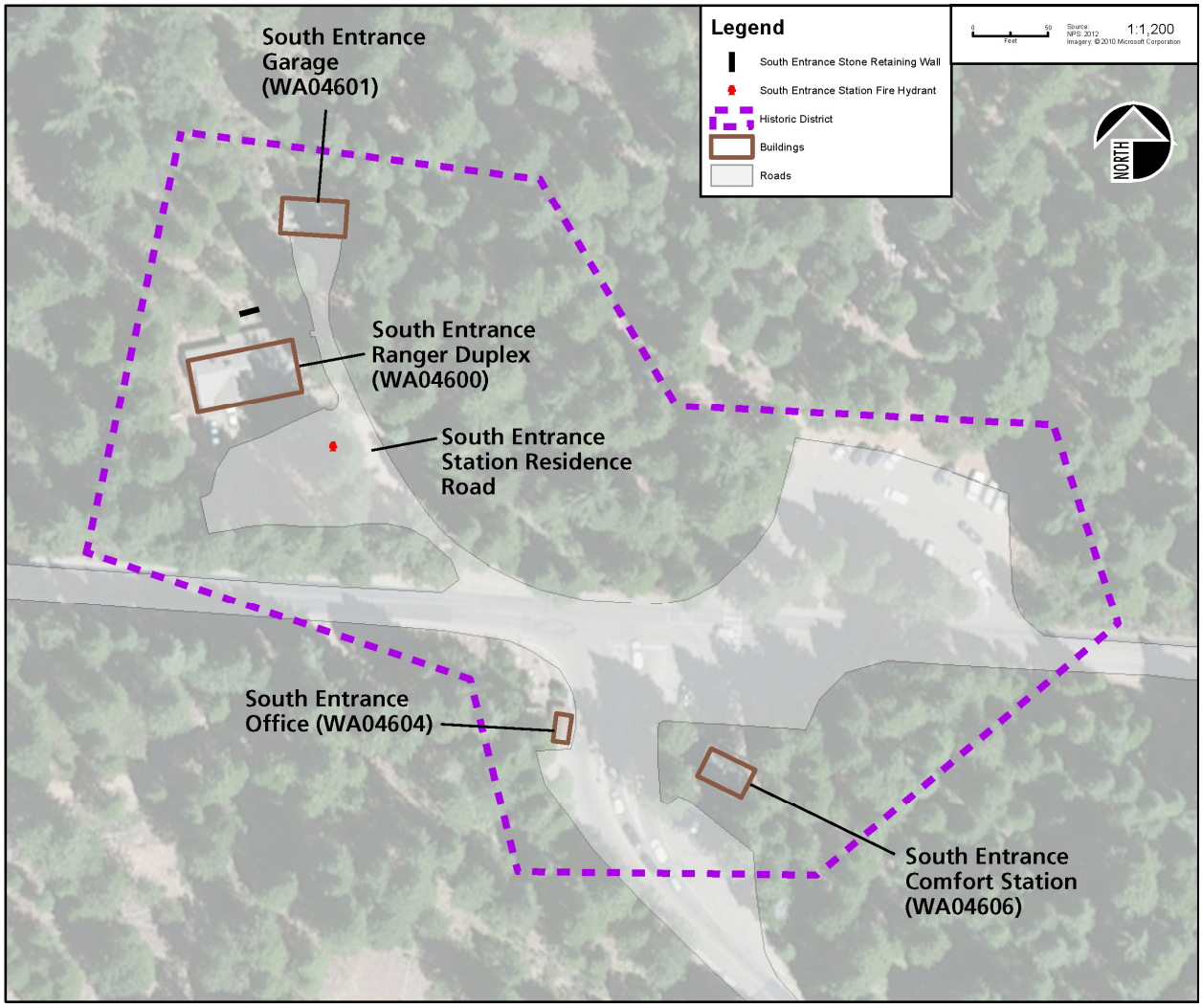


Figure 3-24 – South Entrance Station Historic District

Contributing Elements of the South Entrance Historic District

- South Entrance Office (WA04604) – A 1934 checking station built in the Park Rustic style. It has been remodeled to function as an office, resulting in the removal of some of the architectural details associated with its original function.
- South Entrance Comfort Station (WA04606) – A 1934 Park Rustic style building containing lavatories (figure 3-25).
- South Entrance Ranger Duplex (WA04600) – The 1934 Park Rustic style living quarters (dormitory) for Wawona District park rangers stationed at South Entrance.



Figure 3-25 – South Entrance Comfort Station

- South Entrance Garage (WA04601) – A 1934 garage constructed adjacent to the ranger duplex and built in the Park Rustic style.
- South Entrance Stone Retaining Wall – A stone retaining wall at the rear of the ranger duplex, designed to stabilize the cut in the hill slope north of the building.
- South Entrance Station Residence Road – A one-lane gravel road that leads from Wawona Road past the east side of the ranger duplex to the entrance of the garage that was constructed in 1934. The road has been altered by the addition of a loop road that branches from this main access road to provide access to the front of the ranger duplex.
- South Entrance Station Fire Hydrant – A historic-period fire hydrant in the vicinity of the Ranger Duplex that represents the only above-ground evidence of the South Entrance water system in direct proximity to the buildings.

The contributing buildings and structures were all built during the same time period, in a similar style, and possess a common association with development of the park's South Entrance area. The four historic buildings represent a unique style of Park Rustic architecture that was refined in the national parks during the early years of the NPS, and primarily constructed with native materials intended to blend harmoniously with their surroundings.

In addition to the contributing elements of the district, a lone giant sequoia, planted near the northwest corner of the comfort station after completion of the South Entrance station in 1934, is considered a character-defining element of the historic district landscape.

Circulation was an important landscape characteristic when the South Entrance station was developed. However, circulation features have lost their historical integrity because of multiple alterations to Wawona Road and the park entrance station infrastructure, and attributes of the location are not considered character-defining. Although the T configuration of the intersection has been retained, the number of lanes for Wawona Road has increased, and the widening of Wawona Road resulted in the loss of some historical landscape elements, including the original concrete-curbed traffic islands that directed the vehicles through the checking station and parking areas north and south of the comfort station. In general, the historic district retains integrity of location and setting, and the buildings and structures possess integrity of materials, workmanship, and design (NPS 2004c).

Environmental Consequences

Effects Assessment Methodology. Potential effects of the Mariposa Grove restoration project alternatives on historic buildings, structures, and cultural landscapes were analyzed qualitatively under Section 106 of the NHPA, in accordance with 36 Code of Federal Regulations (CFR) 800.5(a)(1) criteria for determining adverse effects, based on modifications that would be made to character-defining features (i.e. characteristics that qualify the buildings, structures, or landscapes for inclusion in the National Register).

The Secretary of the Interior's Standards *for the Treatment of Historic Properties with Guidelines for Treatment of Cultural Landscapes* (NPS 1996) include factors to consider, such as change and continuity, use, and management and maintenance. Cultural landscapes are dynamic, and preservation seeks to balance continuity with change. Current and proposed use can affect integrity and current conditions. Maintenance and management of a cultural landscape can result in a cumulative adverse effect, or well-conceived maintenance can sustain character-defining features over a long period of time.

National Historic Preservation Act Methods for Assessing Effect. The cultural resources investigations the assessment of potential effects of the project alternatives were undertaken in accordance with the NHPA Section 106 implementing regulations, 36 CFR 800, Protection of Historic Properties. As amended, Section 106 of the NHPA requires federal agencies with either direct or indirect jurisdiction over a proposed undertaking to take into account the effect of the undertaking on historic properties. Pursuant to Director's Order 12 (sections 2.14(6)(3), 6.2 F, and 6.3 F and Appendix 3); 40 CFR 1508.7, 1508.8, and 1508.27; and 36 CFR 800.8, effect intensity, duration, context, and type, as they relate to historic properties, are determined using the criteria established in 36 CFR Part 800. Per 36 CFR 800.5(a)(1), an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Compliance with Section 106 calls for implementation of a four-step process that includes consultation with appropriate parties (36 CFR 800.3); identifying historic properties in the area of potential effect of an undertaking (36 CFR 800.4); assessing adverse effects of the undertaking on historic properties within the area of potential effect (36 CFR 800.5); and resolving any adverse effects (36 CFR 800.6). These steps involve a range of activities, such as defining the undertaking, identifying the proper consulting parties (e.g., SHPO and American Indian tribes and groups), delineating the APE, identifying and evaluating properties in the APE, applying the effects criteria, and resolving any adverse effects.

Under this four-step process, there are three possible effects determinations:

No Historic Properties Affected – A "no historic properties affected" determination indicates that no historic properties are in the APE, or that there are historic properties in the APE, but the undertaking would not alter the characteristics that qualify the historic property for inclusion in or eligibility for the National Register.

No Adverse Effect – A "no adverse effect" determination indicates that there would be an effect on the historic property by the undertaking, but the effect does not meet the criteria of adverse effect in 36 CFR 800.5(a)(1) and would not alter any of the characteristics that make the property eligible for listing in the National Register in a manner that would diminish the integrity of the historic property.

Adverse Effect – An adverse effect indicates that the undertaking would alter, directly or indirectly, any of the characteristics that qualify it for inclusion in the National Register in a manner that would diminish the integrity of the property. Adverse effects may be resolved through development of a project-specific Memorandum of Agreement (MOA) or a Programmatic Agreement among the project proponent (NPS in this case), the SHPO, the Advisory Council on Historic Preservation (ACHP), and other consulting or concurring parties, such as American Indian tribes (36 CFR 800.6). The agreement would specify the mitigating actions that must be taken to resolve the adverse effects, and the implementation and documentation protocols to be followed. The agreement must be executed by all required signatories (i.e. consulting parties) before implementation of a proposed action can be initiated.

Alternative 1: No Action

Under Alternative 1, current buildings and infrastructure, concessioner services (i.e. gift shop and commercial tram) and maintenance, and park management would remain as is (see figures 2-1 through 2-4). No infrastructure improvement, ecological restoration, changes to visitor services, or accessibility upgrades would be implemented.

Operations-related Impacts. Effects on historic buildings, structures, and cultural landscapes under current and predicted future operations could occur as a result of visitor use and routine maintenance and repair. With continuing adherence to the Secretary of the Interior's *Standards for the Treatment of Historic Properties*, routine maintenance activities would cause no physical destruction or damage.

Impact Significance and Determination of Effect. Routine maintenance and repairs to historic buildings and structures within the Mariposa Grove and South Entrance Station historic districts would be implemented in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* to avoid adverse effects.

Conclusion. Under Alternative 1, existing structures, buildings, and infrastructure at the South Entrance and in the lower and upper portions of the Grove would continue to serve their respective current functions and operations for the foreseeable future. No construction-related impacts would occur. Continued routine maintenance and repair of the museum, ranger residence, comfort stations, and other buildings and structures would be conducted in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* to avoid adverse effects. Overall, Alternative 1 is expected to have no adverse effect on the Mariposa Grove Historic District, South Entrance Historic District, and Mariposa Grove Museum.

Cumulative Impacts. The cumulative effects on historic structures discussed in this section are based on an analysis of past, present, and reasonably foreseeable future actions in the Mariposa Grove region in conjunction with the potential effects of Alternative 1 (No Action). The Mariposa Grove Historic District (Determined Eligible, 2004), the Mariposa Grove Museum (National Register, 1978), and the South Entrance Station Historic District (Determined Eligible 2004) are the historic properties within the Mariposa Grove region.

A number of past projects took place in the area. In 1980, the Museum building went through significant repairs to replace logs and repair the structure and the building remains an interpretive facility for the Mariposa Grove. Repair work for the septic system at South Entrance has been ongoing since 2004. Work began in 2012 to relocate and replace the non-historic kiosks at the South Entrance. Within the Grove, new communications equipment was installed at Wawona Point in 2011. The NPS installed new interpretive and directional signs, starting in 2011. In addition, split-rail wood fences were installed in high use areas to direct the public and protect the surface roots of the giant sequoias. Appendix B describes these projects in more detail.

During project implementation of these past projects, the NPS avoided adverse effects, or otherwise carried out appropriate mitigations to minimize effects on historic resources in accordance with the park's 1999 Programmatic Agreement *(1999 Programmatic Agreement Between 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)*. The Scenic Vista Management Plan/EA (2010), which is not fully implemented, and the Wilderness Stewardship Plan (in progress) would implement actions consistent with the standard four-step process outlined in 36 CFR Part 800, Protection of Historic Properties, as described in the Effects Assessment Methodology for Historic Structures and Landscapes described earlier in this section. In the future, the NPS will rehabilitate access to the historic comfort stations at South Entrance and the upper Grove area to enhance accessibility. There are no additional, reasonably foreseeable plans and projects that may contribute to an adverse effect on historic properties in the Mariposa Grove and South Entrance area. Overall, past, present, and future plans and projects would have no adverse effect on historic structures and landscapes.

There would be no change in the treatment and management of historic buildings, structures, and cultural landscape resources as a result of Alternative 1 (No Action). The effects from past, ongoing, and potential future actions in combination with those of Alternative 1 would continue to result in no adverse effects on historic structures and landscapes in the Mariposa Grove area.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2, the preferred alternative, would

- remove the non-contributing commercial tram staging area and gift shop
- substantially reduce the non-contributing in-Grove parking, and relocate primary visitor parking to the proposed transit hub at South Entrance
- discontinue commercial tram operations
- rehabilitate historic features, including repair of stone work at Wawona Point
- convert segments of the contributing road within the Grove to pedestrian trails
- rehabilitate a segment of the abandoned Washburn Road for use as a pedestrian trail
- construct a new trail segment from the picnic area to the lower Grove area
- make accessibility improvements to Grove trails
- improve path of travel accessibility to the upper Grove and South Entrance comfort stations
- install a new septic system/leach field at South Entrance
- refurbish the septic system and leach field in the upper Grove area
- construct a new septic/system leach field in the lower Grove area, or installation of a wastewater pipeline, within the right of way of Mariposa Grove Road, from the lower Grove area to the South Entrance leach field (may require a lift station near South Entrance)
- reconfigure the South Entrance station parking and other non-contributing infrastructure, and reconfigure the Wawona Road/Mariposa Grove Road intersection.

Certain actions under Alternative 2 would rehabilitate historic structures or features that contribute to the significance of the South Entrance Station and Mariposa Grove historic districts. The Secretary of the Interior's *Standards for the Treatment of Historic Properties* define rehabilitation as "the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

Historic rehabilitation and ecological restoration at Wawona Point would be components of this alternative. Historic rehabilitation of the Wawona Point overlook would include repointing historic rockwork, rebuilding historic steps, restoring historic pathways, replacing existing railing with code-compliant safety railing, removing excess pavement, and revegetation that could include screening of incompatible, modern communications equipment.

Paths of travel to the historic comfort stations at the upper Grove area and at South Entrance would be improved to better meet ABAAS requirements. Any modification of the paths of travel would be completed in a historically compatible manner that would not detract from the historic setting or feeling. Rehabilitation of the historic comfort stations, which is not included in this project, may be

undertaken in the future as a separate project as funding becomes available and would be addressed through a separate compliance process, as needed.

Ecological restoration actions such as improvement of hydrologic flow through road and trail modifications, repair and replacement of culverts, and replacement of leaking water lines; project-specific prescribed fire and hazardous fuel reduction treatments; reclamation of giant sequoia habitat through reduction of both non-contributing and contributing hardscape features; and soil decompaction; would be components of this alternative. Actions that remove incompatible buildings and structures from the lower part of Mariposa Grove and ecologically restore giant sequoia habitat would serve to restore giant sequoia groves that contribute to the Mariposa Grove Historic District.

Proposed modifications to the extension of the Mariposa Grove Road within the Grove, which is a circulation feature that contributes to the Mariposa Grove Historic District, would alter the historic design, materials, and workmanship of the historic paved road. These modifications include road realignment and installation of a new drainage crossing structure at the Sentinels, replacement of asphalt pavement with a hardened permeable surface, narrowing of the existing roadbed, removal of a road segment from wetlands in the lower Grove area, and conversion of road segments to pedestrian trails.

The parking lot to be relocated from the lower Grove area to South Entrance and the new visitor services would overlap the eastern boundary of the South Entrance Station Historic District, and would include modifications to Mariposa Grove Road for ingress/egress into the new parking facility and a new shuttle stop, and conversion of the existing overflow parking lot for bus turn-around. A new roundabout could be constructed west of the contributing office (former check station) building, replacing the existing T-intersection situated east of the office at the intersection of Wawona Road and Mariposa Grove Road. This intersection reconfiguration would be implemented if, based on monitoring of intersection capacity following relocation of the entrance kiosks, which was recently completed under a separate project, traffic volumes and flow result in back-ups to the new kiosks on a regular basis.

Construction- and Restoration-related Impacts. Actions under Alternative 2 that have the potential to affect historic buildings, structures, and cultural landscapes, and the nature of the effects, are summarized as follows:

1. *Reconfiguration of Intersection at South Entrance*. The existing T-intersection of Wawona Road and Mariposa Grove Road could be reconfigured and replaced by a roundabout, if future traffic conditions warrant. The existing intersection is east of the South Entrance office building; the proposed roundabout would be situated west of the office building. The office building, which is a contributing element of the South Entrance Historic District, would not be affected by an intersection reconfiguration.

   Reconfiguration of the intersection would affect the setting and intersection design within the South Entrance Historic District. However, the historic circulation features in this area of the district are no longer extant, and the proposed changes represent minor alterations to the setting of the district overall. The redesign of the circulation features would not have an adverse effect on the historic district. In addition, the historical integrity of the office building would not be affected because no alterations to this contributing building would occur as a result of the road alterations. Therefore, there would be **no adverse effect** on the South Entrance Station Historic District from the proposed intersection reconfiguration.

2. *Construction of South Entrance Hub*. The new transit hub would include construction of a 295-space parking lot, a shuttle boarding and tour bus transfer area (including turnouts from Mariposa Grove Road), a bus turn-around area, visitor contact area, accessible comfort station and septic system/leach field, and a new pedestrian trailhead on the historic Washburn Wagon Road. Construction of the transit hub at South Entrance would occur partially within the southeastern part of the South Entrance Station Historic District (figure 3-24), and within the Mariposa Grove Historic District (i.e. at new turnouts from Mariposa Grove Road, a contributing element of that district).

   The modification of roads within the historic districts would affect the district settings, but it would not introduce a new use to the area. The new parking and visitor facilities would be constructed outside the boundaries of both the South Entrance and Mariposa Grove historic districts. The South Entrance vicinity currently is heavily used for parking, shuttle boarding, restrooms, and visitor contact. The introduction of new infrastructure would not require the removal of any of the contributing elements of the South Entrance Historic District, such as the historic buildings and structures, and the turn-offs would not alter the integrity of Mariposa Grove Road location, design, setting, materials, workmanship, feeling, or association. The visual effect of the new transit hub on the South Entrance setting would be minimal and, therefore, construction of a South Entrance Hub and reconfiguration of the road intersection under Alternative 2 would have **no adverse effect** on the Mariposa Grove or South Entrance Station historic districts. The effects of rehabilitating the Washburn Wagon Road for use as a trail are also assessed in the Archeology subsection of this chapter of the *Mariposa Grove FEIS*.

3. *Removal/Replacement of Non-Historic Buildings and Infrastructure in the Lower Grove Area*. The parking lot, vault toilets, gift shop, and tram staging area are all non-contributing features within the Mariposa Grove Historic District. All of these features would be removed from the lower Grove area, and a smaller, accessible comfort station, a septic system and leach field (or a new sewer line from the lower Grove area to the South Entrance leach field within the Mariposa Grove Road right of way), a shuttle boarding/off-season parking area, and a trailhead for new accessible trails would be constructed. These actions would occur within the boundaries of the Mariposa Grove Historic District. Removal of incompatible and non-contributing buildings, structures, and hardscape, and replacement with restored lower Grove giant sequoia habitat and new, historically compatible, less intrusive comfort station and infrastructure are expected to affect the setting of the lower Grove portion of the Mariposa Grove Historic District. However, as these actions would reestablish a level and types of development in the lower Grove area closer to the level of development during the period of significance (i.e. roads, trails, limited parking, and comfort station), they may be considered to have **no adverse effect** on the district. The potential construction of a new wastewater line within the Mariposa Grove Road right of way from the lower Grove area to South Entrance would be below grade, and would have **no adverse effect** on the historic district.

4. *Conversion of Paved Vehicular Road in Lower Grove Area to an Accessible Trail.* An ABAAS-compliant trail would be constructed within the boundaries of the Mariposa Grove Historic District. It may be constructed as an at-grade trail with sections of boardwalk, or entirely as a boardwalk. Where the trail crosses the lower Grove area wetlands along the historic road, the road bed fill would be removed to allow for wetland restoration. An existing rock masonry wall would be removed to construct the boardwalk. Boardwalk construction would place the travel surface higher than the existing road surface, and would include redirecting vehicular traffic (e.g., service vehicles) onto a new bypass road around the lower Grove area. The bypass route would follow an abandoned road alignment. The effect from introduction

of a boardwalk as well as the removal of a segment of the road grade from the wetlands, would affect the integrity of design, materials, and feeling of this portion of the historic roadway. Therefore, this action would have an **adverse effect** on the Mariposa Grove Historic District.

5. *Rehabilitation/Construction of a Pedestrian Trail from South Entrance to the Lower Mariposa Grove Area*. A segment of the abandoned historic Washburn Wagon Road between the new South Entrance Hub and the existing picnic area along Mariposa Grove Road would be rehabilitated for use as a pedestrian trail, and a new trail segment would be constructed south of Mariposa Grove Road from the picnic area to the lower Grove area. The path of the new trail would lie partially within the boundaries of Mariposa Grove Historic District, but would not affect the historic integrity of contributing district features or introduce a new use to the district. The visual effect on the South Entrance Station and Mariposa Grove historic district settings would be minimal, and therefore this action would have **no adverse effect** on either historic district. The effects of rehabilitating the Washburn Wagon Road for use as a trail are also assessed in the Archeology subsection of this chapter of the *Mariposa Grove FEIS*.

6. *Engineered Hydrology and Road Improvements*. Road and drainage modifications within the Mariposa Grove Historic District would be undertaken under Alternative 2 to restore natural hydrologic flows as part of the ecological restoration of giant sequoia habitat. Actions and their potential effects on the historic district are summarized as follows:

    a. *Culvert Repairs and Replacement*. The culvert repairs and replacement would occur within the boundaries of the Mariposa Grove Historic District. The culverts are not contributing elements of the Mariposa Grove Historic District and are difficult to associate with a particular time within the district period of significance, having been constructed and reconstructed as needed. In general, there are about 60 culverts along the road through the Grove that could be repaired or replaced. Some of the culverts are at the bases of giant sequoias. The culverts vary in construction style, but typically are riprap covered with dirt in rock channels, some with minor rock headwalls. The masonry headwalls are of standard, very simple construction that does not reflect significant engineering design or artistic construction, nor exemplify a design unique to the Civilian Conservation Corps period. Culvert repairs and replacement would be conducted in accordance with the Secretary's Standards for Rehabilitation and would not alter the integrity of the contributing road's location, design, materials, workmanship, feeling, or association. Therefore, culvert repair or replacement would have **no adverse effect** on the Mariposa Grove Historic District or its contributing features.

    b. *Outsloping of Road and Trail Segments*. Outsloping would occur within the boundaries of the Mariposa Grove Historic District along selected contributing and non-contributing trails as well as those portions of the Mariposa Grove Road that function primarily as trails. Outsloping would require regrading, and would result in micro-changes in the road elevation and cross-section, but would not significantly alter the location, design, materials, workmanship, feeling, or association. Therefore, outsloping would have **no adverse effect**.

7. *Minor Road Realignment in Lower Mariposa Grove Area*. Mariposa Grove Road would be slightly realigned to accommodate construction of a new septic system and leach field, a relocated shuttle passenger drop-off /off-season parking area, comfort station, and accessible trailhead. The alterations to the road alignment would occur within the boundaries of the Mariposa Grove Historic District, and the road is a contributing element of the district. The shift in the alignment would affect the design of the roadway, but the changes would be minor. The character-defining circulation patterns of the Mariposa Grove Historic District

would be retained and the road's integrity of materials, workmanship, feeling, and association would be retained. Therefore, this road realignment would have **no adverse effect** on the district or its contributing elements.

8. *Relocation of Passenger Drop-Off /Off-Season Parking Area in Lower Mariposa Grove Area*. The relocation of passenger drop-off /off-season parking area would occur within the boundaries of the Mariposa Grove Historic District. Removal of the non-contributing existing shuttle/bus parking area and gift shop and replacement with restored lower Grove habitat, and relocation of a historically compatible, less intrusive drop-off /parking area to the northeast would occur under this alternative. Because of the addition of a new non-contributing circulation features within the pedestrian passenger drop-off area, an **adverse effect** is expected on the setting of the lower Grove portion of the Mariposa Grove Historic District.

9. *Conversion of North Portion of Parking Lot and an Old Road Alignment in Lower Mariposa Grove to New Grove Bypass Road.* The north portion of the existing lower Grove area 115-space parking lot would be converted to a new hardened, narrow Grove bypass road that would connect with an old, non-contributing road alignment, and subsequently merge with the existing Mariposa Grove Road to the northeast of the lower Mariposa Grove area. This wetland bypass would be used by accessible transport and service vehicles. The conversion of the portion of the parking lot and reuse of an old road alignment would occur within the boundaries of the Mariposa Grove Historic District; however, the parking lot and abandoned road are not contributing features of the district. Removal of non-contributing hardscape, and replacement with restored lower Grove giant sequoia habitat and restored wetlands, and a new, historically compatible, less intrusive road that follows an abandoned road trace, is expected to affect the setting of the lower Grove portion of the Mariposa Grove Historic District, but would have **no adverse effect** on the district or its contributing elements.

10. *Major Road Realignment.* Mariposa Grove Road would be realigned to reduce a sharp curve in the vicinity of the Sentinels at the approach to the lower Mariposa Grove area, and a new vehicular crossing structure (a box culvert or bridge) would be constructed to span the intermittent drainage at that location. These actions would improve safety, protect giant sequoias from erosion in the drainage, which could threaten their stability and long-term survival, and increase the roadway capacity for tour buses. The current road curve segment would be topographically and hydrological restored, eliminating the road prism. The realignment and drainage crossing construction would occur within the boundaries of the Mariposa Grove Historic District, and the Mariposa Grove Road and the giant sequoias are contributing elements of the district. This major realignment, eradication of the road prism, and addition of a new structure where there historically was none would affect the road's aspects of integrity including design, materials,, and feeling in the vicinity of the Grove entrance. Straightening the curve and introduction of a crossing structure would alter the sense of arrival into the lower Grove area, and the visitors' first view of big trees: the three giant sequoias known as the Sentinels. Therefore, this action would have an **adverse effect** on the historic district.

11. *Conversion of Paved Road to Accessible Trail in the Wetland of the Lower Grove Area*. The 10- to 20-foot-wide, asphalt-paved Mariposa Grove Road in the wetland area in the vicinity of the Fallen Monarch tree would be converted to an 8- to 10-foot-wide ABAAS-compliant accessible, hardened loop trail in the ecologically restored lower Grove area. The affected segments of this historic roadway are within the boundaries of the Mariposa Grove Historic District, and the road is a contributor to that district. The proposed conversion may require grade modifications and may introduce a boardwalk to reduce impacts on sensitive wetlands, but the road prism would largely be retained. An exception would occur where the road

crosses the wetlands; for that segment, the road bed and fill including a stone headwall where the creek crosses under the road would be removed to allow the wetland to be restored. To attain ABAAS compliance, the historic road alignment also may be altered to incorporate the use of switchbacks and curves not present in the existing road design. Narrowing, introduction of a boardwalk, removal of road materials from the wetland, and changes in alignment would result in a loss of integrity of historic road design and materials. Although the removal of the asphalt paving and replacement with a hardened surface in itself would not necessarily result in an adverse effect, the conversion of the roadway into a ABAAS compliant trail, l would likely alter the feeling and design in such a way that it would no longer feel or appear as a historic road. Therefore, conversion of this portion of the historic road into an ABAAS compliant pedestrian trails and boardwalks would have an **adverse effect** on the historic district.

12. *Conversion of Segment of Mariposa Grove Road and Loop Road between Grizzly Giant and Mariposa Grove Museum, and Wawona Point to a Hardened Trail.* The segment of Mariposa Grove Road between Grizzly Giant and Wawona Point, including a short spur to the Mariposa Grove Museum and nearby comfort station, would retain the historic road prisms. However, where possible, the travel-way would be narrowed to a minimum width of 11 feet, asphalt-paved surfaces may be converted to hardened surface, disturbed areas along the road would be allowed to revert to natural conditions, and existing pullouts would be assessed and removed where unnecessary. The segment of Mariposa Grove Road between Grizzly Giant and the museum, and the Wawona Point road, are within the boundaries of the Mariposa Grove Historic District and are contributors to that district. The integrity of location, setting, and association would be retained, and resurfacing would not result in an adverse effect. The character-defining circulation patterns of the Mariposa Grove Historic District would be retained, and these segments would continue to convey their feeling as historic roads. Therefore, proposed modification of these historic roadway segments under Alternative 2 would have **no adverse effect** on the historic district or its contributing elements.

13. *Conversion of the Loop Road in the Upper Grove Area to a Pedestrian Trail*. The portion of the loop road extending from the restrooms in the upper Grove area to the T-intersection with the road extending to Wawona Point, would be modified from a paved, one-way road (varies between 12 and- 20 feet wide) to a pedestrian trail (from 4 to 6 feet wide). Previously disturbed road areas would be revegetated. The loop road is within the boundaries of the Mariposa Grove Historic District, and is a contributing road circulation feature. Although the conversion or the road into a trail would retain the historic road prism, the road would no longer appear as such because of the combination of the removal of the asphalt surfacing, the significant reduction of its width into a dirt trail, and the revegetation of the disturbed areas along the trail. As a result, this loop road would no longer convey its feeling as a historic road. Therefore, this action would have an **adverse effect** on the historic circulation system within the Mariposa Grove Historic District.

14. *Ecological Restoration of Road Margins*. The road margins of Mariposa Grove Road between the lower Grove area and Grizzly Giant, the Mariposa Grove Road and loop road between Grizzly Giant and the Mariposa Grove Museum, the Wawona Point spur, and the east and south sections of a paved road loop that is being converted to pedestrian trail in the upper Grove area, may be modified to support revegetation. The historic road prism (cut, fill, and road bed) would largely be retained, but where narrowing occurs, road margins would be revegetated using native forbs, grasses and low shrubs to retain views into the adjacent forest, and thereby maintaining the character of the 1934 roadside landscape design.

Therefore, conversion of the historic roadway margins would have **no adverse effect** on character-defining roadside landscaping within the Mariposa Grove Historic District.

15. *Modify Path of Travel to Historic Comfort Station at South Entrance*. The historic comfort station at South Entrance is a contributor to the South Entrance Historic District. The path of travel to this structure would be upgraded to improve accessibility in compliance with ABAAS as part of this project. The comfort station is not proposed for rehabilitation at this time, but future accessibility improvement may be implemented under a separate future project as funds become available. The path of travel is not a contributing element of the historic district. Path-of-travel improvements could include minor grading, realignment to reduce grades, resurfacing with hardening materials, and proving ramping at existing curbs or other obstacles. Comfort station path-of-travel accessibility modifications would be completed using historically compatible design and materials, and would follow existing pathways to the extent practicable. These improvements would not alter location, workmanship, design, or association of the comfort station or the South Entrance Station Historic District. Realignment of the paths of travel could affect the setting and feeling of the district, but these actions would have **no adverse effect** on the district.
16. *Septic System/Leach Field Improvements at South Entrance and in the Upper Grove Area*. The septic system/leach field at South Entrance, which serves the historic ranger duplex and the historic comfort station, and the septic system/leach field in the upper Grove area, which serves the historic comfort station, would be improved. The South Entrance septic system would be relocated and expanded to accommodate the new visitor services at the South Entrance hub. The upper Grove system, which exceeds its service life, would be replaced pending geotechnical analysis. Neither of these systems is a contributor to the respective historic districts. These improvements would be conducted in a manner that would avoid impact on character-defining or contributing elements of the districts, and would therefore have **no adverse effect** on Mariposa Grove or South Entrance Station historic districts.
17. *Rehabilitation of Wawona Point Overlook.* Under Alternative 2, the masonry structures at the overlook would be rehabilitated in accordance with the Secretary of the Interior's treatment standards, which define rehabilitation to allow incorporation of other defined treatments, including preservation and restoration. Stone masonry would be restored by repointing and stabilization of side walls. Rehabilitation actions would include installation of compatible, code-compliant handrails. Landscape rehabilitation would involve ecological restoration of an abandoned parking area with low-growing plants that will retain the spatial characteristics of the former parking area, and revegetation that could include screening of incompatible, modern communications equipment. Historic overlook features would be stabilized and preserved to the extent possible. These rehabilitation actions would have **no adverse effect** on the historic features of Wawona Point, located within the Mariposa Grove Historic District.
18. *Change in Function of Mariposa Grove Museum.* Alternative 2 would include a possible change in the current use of the building as the Grove's primary interpretive center to another compatible use. Physical alteration of the building is not planned under this project, and any new use would be compatible with the historic use and rustic character of the building. Should alternations to the building become necessary once a use is determined, further compliance would be completed as a separate project. Therefore, there would be **no adverse effect** on the Mariposa Grove Museum or the Mariposa Grove Historic District under Alternative 2.
19. *Water Supply System Repairs and Modifications.* The water supply storage tank and chlorination unit are within the Mariposa Grove Historic District, and a water distribution pipeline traverses the Mariposa Grove Historic District at its upper end, and terminates at

the South Entrance Station Historic District, where it serves facilities at South Entrance. These water storage, treatment, and distribution systems are not contributing elements of either historic district. The water tank and chlorinator are to be relocated to a new location along the access road leading to Wawona Point as part of this action. The new location would be chosen so that none of the nearby contributing elements of the Mariposa Grove Historic District would be affected. The extent of water pipeline repairs needed and methods for repairs are not yet determined, but the repairs are not be expected to require removal, realignment, or major alteration of any contributing elements of the Mariposa Grove Historic District, the Mariposa Grove Museum, or the South Entrance Station Historic District. Any effects on the setting of the districts caused by repairs to the pipeline would be temporary, and would not be adverse. The new buried water tank at the South Entrance would not impact the road, which is a contributing feature. Therefore, the water system modifications would have **no adverse effect** on historic properties.

20. *Structural Sustainability Improvements to Existing Infrastructure*. The NPS promotes the recognition of historic preservation as the best sustainable practice for the historic built environment. The retention of historic buildings, structures, and cultural landscapes conserves the natural, labor, and energy resources expended in the original construction and prior maintenance of these cultural resources, and minimizes the need for additional investment of raw materials and labor to replace such resources with new construction. The *National Park Service Guiding Principles of Sustainable Design* (NPS 1993) are primarily intended to be applied to new construction. Many of these sustainability guidelines, which call for designs such as re-orientating buildings or constructing vestibules, are not proposed for any of the contributing buildings of the Mariposa Grove and South Entrance Station historic districts or the Mariposa Grove Museum. Therefore, there are no historic properties affected by sustainability upgrades under Alternative 2.
21. *Construction Staging Areas*. Construction staging areas needed under Alternative 2 may be located within or adjacent to the South Entrance Station and Mariposa Grove historic districts, but staging areas would be sited to avoid historic features and would be temporary. These temporary staging areas are expected to affect both historic districts, but the effects would not be adverse. Therefore, there would **no adverse effect** on the historic districts from construction staging activities.

Impact Significance and Determination of Effect. Implementation of Alternative 2 is expected to have an adverse effect on the Mariposa Grove Historic District, predominantly through proposed modifications to the Mariposa Grove Road, which is proposed as part of the ecological restoration of giant sequoia and wetland habitat measures and accessibility improvements under this alternative. Although there would be adverse effects to the historic district as a result of this alternative, the combined actions do not result in a loss of integrity of the historic district as a whole. Ensuring the long-term health of the Grove remains a primary management objective for both the cultural and natural resources in all the action alternatives. The NPS is firmly committed to the responsible management of historic properties that may be affected by the proposed engineered hydrologic and road improvements, and acknowledges the delicate balance required to ecologically restore the Mariposa Grove of Giant Sequoias and to preserve the historic properties, of which the giant sequoias themselves are a key contributing component.

Alternative 2 would have no adverse effect on the South Entrance Station Historic District. The majority of improvements for the South Entrance Hub would be located outside the district. The accessibility improvements to the path of travel to the historic comfort station and reconfiguration of the Wawona Road/Mariposa Grove Road intersection would minimally affect the setting and feeling

of the historic district, but would not alter the integrity of contributing or character-defining features of the South Entrance Historic District.

All actions under Alternative 2 that would affect contributing historic structures or cultural landscape features and that are necessary either to ensure long-term survival of the giant sequoias or to meet current accessibility or safety codes would, to the extent practicable, be designed in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. When such design is not feasible, the park would choose the least invasive/disruptive option, and consult with SHPO to develop measures to resolve adverse effects.

Operations-related Impacts. No adverse effects on historic buildings, structures, or cultural landscapes are anticipated from park or concessioner operations under Alternative 2, as operating activities would not significantly alter, directly or indirectly, any of the characteristics of the historic buildings, structures, and cultural landscapes that qualify them for inclusion in the National Register in a manner that would diminish the integrity of the properties' location, design, setting, materials, workmanship, feeling, or association. Alternative 2 would decrease incompatible uses and operational stress on the Mariposa Grove Historic District through elimination of the gift shop and commercial tram service, relocation of most transit facilities to South Entrance, and substantial curtailment of vehicular access to and through the Grove.

Modifications to non-contributing South Entrance station infrastructure (existing overflow parking and road intersection design) and relocation of Mariposa Grove visitor parking to the South Entrance area, would be compatible with historic circulation patterns and 1934 parking patterns in the South Entrance Station Historic District. These improvements would alleviate traffic congestion and reduce traffic hazards associated with future anticipated visitor access to Yosemite National Park and the Mariposa Grove of Giant Sequoias. Operations under Alternative 2 would result in no physical destruction or damage; physical alterations inconsistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*; disposal of the property; incompatible change in the character of the historic properties' use or setting; introduction of incompatible visual, atmospheric, or auditory elements; or neglect or deterioration that would constitute an adverse effect on the Mariposa Grove or South Entrance Station historic districts. The management and routine maintenance and repair of historic buildings, structures, and cultural landscape features would continue to be implemented in keeping with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*.

Impact Significance and Determination of Effect. Operation of Alternative 2 would have no adverse effect on historic buildings, structures, or cultural landscapes.

Conclusion. Under Alternative 2, proposed ecological restoration and code-compliance actions would adversely affect contributing elements of the Mariposa Grove and the South Entrance Station historic districts. The actions would have no adverse effect on the Mariposa Grove Museum. It is expected that the following actions would have no adverse effect to historic properties:

- removal of the lower Grove area non-historic buildings and infrastructure, including the gift shop, comfort station, parking lot, and tram staging area
- possible installation of a wastewater pipeline within the Mariposa Grove Road right of way from the lower Grove comfort station to the South Entrance leach field (in lieu of a new leach field in the lower Grove area)
- engineered hydrology and road improvements including repair and replacement of culverts, outsloping, minor road alignment shifts, removal of road surface but retention of road prisms

- refurbishing of the upper Grove area septic system/leach field
- rehabilitation of Wawona Point overlook
- repurposing of the Mariposa Grove Museum
- modifications to/repair of the water supply system
- construction of new South Entrance Hub infrastructure, including new leach field, parking, bus turn-around area, Mariposa Grove Road turnouts, accessible comfort station, and improved path of travel to the historic comfort station
- reconfiguration of the T-intersection to a traffic circle at the South Entrance
- rehabilitation of Washburn Wagon Road (also see Archeology section in this chapter) and construction of a new trail segment from the picnic area to the lower Grove area
- temporary construction staging areas within Mariposa Grove and South Entrance Station historic districts

However, the following actions would constitute an adverse effect on the Mariposa Grove Historic District:

- relocation of Mariposa Grove out of the wetland in the lower Grove area, removal of the road fill within the wetland, and installation of a new ABAAS-compliant trail minimizing impacts on the wetland including the use of boardwalks, where needed.
- relocation of a smaller parking area and comfort station, and creation of a shuttle turnaround area to the northeast of the existing bus parking area
- engineered hydrology and roadway improvements that involve major road alignment shifts, such as straightening of the curve in Mariposa Grove Road near the Sentinels, and construction of a new Mariposa Grove Road drainage-crossing structure at the Sentinels
- narrowing of historic roads to less than 8 feet wide along the upper Grove loop road
- eradication of road prisms for topographic and hydrological or wetlands restoration (e.g., at the Sentinels and in the lower Grove wetlands).

Adverse effects on historic properties as a result of implementation of this project alternative would be resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be refined in consultation with the SHPO, ACHP, and associated American Indian tribes and groups. The draft MOA is in Appendix G. The final agreement will be signed before the Record of Decision is completed and will be included as a part of the decision document for this project.

Operation of South Entrance and Mariposa Grove under Alternative 2 would have no adverse effect on the Mariposa Grove Historic District or the South Entrance Station Historic District.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting historic structures and landscapes would be the same as those under Alternative 1 (No Action)—no adverse effects on historic structures and landscapes in the Mariposa Grove area. Under Alternative 2, some proposed actions would affect historic properties, such as demolition of non-historic buildings in the lower Grove area, but the effects would not be adverse. Some actions would constitute an adverse effect on the Mariposa Grove Historic District, such as the conversion of the Mariposa Grove Road to an ABAAS-compliant loop trail. Alternative 2 would not have an adverse

effect on the South Entrance Station Historic District because most actions are either outside the boundary, or involve updating circulation features which were not identified as contributing in the 2004 Determination of Eligibility. The Mariposa Grove Museum would have no physical changes made to the structure as a result of this alternative. The cumulative effect of past, present, and future projects (no adverse effect), in conjunction with of Alternative 4 (adverse effect), would be an adverse effect on historic properties. Adverse effects would be resolved through consultation with the California SHPO and traditionally associated American Indian tribes and groups in accordance with 36 CFR Part 800 (NHPA implementing regulations) and implemented through a project-specific MOA (Appendix G).

Alternative 3: Grizzly Giant Hub

Implementation of Alternative 3 would:

- remove the non-contributing gift shop and tram staging area/tram operations from Mariposa Grove
- remove parking lot from lower Grove area
- reduce the number of vault toilets in the lower Grove area
- convert the segment of the historic paved road between the lower Grove area and Grizzly Giant in to a pedestrian trail
- Remove a segment of the Mariposa Grove Road at the entrance to the lower Grove area and ecologically restore the area.
- build a new two-way, paved bypass road, including two new bridges, to a new visitor arrival area with parking and other visitor amenities located outside giant sequoia habitat near the Grizzly Giant

The Grove and South Entrance water supply system would be modified as described for Alternative 2, and the upper Grove leach field would be refurbished. New comfort stations at the lower Grove area and the new Grizzly Giant hub would use vault toilets, and would not require development of additional septic systems or leach fields.

Numerous other historic rehabilitation and ecological restoration actions within the Mariposa Grove Historic District would be similar in scope to like actions described for Alternative 2. These would include rehabilitation of the Wawona Point overlook, and habitat restoration measures (including road and trail improvements to restore hydrologic flows. Development of accessible trails in the lower and mid-Grove areas would be less extensive than is proposed under Alternative 2.

Alternative 3 would not modify facilities at South Entrance. The existing South Entrance parking lot, shuttle stop, leach field, and intersection of Wawona Road and Mariposa Grove Road would be retained, as would all four of the historic buildings that contribute to the South Entrance Station Historic District (ranger duplex and associated garage, office building, and comfort station). There would be no adverse effect at the South Entrance under Alternative 3.

Construction- and Restoration-related Impacts. Construction and ecological restoration actions proposed under Alternative 3 are expected to affect contributing elements of the Mariposa Grove Historic District. Actions under Alternative 3 that have the potential to affect historic buildings, structures, and cultural landscape features include the following:

1. *Removal/Replacement of Non-Contributing Buildings and Infrastructure in the Lower Grove Area.* The non-historic gift shop, tram staging area, parking lot, and comfort station in the lower part of Mariposa Grove would be demolished and removed. A new, 10-space, dedicated ABAAS-compliant parking lot, a new accessible 2-vault comfort station, and a new trail head would be constructed, largely in the footprint of previous infrastructure at the lower Grove area. Construction would occur within the boundaries of the Mariposa Grove Historic District. While the introduction of new infrastructure in the historic district would affect the lower Grove setting of the historic district, it would not introduce a new use to the area, which is already heavily used for parking, shuttle boarding, restrooms, and visitor contacts, or remove any contributing elements of the historic district, and would restore the natural setting of the lower Grove area to a more historic condition. As these actions would reestablish a level and types of development in the lower Grove area more similar to those present during the period of significance (i.e. roads, trails, limited parking, and comfort station), they may be considered to have **no adverse effect** on the district. The visual effect on the South Entrance setting would be minimal and, therefore, there would be **no adverse effect**.
2. *Construction of New Grizzly Giant Bypass Road.* Under Alternative 3, the Mariposa Grove Road approach to the lower Mariposa Grove area, including the curve at the Sentinels, would be removed and the area ecologically restored, and a new two-way, paved road would be constructed to bypass the lower Grove area and to serve the new Grizzly Giant Hub. This removal, ecological restoration, and new road and bridge construction would occur within the Mariposa Grove Historic District. Although construction of the new bypass road would not directly affect contributing elements of the district, it would introduce a new roadway in the district that would indirectly affect the integrity of setting, feeling, and association of the district. Removal and ecological restoration of the historic entry road segment of Mariposa Grove Road would directly affect the contributing historic roadway, and eliminate the character-defining historic first view of giant sequoias on the approach to Mariposa Grove (i.e. view of the Sentinels), thereby altering the sense of arrival at the Grove and affecting the integrity of location, material, workmanship, association, and feeling of the Mariposa Grove Road. These actions under Alternative 3 would have **an adverse effect** on the Mariposa Grove Historic District.
3. *Construction of New Grizzly Giant Hub*. Construction of the new hub buildings and infrastructure, including a visitor parking lot, bus parking, a visitor contact area, a trailhead for a new accessible Grizzly Giant trail, a new comfort station, and removal of the existing vault toilet and the commercial tram turnout, would occur within the boundaries of the Mariposa Grove Historic District. The introduction of new infrastructure in the historic district would affect the setting of the district, but it would not introduce a new use to the area, which is already heavily used for parking, shuttle boarding, restrooms, and visitor contact, or remove any of the contributing elements of the historic district. Due to its location outside of giant sequoia habitat in a previously disturbed area to which views from the Grizzly Giant would be topographically screened, the important character-defining view of the Grizzly Giant would be minimally affected. Therefore, construction of the new hub facilities would have **no adverse effect** on the historic district.
4. *Engineering Hydrology and Road Improvements.* As described for Alternative 2, ecological restoration of giant sequoia habitat and wetlands would include engineered hydrology improvements including the repair and replacement of culverts, outsloping of road and trail surfaces, minor road alignment shifts, road narrowing, removal of asphalt pavement, localized modifications to historic road prisms, conversion of vehicular roads to pedestrian-only trails, soil decompaction, and revegetation. Specifically, ecological restoration actions

under Alternative 3 that could affect the Mariposa Grove Historic District would include the following:

a. *Drainage Modifications*. Culvert repairs and replacement would occur within the boundaries of the Mariposa Grove Historic District. The culverts are not contributing elements of the Mariposa Grove Historic District and are not clearly associated with a particular timeframe within the period of significance, having been repaired and reconstructed as needed. There are about 60 culverts along the historic Mariposa Grove Road throughout the Grove that could be repaired or replaced. Some of the culverts are at the bases of giant sequoias. They vary in construction style but typically are soil-covered riprap in rock channels, some with minor rock headwalls. The masonry headwalls are of standard, very simple construction that does not reflect significant engineering design or artistic construction, or exemplify a design unique to the Civilian Conservation Corps period to which they are inferred to date. Culvert repairs and replacement would not alter the integrity of the contributing road's location, design, materials, workmanship, feeling, or association. Therefore, culvert repair or replacement would have **no adverse effect** on the historic property.

b. *Outsloping of Road and Trail Segments*. Outsloping would occur within the boundaries of the Mariposa Grove Historic District along selected contributing and non-contributing trails and along the extension of Mariposa Grove Road through the Grove, which is a contributing element of the district. Outsloping would require regrading, and would result in micro-changes to the elevation and cross-grade, but would not significantly alter the integrity of the road location, design, materials, workmanship, feeling, or association. Therefore, outsloping would have **no adverse effect** on the Mariposa Grove Historic District.

5. *Conversion of Paved Road to Accessible Trail in Lower Grove Area*. The 10- to 20-foot-wide portion of the Mariposa Grove Road would be converted to an 8- to 10-foot-wide ABAAS-compliant accessible loop trail in the ecologically restored lower Grove area. The affected segments of this historic roadway are within the boundaries of the Mariposa Grove Historic District, and the road is a contributor to that district. The proposed conversion may require grade modifications and may introduce a boardwalk to reduce impacts on sensitive wetlands, but the road prism likely would be retained. To attain ABAAS-compliance, the historic road alignment also may be altered to incorporate the use of switchbacks and curves not present in the existing road. Narrowing to less than 8 feet, introduction of a boardwalk, potential removal of fill from the lower Grove area wetlands, and changes in alignment would result in a loss of integrity of historic road design, materials, and workmanship. The integrity of location, setting, and association would be retained and the removal of the asphalt paving and replacement with an alternative hardened surface would not result in an adverse effect, but the conversion from a road to a narrower pedestrian trail would alter the design of the road such that it no longer conveys the feeling of a historic road. Therefore, conversion of historic road segments to pedestrian trails would have an **adverse effect** on this contributing feature in the Mariposa Grove Historic District.

6. *Conversion of Existing Trail to Accessible Trail at Grizzly Giant*. A new, accessible trail would be developed that connects the new Grizzly Giant hub parking area with an existing pedestrian trail that connects the lower Grove area with the Grizzly Giant area within the Mariposa Grove Historic District. This trail would originate at the Grizzly Giant Hub and would require grading and resurfacing to meet ABAAS, but would not affect the historic views of the Grizzly Giant. This action would have **no adverse effect** on the Mariposa Grove Historic District.

7. *Conversion of Segment of Mariposa Grove Road and Loop Road between Grizzly Giant and Mariposa Grove Museum, and Wawona Point Spur to a Hardened Trail.* The segment of Mariposa Grove Road between Grizzly Giant and Wawona Point, including a short spur to the Mariposa Grove Museum and nearby comfort station, would retain the historic road prisms. However, where possible, the travel-way would be narrowed to a minimum width of 11 feet, asphalt-paved surfaces may be converted to hardened surface, disturbed areas along the road would be allowed to revert to natural conditions, and existing pullouts would be assessed and removed where unnecessary. The segment of Mariposa Grove Road between Grizzly Giant and the museum, and the Wawona Point road, are within the boundaries of the Mariposa Grove Historic District and are contributors to that district. The integrity of location, setting, and association would be retained, and resurfacing would not result in an adverse effect. The road would be narrowed to a minimum width of 11 feet. The character-defining circulation patterns of the Mariposa Grove Historic District would be retained, and these segments would continue to convey their feeling as historic roads. Therefore, proposed modification of these historic roadway segments under Alternative 3 would have **no adverse effect** on the historic district or its contributing elements.
8. *Conversion of the Loop Road in the Upper Grove Area to a Pedestrian Trail*. The portion of the loop road extending from the restrooms in the upper Grove area to the T-intersection with the road extending to Wawona Point would be modified from a paved, one-way road (varies between 12 and 20 feet wide) to a pedestrian trail (from 4 to 6 feet wide). Previously disturbed road areas would be revegetated. The loop road is within the boundaries of the Mariposa Grove Historic District, and is a contributing road circulation feature. Although the conversion or the road into a trail would retain the historic road prism, the road would no longer appear as such because of the combination of the removal of the asphalt surfacing, the significant reduction of its width into a dirt trail, and the revegetation of the disturbed areas along the trail. As a result, this loop road would no longer convey its feeling as a historic road. Therefore, this action would have an **adverse effect** on the historic circulation system within the Mariposa Grove Historic District.
9. *Ecological Restoration of Road Margins*. The road margins of Mariposa Grove Road between the lower Grove area and Grizzly Giant, the Mariposa Grove Road and loop road between Grizzly Giant and the Mariposa Grove Museum, the Wawona Point spur, and the east and south sections of a paved road loop that is being converted to a pedestrian trail in the upper Grove area, may be modified. The historic road prism (cut, fill, and road bed) would largely be retained, but where narrowing occurs, road margins would be ecologically restored. The modification of road margins could affect the Mariposa Grove Historic District's character-defining roadside landscaping, which was created in 1934 and is characterized by the absence of overhanging banks or protruding root systems of stumps, and reshaped slopes that conform to the surrounding topography. These landscape features would be reproduced in the case of modified road/trail shoulders, maintaining the character of the 1934 roadside landscape design. Therefore, conversion of the historic roadway margins would have **no adverse effect** on character-defining roadside landscaping.
10. *Improvement of Septic System/Leach Field in the Upper Grove Area.* The non-contributing septic system/leach field in the upper Grove area, which serves the historic comfort station, has exceeded its service life and would be replaced. These improvements would be conducted in a manner that would avoid impact on character-defining or contributing elements of the district, and would therefore have **no adverse effect** on Mariposa Grove Historic District.
11. *Rehabilitation of Wawona Point Overlook.* As described under Alternative 2, the masonry structures at the overlook would be rehabilitated under Alternative 3 in accordance with the

Secretary of the Interior's treatment standards. Stone masonry would be restored by repointing and stabilization of side walls. Rehabilitation actions would include installation of compatible, code-compliant handrails. Landscape modifications would involve ecological restoration of the abandoned parking area and revegetation that could include screening of incompatible, modern communications equipment. Historic overlook features would be stabilized and preserved to the extent possible. These historic rehabilitation actions would have **no adverse effect** on Wawona Point, located within the Mariposa Grove Historic District.

12. *Change in Function of Mariposa Grove Museum.* Alternative 3 would include a change in the current use of the building as the Grove's primary interpretive center to another compatible use, such as a hiker's shelter. Physical alteration of the building is not planned under this project, and any new use would be compatible with the historic use and rustic character of the building. Should alterations to the building become necessary once a use is determined, further compliance would be completed as a separate project. Therefore, there would be **no adverse effect** on the Mariposa Grove Museum under Alternative 3.
13. *Water supply System Repairs and Modifications.* As described for Alternative 2, the water supply storage tank and chlorination unit are within the Mariposa Grove Historic District, and water distribution pipeline traverse the Mariposa Grove Historic District at its upper end, and enters the South Entrance Station Historic District at its terminus, where it serves facilities at South Entrance. These water storage, treatment, and distribution systems are not contributing elements of either historic district. The water tank and chlorinator are to be relocated to the vicinity of the upper Grove comfort station as part of this action. The new location would be chosen so that none of the nearby contributing elements of the Mariposa Grove Historic District would be affected. The extent of water pipeline repairs needed and methods for repairs are not yet determined, but the repairs are not be expected to require removal, realignment, or major alteration of any contributing elements of the Mariposa Grove Historic District, the Mariposa Grove Museum, or the South Entrance Station Historic District. Any effects on the setting of the districts caused by repairs to the pipeline would be temporary, and if any historic materials are removed, they would be replaced in kind/repaired to their condition prior to construction. Therefore, the water system modifications would have **no adverse effect** on historic properties.
14. *Structural Sustainability Improvements to Existing Infrastructure*. The NPS promotes the recognition of historic preservation as the best sustainable practice for the historic built environment. The retention of historic buildings, structures, and cultural landscapes conserves the natural, labor, and energy resources expended in the original construction and maintenance of these cultural resources, minimizes the need for additional investment of raw materials and labor to replace such resources with new construction. The *National Park Service Guiding Principles of Sustainable Design* are primarily intended to be applied to new construction. Many of these sustainability guidelines, which call for designs such as re-orientating buildings or constructing vestibules, are not proposed for the contributing building of the Mariposa Grove Historic District or the Mariposa Grove Museum. Therefore, sustainability upgrades under Alternative 3 would have **no adverse effect** on the historic district.
15. *Construction Staging Areas.* Construction staging areas needed under Alternative 3 may be located within or adjacent to the Mariposa Grove Historic District, but staging areas would be sited to avoid historic features and would be temporary. These temporary staging areas are expected to affect the Mariposa Grove Historic District, but the effects would not be adverse. Therefore, there would **no adverse effect**.

Impact Significance and Determination of Effect. Construction and ecological restoration under Alternative 3 is expected to result in an adverse effect on the Mariposa Grove Historic District. Although there would be adverse effects to the historic district as a result of this alternative, the combined actions do not result in a loss of integrity of the historic district as a whole. Ensuring the long-term health of the Grove remains a primary management objective for both the cultural and natural resources in all the action alternatives. Adverse effects on the historic district as a result of implementation of this project alternative would be resolved through consultation with the California SHPO, in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be developed in consultation with the SHPO, ACHP, and associated American Indian tribes and groups.

Operations-related Impacts. As described for Alternative 2, Alternative 3 would decrease the use and operational stress on the setting of the Mariposa Grove Historic District and associated character-defining giant sequoias by eliminating the commercial tram operations and diverting the majority of vehicular traffic out of giant sequoia groves and habitat. Under Alternative 3, shuttle service to the Grove would be discontinued. Routine maintenance and repairs would continue, and repairs to historic buildings, structures, or cultural landscape features would be performed in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. There would be no adverse effects on historic buildings, structures, or cultural landscapes from park or concessioner operations under Alternative 3 because operating activities would not significantly alter, directly or indirectly, any of the characteristics of the historic buildings, structures, or cultural landscapes that qualify them for inclusion in the National Register.

Impact Significance and Determination of Effect. Operation of Alternative 3 would have no adverse effect on historic buildings, structures, or cultural landscapes.

Conclusion. Under Alternative 3, construction-related actions would adversely affect contributing elements of the Mariposa Grove Historic District. There would be no modification of facilities at the South Entrance and no adverse effect in that location under Alternative 3. It is expected that the following actions would affect historic properties within the APE, but the effects would not be adverse:

- removal of non-contributing structures in the lower Grove area
- removal of parking lot in the lower Grove area and replacement with 10-space ABAAS-compliant parking area
- reduction in number of vault toilets at the lower Grove area
- conversion of Mariposa Grove Road between Grizzly Giant and Wawona Point, including the spur to the Mariposa Museum and upper Grove comfort station, to a hardened trail/service road
- historic rehabilitation of Wawona Point masonry features
- refurbishment of the upper Grove leach field
- compatible re-purposing of the Mariposa Museum building
- habitat restoration measures
- cessation of tram operations.

However, modifications to segments of the Mariposa Grove Road at the approach to the lower Grove and on the upper Grove loop road, and introduction of a new, paved, two-lane road to a new Grizzly Giant hub would result in:

- changes in circulation patterns, traffic, and visitor use,
- loss of historic design and feeling where historic road travel-ways are narrowed and converted to hardened roads and pedestrian trails, and
- loss of location, design, materials, association, and feeling along the segments of road to be abandoned and ecologically restored (e.g., near the Sentinels) when the new lower Grove bypass road to the Grizzly Giant hub is constructed, and where the historic road prism is to be removed (e.g., through the lower Grove wetlands).

These modifications would be considered **adverse effects** because they would impact the historic integrity of the road and would alter character-defining views and the sense of arrival at the giant sequoia grove in the Historic District. Additionally, introduction of a new two-lane, paved bypass road and bridges to the proposed Grizzly Giant hub would alter the setting, cultural landscape, and feeling of the Mariposa Grove Historic District, and as such would have an **adverse effect** on the integrity of the district.

Adverse effects on historic properties as a result of implementation of this project alternative would be resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be refined in consultation with the SHPO, ACHP, and associated American Indian tribes and groups. The draft MOA is in Appendix G. The final agreement will be signed before the Record of Decision is completed and will be included as a part of the decision document for this project.

Park and concessioner operations under Alternative 3 would have **no adverse effect** on historic buildings, structures, or cultural landscapes of the Mariposa Grove Historic District because operating activities would not significantly alter, directly or indirectly, any of the characteristics of the historic buildings, structures, or cultural landscapes that qualify them for inclusion in the National Register. Ongoing maintenance of contributing features and buildings would be performed in accordance with the Secretary of the Interior's *Standards for Treatment of Historic Properties*.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting historic structures and landscapes would be the same as those under Alternative 1 (No Action)—no adverse effects on historic structures and landscapes in the Mariposa Grove area. Under Alternative 3, some proposed actions would affect historic properties, such as demolition of non-historic buildings in the lower Grove area, but the effects would not be adverse. Some actions would constitute an adverse effect on historic circulation patterns and visitor use, such as introduction of a new, paved two-lane road to a new Grizzly Giant hub. Alternative 3 would not have an adverse effect on the South Entrance Station Historic District or the Mariposa Grove Museum. The cumulative effect of past, present, and future projects (no adverse effect), in conjunction with of Alternative 4 (adverse effect), would be an adverse effect on historic properties. Adverse effects would be resolved through consultation with the California SHPO and traditionally associated American Indian tribes and groups in accordance with 36 CFR Part 800 (NHPA implementing regulations) and implemented through a project-specific MOA (Appendix G).

Alternative 4: South Entrance Hub with Modified Commercial Tram Service

Actions under Alternative 4 would be largely as described for Alternative 2, with a few differences:

- A new ABAAS-compliant lower Grove loop trail would be constructed with an at-grade, hardened surface rather than a boardwalk, and limited commercial tram service would be maintained.
- Tram staging would be relocated to a South Entrance Hub, and the tram would operate on an abbreviated seasonal and daily schedule and along a limited route within Mariposa Grove.
- The Mariposa Grove Road would remain asphalt-paved from the lower Grove area to the Mariposa Grove Museum in the upper Grove area, where a tram turnaround would be constructed. The upper Grove loop road would be closed to tram traffic, and would be narrowed and converted to a pedestrian trail, as described under Alternatives 2 and 3.

Construction- and Restoration-Related Impacts. Construction proposed under Alternative 4 is expected to result in adverse effects on the Mariposa Grove Historic District to the same extent described above in Alternative 2, with several exceptions, described as follows:

1. *Accessible Loop Trail in the Lower Grove Area*. A new accessible loop trail would be constructed at the lower Grove area on the same route as described for Alternatives 2 and 3 (see figure 2-16), but the trail would be at grade with a hardened surface and would not have a boardwalk finish. The historic road segment to be converted for this use would still be narrowed to 8 to 10 feet, and alignment and grade modifications to meet ABAAS criteria could be necessary. These changes could have an **adverse effect** on the historic integrity of design and feeling of the contributing road, but the road prism would be largely retained.
2. *Modify Path of Travel to Upper Grove Comfort Station for ABAAS Compliance*.
3. *Relocation of Commercial Tram Staging Area.* The commercial tram staging area would be moved from the lower Grove area to the new South Entrance Hub. Tram ticketing and boarding would be incorporated into the same hub footprint as described for Alternative 2, and effects on the South Entrance Station Historic District and Mariposa Grove Road would be as described for Alternative 2. Relocation of tram staging to the South Entrance Hub would have **no adverse effect** on either historic district.
4. *Shortened Commercial Tram Route in Mariposa Grove*. The commercial tram route would be shortened relative to the no action alternative (Alternative 1), and would operate on the existing paved road from the lower Grove area to the Mariposa Grove Museum in the upper Grove area. The tram would no longer travel the upper Grove one-way loop road from the water tank to the comfort station, which would be converted for use as a pedestrian trail, as described under Alternatives 2 and 3. The converted segments would retain the historic road prisms, and where possible, the travel-way would be narrowed to a minimum width of 11 feet, asphalt-paved surfaces may be converted to hardened surface, disturbed areas along the road would be allowed to revert to natural conditions, and existing pullouts would be assessed and removed where unnecessary. The affected segments of Mariposa Grove Road are within the boundaries of the Mariposa Grove Historic District and are contributors to that district. The integrity of location, setting, and association would be retained, and resurfacing would not result in an adverse effect. The road would be narrowed to a minimum width of 11 feet. The character-defining circulation patterns of the Mariposa Grove Historic District would be retained, and these segments would continue to convey their feeling as historic roads. Therefore, proposed modification of these historic roadway segments under

Alternative 4 would have **no adverse effect** on the historic district or its contributing elements.

5. *Modification of South Entrance Intersection.* Under Alternative 4, the existing T-intersection of Wawona Road and Mariposa Grove Road would be realigned as a modified T-intersection with Mariposa Grove Road located west of the contributing office building. The driveway to the ranger duplex would exit from Mariposa Grove Road just north of the modified T-intersection with Wawona Road. Intersection realignment would avoid effects on character-defining and contributing elements of the South Entrance Station Historic District that would diminish the attributes that make them eligible for listing in the National Register. As described under Alternative 2, modification to the circulation pattern within the South Entrance Station Historic District would have no adverse effect because the modified intersection would retain the primary historic circulation attribute of the junction of the three roads. Therefore, this intersection modification would have **no adverse effect** on the district or on Mariposa Grove Road, which is a contributing element of the Mariposa Grove Historic District.
6. *Retain Mariposa Grove Museum Function.* Under Alternative 4, the current museum function as an interpretive center and visitor rest stop would remain at the Mariposa Grove Museum. No physical alteration of the museum build would occur under this project, so there would be **no effect** on the historic property as a result of this action. Should alterations to the building become necessary once a use is determined, further compliance would be completed as a separate project.

Please refer to the discussion under Alternative 2: South Entrance Hub for detailed descriptions of actions common to both Alternative 2 and Alternative 4, and the associated effects on the Mariposa Grove and South Entrance Station historic districts. These shared actions, and the associated potential effects on contributing buildings, structures, and landscape features, include:

- remove the non-contributing commercial tram staging area and gift shop from the lower Grove area
- substantially reduce the non-contributing in-Grove parking, and relocate primary visitor parking to the proposed transit hub at South Entrance
- rehabilitate historic Wawona Point
- make accessibility improvements to Grove trails and the path of travel to the South Entrance comfort station
- replace the septic system/leach field at South Entrance
- refurbish (e.g., relocate and replumb) the septic system and leach field in the upper Grove area
- construct a new septic/system leach field in the lower Grove area, or installation of a wastewater pipeline, within the right of way of Mariposa Grove Road, from the lower Grove area to the South Entrance leach field (may require a lift station near South Entrance)
- reconfigure the South Entrance station parking and other non-contributing infrastructure, and reconfigure the Wawona Road/Mariposa Grove Road intersection.
- rehabilitate the segment of the Washburn Wagon Road between the South Entrance hub and the picnic area along Mariposa Grove Road for use as a pedestrian trail, and construct an extension of the trail from the picnic area to the lower Grove area

- replace and relocate the water storage and treatment units, and repair/replacement of the leaking water distribution line in the upper Grove area
- convert segments of historic roads for use as pedestrian trails, including removal of asphalt pavement and revegetation of trail margins within the historic road prism
- install an expanded septic system/leach field at South Entrance
- refurbish septic system and leach field in the upper Grove area
- construct a new septic/system leach field in the lower Grove area, or installation of a wastewater pipeline, within the right of way of Mariposa Grove Road, from the lower Grove area to the South Entrance leach field (may require a lift station near South Entrance)

Impact Significance and Determination of Effect. As with Alternative 2, construction of Alternative 4 is expected to result in adverse effects on the Mariposa Grove Historic District, which is a historic property under Section 106 of the NHPA. Although there would be adverse effects to the historic district as a result of this alternative, the combined actions do not result in a loss of integrity of the historic district as a whole. Ensuring the long-term health of the Grove remains a primary management objective for both the cultural and natural resources in all the action alternatives.

Alternative 4 would also affect the South Entrance Station Historic District, but the effects would not be adverse. Adverse effects on the historic district historic properties as a result of implementation of this project alternative would be resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be developed in consultation with the SHPO, ACHP, and associated American Indian tribes and groups.

Operations-related Impacts. As described for Alternatives 1, 2, and 3, no adverse effect on historic buildings, structures, or cultural landscapes are anticipated from park or concessioner operations under Alternative 4. Operational activities, including maintenance and repairs of infrastructure and facilities and monitoring of traffic/parking, would not significantly alter, directly or indirectly, any of the characteristics of the historic buildings, structures, or cultural landscapes that qualify them for inclusion in the National Register. Alternative 4 would decrease the use and operational stress on the setting of the Mariposa Grove Historic District and associated habitats by reducing infrastructure and visitor services within the Grove. Operations under Alternative 4 would not result in physical destruction or damage; alteration inconsistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties;* disposal of the property; incompatible change in the character of the property's use or setting; introduction of incompatible visual, atmospheric, or auditory elements; or neglect or deterioration.

The management of and routine maintenance and repair of historic buildings, structures, and cultural landscapes would continue to be implemented in keeping with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*.

Impact Significance and Determination of Effect. Operation under Alternative 4 would have **no adverse effect** on historic buildings, structures, or cultural landscapes within the Mariposa Grove and South Entrance Station historic districts.

Conclusion. As described for Alternative 2, under Alternative 4, construction-related actions related to restoration of hydrologic function of giant sequoia habitat, and to accessibility upgrades to trails and facilities, would result in alteration of design, materials, workmanship, and/or feeling of the

contributing Mariposa Grove Road, and would therefore have an **adverse effect** on the Mariposa Grove Historic District.

It is expected that the following actions would affect historic properties within the APE, but the effects would not be adverse:

- reconfiguration of the intersection at the South Entrance
- construction of new South Entrance infrastructure
- removal of the lower Grove non-historic structures and infrastructure and construction of new lower Grove infrastructure
- rehabilitation of the Washburn Wagon Road for use as a pedestrian trail from South Entrance to the picnic area and extension of a new trail to the lower Grove area
- minor engineered hydrology and road improvements including repair and replacement of culverts and outsloping
- refurbishing of the upper Mariposa Grove leach field and expansion/relocation of the South Entrance leach field
- Construction of a septic system/leach field at the lower Grove area or installation of a wastewater pipeline from the lower Grove area to the South Entrance septic system/leach field along the right of way of the Mariposa Grove Road
- ABAAS improvements to paths of travel to the historic comfort stations in the upper Grove area and at South Entrance
- rehabilitation of Wawona Point overlook
- repair of the Mariposa Grove and South Entrance water supply system
- construction staging areas

Adverse effects on historic properties as a result of implementation of this project alternative would be resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be developed in consultation with the SHPO, ACHP, and associated American Indian tribes and groups. Concessioner and NPS operations at Mariposa Grove and South Entrance under Alternative 4 would have **no adverse effect** on historic buildings, structures, or cultural landscapes.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting historic structures and landscapes would be the same as those under Alternative 1 (No Action)—no adverse effects on historic structures and landscapes in the Mariposa Grove area. Under Alternative 4, some proposed actions would affect historic properties, such as demolition of non-historic buildings in the lower Grove area, but the effects would not be adverse. Some actions would constitute an adverse effect on the Mariposa Grove Historic District, such as the conversion of the Mariposa Grove Road to an ABAAS-compliant loop trail. Alternative 4 would not have an adverse effect on the South Entrance Station Historic District or the Mariposa Grove Museum. The cumulative effect of past, present, and future projects (no adverse effect), in conjunction with of Alternative 4 (adverse effect), would be an adverse effect on historic properties. Adverse effects would be resolved through consultation with the California SHPO and traditionally associated American Indian tribes and groups in accordance with 36 CFR Part 800 (NHPA implementing regulations) and implemented through a project-specific MOA (Appendix G).

AMERICAN INDIAN TRADITIONAL CULTURAL RESOURCES

Introduction and Definitions

Traditional cultural resources are defined as "objects and places, including sites, structures, landscapes, and natural resources, with traditional cultural meaning and value to associated peoples" (NPS 2006). Traditional cultural practices involve resources that are:

- culturally valued tangible locations,
- involve social use of the biophysical, geophysical, or built environment, and
- reflect socio-cultural attributes, including social cohesion, lifeways, religious practices, and other social institutions, such as education and recreation, that play out in the biophysical and built environments, but are not tangible in and of themselves.

If an American Indian traditional cultural resource or practice meets any of the eligibility criteria for listing in the National Register (36 CFR 60.4), it is considered a historic property with traditional cultural or religious significance. However, many resources and practices that are significant to contemporary American Indian tribes or groups do not meet the National Register criteria, but the cultural value of these resources may have acquired a historic merit through repeated use over time.

The NPS (2006) is committed to protecting and preserving traditional cultural resources that do not qualify as historic properties, but that are culturally significant to traditionally associated American Indian peoples.

Affected Environment

Although no previous ethnographic research has been identified that focuses exclusively on the Mariposa Grove of Giant Sequoias, other source materials have been identified that demonstrate that numerous tribal groups have, and continue to, value and utilize giant sequoia groves regionally. The presence of multiple prehistoric archeological sites and extensive fire scarring in the Mariposa Grove, as well as information learned from recent interviews and consultations with contemporary traditionally associated peoples, confirm that Mariposa Grove was a traditionally significant area, beginning at least 3,500 years ago (Hull 1989, Anderson 1993, Goldberg et al. 2012).

Tribal groups identified as historically frequenting giant sequoia groves on the western slopes of the central and southern Sierra Nevada include the Nisenan or Southern Maidu; the Western Mono; various Foothill Yokuts cultural groups; the Southern, Central, and Northern Sierra Miwok; the Tubatulabal; and several groups from the eastern side of the Sierra Nevada, including the Washoe, the Northern Paiute (e.g., the Mono Lake Kudzedikaa), and the Owens Valley Paiute (Anderson 1993, Latta 1977, Powers 1976). Recent ethnographic interviews conducted with park-associated American Indians note the particular salience of giant sequoias and Mariposa Grove to Southern and Central Sierra Miwok, Chukchansi Yokuts, and Western Mono peoples (Anderson 1993). These groups are directly related to contemporary American Indian groups, nearly all of whom have documented traditional associations with Yosemite National Park and the Mariposa Grove of Giant Sequoias. The park currently consults with seven traditionally associated American Indian tribes and groups: The American Indian Council of Mariposa County, Inc. (also known as the Southern Sierra Miwuk Nation), Bishop Paiute Tribe, Bridgeport Indian Colony, Mono Lake Kutzadikaa Tribe, North Fork Rancheria of Mono Indians of California, Picayune Rancheria of the Chukchansi Indians, and Tuolumne Band of Me-Wuk Indians.

There likely are numerous reasons why the ethnographic record is largely lacking specific data about traditional use of the Mariposa Grove and other giant sequoia groves. Early non-indigenous visitors to Mariposa Grove did little to document native use of the area beyond vilifying the Indians' deliberate use of fire (Brace 1869; Muir 1961). By the time outsiders first saw the Mariposa Grove circa 1855, American Indian lifeways had been drastically disrupted in the region due to missionization, disease, reduced access to resources, and the subsequent population decline and changes in marriage patterns and other cultural practices (Bunnell 1859; Davis-King 1999).

The limited ethnographic information that is available indicates that the giant sequoias were considered sacred by the American Indian peoples (Anderson 1993; Goode 1992). It further suggests that the giant sequoia groves were areas where initiations or other important ceremonies were performed (Anderson 1993).

Ethnographers have documented at least 12 different words for the giant sequoia in American Indian languages (Powers 1976, Bunnell 1990, Anderson 1993, Davis-King 1999). At least 7 of these words are variations of the word *wah-wo-nah*, suggesting connections to the Mariposa Grove of Giant Sequoias in the area now known as Wawona. Powers (1976:398) reported that the Western Mono variant—*woh-woh'-nau*—was meant to imitate "... the hoot of the owl, which is the guardian spirit and deity of this great monarch of the forest."

The Mariposa Grove of Giant Sequoias contains extensive evidence of anthropogenic fires. These fires were undoubtedly started by American Indians who understood that giant sequoia seedlings and giant sequoia habitat thrive in response to frequent fires. American Indians ignited fires in the giant sequoia groves in order to prolong the lifecycles of the big trees, to clear brush from trails, to attract game, and to improve the growth of specific plant materials. Data from ethnographic interviews conducted previously also show that most fires in the giant sequoia groves burned in the late growing season, between early August and October or November (Anderson 1993, Goldberg et al. 2012).

Indigenous uses of giant sequoias include use of the bark for housing material by Central Sierra Miwok, Yokuts, and Paiute tribes (Barrett and Gifford 1933, Anderson 1993). It has also been reported that Yokuts groups used the pitch from the giant sequoia bark as a medicine, and that the fumes from burning the gum were used to treat neuralgia (Hudson 1901, Anderson 1993:257).

Besides the giant sequoias themselves, numerous plants and animals valued by park-associated American Indians are found in or in close proximity to giant sequoia groves. These plants include, but are not limited to, elderberry, wild onion, sugar pine, hazelnut, chinquapin, soaproot, strawberry, grass seeds, sedge, mushrooms, alder, dogwood, currant, and raspberry. Many plants had multiple uses, and filled needs for medicine, subsistence, and/or spiritual purposes (Goldberg et al. 2012). Important basketry plants are also found growing in or around giant sequoia groves including willow, hazelnut, black oak, buck brush, deer brush, maple, and bitter cherry (Goldberg et al. 2012:38).

Much of the fauna that historically inhabited giant sequoia groves also played a major role in American Indian traditional practices and beliefs. Many faunal species have spiritual significance, in addition to filling subsistence and other needs. Research has identified several traditionally significant faunal species including, but not limited, to owls, falcons, eagles, bears, beavers, deer, elk, fish, coyote, and caterpillars. As an example of spiritual significance, the North Fork Mono (a band of Western Mono) considered the golden eagle to be the creator and the chief of the birds. This species was revered by both of the North Fork Mono moieties, while they considered the bald eagle a totem of the *Pakwihu* moiety (Gifford 1932). The Chukchansi Yokuts moieties were eagle and

coyote (Gayton 1948). Several American Indian groups (e.g., Western Mono, Miwok, and Yokuts) are reported to have collected caterpillars, grubs, or worms for food.

Extensive changes since the arrival of Anglo-Americans and other cultural and ethnic groups have affected the ability of American Indian tribes and groups who traditionally used the Mariposa Grove to access resources there. However, contemporary tribal groups have maintained strong connections to Mariposa Grove as part of their continuing cultural heritage. Recent ethnographic interviews conducted with park-associated American Indians note the particular importance of the Mariposa Grove to Southern and Central Sierra Miwok, Chukchansi Yokuts, and Western Mono peoples (Goldberg et al. 2012). It is important to note that archeological resources are highly valued by American Indians who have traditional associations with Yosemite National Park. Archeological sites, including those within and near the Mariposa Grove of Giant Sequoias and South Entrance, continue to be vital components of American Indian cultural patrimony, and reflect tangible links to ancestral occupation, burial grounds, and places of prayers and other ceremonial activities. The importance of these sites was affirmed during consultation meetings among Yosemite National Park staff and associated American Indian tribes and groups in 2011, and a consultation site visit to the Mariposa Grove of Giant Sequoias in January and May 2012, and April and July 2013. Several tribal representatives stated that the "protection of documented prehistoric archeological resources in the Grove from future development is of paramount concern" (Goldberg et al. 2012:11). Park-associated American Indians have expressed a cultural connection to Mariposa Grove, which indicates that the Grove would have high value for continuing traditional cultural practices.

Environmental Consequences

Impact Analysis Methodology

No historic properties with traditional cultural or religious significance (beyond archeological sites) have currently been identified within the Restoration of the Mariposa Grove of Giant Sequoias project area, therefore, impacts on traditional cultural resources are assessed under NEPA in this *Mariposa Grove FEIS*.

Pursuant to NEPA regulations (40 CFR 1500-1508), project impacts are evaluated based on the criteria of context and intensity. Context means the affected environment in which a proposed project occurs. Intensity refers to the severity of the effect, which is examined in terms of the type, quality, and sensitivity of the resource involved, location and extent of the effect, duration of the effect (short- or long-term), and other consideration of context. Beneficial and adverse effects are considered. When no measurable effect is identified, impact is found not to occur. The intensity of impacts is the degree or magnitude of a potential impact, described as negligible, minor, moderate, or substantial. Context and intensity are considered together when determining whether an impact is significant under NEPA.

The impact intensities criteria for those traditional cultural resources within the project area that are significant to park-associated American Indians are defined below. Note that archeological resources are evaluated in a separate section of this *Mariposa Grove FEIS*:

- Negligible Impact Intensity – the impact would be at the lowest levels of detection, barely measurable, with no perceptible consequences either adverse or beneficial to the resources.
- Minor Impact Intensity – the impact is measurable or perceptible, but it is slight and affects a limited area of a resource or group of resources.

- Moderate Impact Intensity – the impact is measurable and perceptible.
- Major Impact Intensity – the impact is substantial, noticeable, and permanent.

Alternative 1: No Action

Alternative 1, existing infrastructure; current Mariposa Grove concessioner facilities, operations, and maintenance; and current NPS management and shuttle operations would remain unaltered. No infrastructure renovation or improvements or ecological restoration actions, such as modification of Grove transit and parking operations; removal or upgrading of existing facilities; construction of new facilities and infrastructure; improvement of visitor way-finding, interpretation, and universal access; improvement of hydrologic flows; project-specific prescribed fire and hazardous fuel reduction treatments, or soil decompaction, would be implemented.

Operations-related Impacts. Current concessioner and park operations at the Mariposa Grove would be maintained under the no action alternative (Alternative 1). American Indians who are traditionally associated with the Mariposa Grove have maintained a strong connection to the Grove and have expressed a special, vital relationship with the Grove, and specifically with the giant sequoias, which are considered sacred. Traditionally associated American Indian tribes and groups also have continuing cultural connections with all of the prehistoric archeological sites within the project area (see Archeology section of this chapter), especially site CA-MRP-0661/H in the lower portion of the Grove. Under Alternative 1, current assured access to the Mariposa Grove afforded by the NPS to American Indians with local cultural associations would remain unchanged. However, many of the values that American Indians associate with the Grove, such as the general health of the giant sequoia ecosystem, continued availability of flora and fauna important for traditional uses, and archeological site conditions at South Entrance and Mariposa Grove, would continue to be affected by visitor facilities (e.g., parking areas, the gift shop), visitor use, and operational practices (e.g., commercial tram and gift shop operations, use of the Grove and South Entrance areas, lack of ecological restoration throughout the Grove and at Wawona Point). Furthermore, the current lack of interpretation of traditional cultural practices and resources within Mariposa Grove would continue.

Impact Significance. Giant sequoia groves have been important to native cultures over the millennia. The trees themselves are considered sacred, and ethnographic data suggest that the groves were areas where initiations or other important ceremonies were performed. The giant sequoia ecosystem also supports a number of fauna and flora species that have traditional importance, both spiritual and subsistence-related, to traditionally associated American Indians. The American Indian archeological sites within the project area also are important to traditionally associated tribes and groups. Alternative 1 would have long-term, moderate, adverse impacts on Mariposa Grove habitat, and long-term negligible adverse impacts under NEPA on archeological sites that are traditionally significant to associated American Indians.

Conclusion. Under the no action alternative (Alternative 1), the current conditions and operations at the Mariposa Grove would remain unchanged. The health of the giant sequoia ecosystem at the Mariposa Grove would continue to be impacted by unnecessary infrastructure located within the Grove, and the potential for adverse impacts at archeological sites would continue through unauthorized collection of artifacts or vandalism. There would continue to be limited interpretation of American Indian traditional cultural resources and practices in this area of the park. Current access to the Mariposa Grove by American Indian tribes to pursue traditional cultural practices would not be altered. Overall, Alternative 1 is the only alternative that would not result in noticeable (i.e. more than negligible) adverse impacts on culturally significant characteristics of archeological sites that are considered important traditional cultural resources by American Indians associated

with the project area. However, moderate adverse impacts on the giant sequoia habitat would continue.

Cumulative Impacts. The cumulative impacts on American Indian traditional cultural resources discussed in this section considers past, present, and reasonably foreseeable actions in the Mariposa Grove area (Appendix B), in combination with potential impacts of Alternative 1 (No Action). The timeframe for this analysis encompasses the period after the Mariposa Grove became a part of the Yosemite Land Grant in 1864, and the period after 1932 for areas near the South Entrance, after the NPS acquired the area. Before these periods, the ability for American Indians to hunt, gather, conduct controlled burns, and practice traditional ceremonies was already dramatically reduced. Significant logging had occurred near the South Entrance. Installation of the South Entrance Station and ranger residence provided controlled access into the park through this southern portal.

Current plans and projects in the Mariposa Grove area would have beneficial and adverse impacts on areas of traditional plant use (Appendix B). The *Parkwide Invasive Plant Management Plan Update* and the Wawona Meadow Restoration Project would result in long-term beneficial impacts on areas of traditional plant use. Activities associated with the *Fire Management Plan/Operational Fire Management Plan* and U.S. Forest Service fuels reduction projects would greatly reduce the threat of large high-severity catastrophic fires, and reduce the potential for vegetation type conversion. These actions would have a long-term beneficial impact on areas of traditional plant use.

There would be adverse impacts on areas of traditional plant use associated with the current South Entrance Station Kiosks Replacement project, the *Scenic Vista Management Plan* due to the localized loss of vegetation. Site-specific adverse impacts on vegetation could be short-term (during construction) and long-term (direct displacement of vegetation). The NPS would endeavor to avoid adverse impacts on traditional cultural resources such as areas of traditional plant use during the design phase for these projects. Where such avoidance is not feasible, the NPS, in consultation with traditionally associated American Indian tribes and groups, would mitigate the impacts to the greatest extent possible. Overall, there would be a long-term minor beneficial impact on traditional cultural resources as a result of past, present, and current projects.

Under Alternative 1 (No Action), there would be a long-term moderate adverse impact on traditional cultural resources in the Mariposa Grove. These impacts include ongoing impacts to giant sequoia habitat, the availability of flora and fauna important for traditional uses, and archeological site conditions that would continue to be affected by visitor facilities in the grove such as parking lots and the gift shop.

In summary, past impacts on traditional cultural resources in the region have been adverse, long-term, and minor. Present and foreseeable future actions would contribute to reversing the adverse impacts of past actions in the Mariposa Grove area. Under Alternative 1, there would be a long-term moderate adverse impact on traditional cultural resources in the Mariposa Grove. Past, present, and future impacts, in conjunction with the impacts of Alternative 1 (No Action), would result in a long-term moderate adverse impacts on traditional cultural resources in the Mariposa Grove area.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the commercial tram operations and reduce the amount of impervious surfaces and structures in the lower portion of the Grove, while relocating primary visitor parking to South Entrance. New visitor services at the South Entrance area would include visitor information, educational, and other sales items. The water tank and chlorination unit on the loop road in the upper portion of the Grove would be moved to a nearby location outside of sequoia habitat, and the gift shop in the lower portion of the Grove and existing vault toilets at Grizzly Giant and in the upper

portion of the Grove would be removed. Numerous other repairs, renovations, and ecological restoration actions, such as water line repair or replacement, replacement of the lower Grove vault toilets with flush toilets, installation of a new septic system and leach field in the lower portion of the Grove, historic rehabilitation of Wawona Point features, and soil decompaction would be components of this alternative. Interpretation of cultural and natural resources would be enhanced. The intersection of Mariposa Grove Road and Wawona Road at South Entrance would be realigned, and a roundabout could replace the existing T-intersection if needed to address traffic congestion near the South Entrance.

Construction-related Impacts. Demolition and removal of structures and pavement, staging of materials and equipment, construction of redesigned facilities, renovation of existing structures, installation of a new leach field, grading and recontouring for hydrological and ecological restoration purposes, and development of new accessible trails in the lower Grove area all would involve ground disturbance, which carries with it the potential to adversely impact archeological resources, including two archeological sites for which local American Indian tribes have expressed a vital connection and a desire for better protection from development and vandalism. Construction activities also could temporarily disturb wildlife and plant communities. Recontouring and replanting of reclaimed areas currently covered by pavement or buildings at the conclusion of construction would ensure that these are temporary impacts.

Construction of a new parking area at the South Entrance would impact nearly half of site CA-0660/H. In addition, extensive clearing would be required prior to construction would be a moderate adverse impact on traditional cultural resources. Actions in the lower Grove area that have the potential to adversely impact CA-MRP-0661/H include installation of a new shuttle turnaround, removal of existing roads and parking areas, and ecological restoration of modified areas. Parking reconfiguration in this area would seek to avoid excavation and rely on use of fill material to avoid impacting surface features. Black oak trees would be left in place in the vicinity of the archeological site, and elsewhere where feasible. The gift shop at the lower portion of the Grove would be removed from the vicinity of site CA-MRP-0661/H.

Impact Significance. Construction activity under Alternative 2 would adversely affect two archeological sites important to culturally associated American Indian tribes and groups who have expressed concern about protecting these resources from future development. There is potential for moderate adverse impacts on site CA-MRP-00660/H from construction of the parking lot at the South Entrance. In addition, extensive clearing of the site would be a moderate adverse impact on traditional cultural resources.

Impacts to site CA-MRP-0661/H in the lower Grove area would be minor, as design would avoid ground-disturbance and impacts to black oaks in the vicinity of the site. Removal of the parking area and gift shop away from CA-MRP-0661/H at the lower portion of the Grove would be a beneficial impact.

Restoration-related Impacts. Restoration activities, under Alternative 2 would improve the overall health of the giant sequoias at the Mariposa Grove. These actions, which would include increasing habitat area, decompaction of soils, improving hydrology, reforestation, and prescribed burns, would enhance values important to American Indians with a cultural association to the groves, some of whom are interested in the restoration and preservation of flora and fauna species for traditional uses. The use of prescribed burns to restore habitat is particularly supported by traditionally associated American Indians. The park would work with associated tribes and groups to improve conditions in the Grove for flora and fauna species important to American Indian tribes and groups. Alternative 2 restoration of the lower portion of the Grove would, on the other hand, have

temporary adverse impacts on traditionally significant archeological site CA-MRP-0661/H through reconditioning of soils where facilities have been removed, and the planting of native vegetation. While reclamation and revegetation of surfaces for ecological restoration purposes would further disturb archeological resources and giant sequoia habitat (see impact significance described above for construction impacts), these actions would lead to long-term beneficial impacts as more natural conditions are restored and site surfaces are stabilized.

Impact Significance. An improved giant sequoia ecosystem through restoration, especially prescribed burns, would have a beneficial impact on those characteristics of Mariposa Grove that are important to traditionally associated American Indians by restoring native vegetation, which in turn would attract native fauna. Temporary, minor adverse impacts on traditionally significant site CA-MRP-0661/H would occur from restoration actions at the lower portion of the Grove.

Operations-related Impacts. Operations under Alternative 2 would continue to allow traditionally associated American Indian tribes and groups to have access to the Mariposa Grove and the South Entrance for traditional practices. There is the potential for continued unauthorized collection of surface archeological artifacts from sites CA-MRP-0660/H and CA-MRP-0661/H under Alternative 2. American Indians traditionally associated with these sites have expressed a desire that the sites be protected from vandalism. If construction and operation of a leach field cannot be designed to avoid impacts on the traditionally significant archeological site (CA-MRP-0661/H), then a sewer line or vault toilets would be installed instead. Implementation of Alternative 2 would provide for additional public information about and interpretation of American Indian traditional cultural resources and practices, which would be a beneficial impact under this alternative. The need for increased public information about American Indian history and cultural practices has been repeatedly expressed by tribal representatives during project consultation. The reduced concentration of visitor parking at the lower portion of the Grove would enhance the natural ambience of the Grove and, thus, enhance the features of the Grove that are important to traditionally associated American Indians.

Impact Significance. Potential vandalism would have a long-term, minor, adverse impact on significant cultural resources under Alternative 2. Enhanced interpretation of traditional cultural resources and practices would have a long-term, beneficial impact on these resources at both the lower Grove area and at South Entrance. Removal of the parking area and gift shop away from CA-MRP-0661/H at the lower portion of the Grove would have a beneficial impact.

Conclusion. Restoration activities to improve the health of the giant sequoia ecosystem at the Mariposa Grove would have long-term, moderate to major beneficial impacts on those values attributed to the Grove by American Indians with cultural associations to the Grove. Alternative 2 would continue to allow traditionally associated American Indians to have access to Mariposa Grove, Wawona Point, and South Entrance to pursue traditional cultural practices, and the expansion of visitor education and interpretation would enhance understanding and appreciation of archeological and traditional cultural resources at the Mariposa Grove. These actions would have long-term, moderate beneficial impacts. The removal of the parking area and gift shop from site CA-MRP-0661/H in the lower Grove area would also have a beneficial impact.

Alternative 2 construction actions, including to the removal of structures and paved areas, would have a long-term, moderate to major adverse impact on archeological site CA-MRP-0660/H. In addition, extensive clearing of the site would be a moderate adverse impact on traditional cultural resources.

There would be a short-term, minor adverse impact on archeological site CA-MRP-0661/H. Final design of facilities in the vicinity of this site would avoid or minimize potential impacts on the site. Any parking reconfiguration in this area would seek to avoid excavation and rely on use of fill material to avoid impacting surface features. Mature black oak trees would be left in place in the vicinity of site CA-MRP-0661/GH and elsewhere, where feasible. Traditionally associated American Indian tribes and groups have specifically expressed concern about future development at these sites.

Overall, there would be a long-term moderate to major adverse impact on traditional cultural resources, largely from the loss of site CA-MRP-0660/H at the South Entrance, and the extensive clearing required as part of the South Entrance parking lot construction. Adverse effects would be resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be developed in consultation with the SHPO, ACHP, and associated American Indian tribes and groups.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting traditional cultural resources would be the same as those under Alternative 1 (No Action)—an overall long-term minor adverse impact on traditional cultural resources in the Mariposa Grove area. Under Alternative 2, there would be a long-term beneficial impact on the giant sequoia ecosystem with respect to restoration of giant sequoia habitat. The NPS would work with tribes and groups to improve accessibility to important resources and enhance interpretation of American Indian traditions and practices in Mariposa Grove. The reduction of automobile traffic within the Grove's giant sequoia habitat would improve the overall Grove experience. There would be major adverse impacts to the historic archeological site at the South Entrance in the lower Grove area, and minor impacts to the archeological site in the lower Grove area. In addition, loss of trees during construction of the South Entrance parking lot would be a long-term adverse impact on traditional cultural resources. Overall, there would be a long-term moderate to major impact on traditional cultural resources under Alternative 2.

The impacts of Alternative 2, in conjunction with the impacts from other past, present, and reasonably foreseeable projects affecting traditional cultural resources, would have an overall long-term moderate to major adverse impact on traditional cultural resources in the Mariposa Grove area. Mitigation developed in consultation with traditionally associated tribes and groups would be applied during project implementation, as described in a project-specific MOA (Appendix G).

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, including two new bridges, and a new parking lot near the Grizzly Giant, but outside of giant sequoia habitat. This alternative would make the Grizzly Giant the primary arrival point for visitors to the Grove. The current South Entrance parking lot would remain as is, and the parking lot in the lower Grove area would be removed and a small lot of ABAAS-compliant spaces would be constructed. The gift shop and commercial tram staging area in the lower portion of the Grove also would be removed, and the comfort station would be replaced. Numerous other repair, renovation, and ecological restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, utility upgrades and relocations, universal access, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction of Alternative 3 would adversely impact one archeological site for which local American Indian tribes have expressed a vital connection and a desire for better protection from development and vandalism. Potential impacts on

CA-MRP-0661/H would occur at the lower Grove area from construction of a new bypass road to the Grizzly Giant Hub, which would bisect this site and alter the character of the topographic features in the immediate site vicinity. The installation of a smaller, relocated comfort station and accessible parking area, and the removal of the gift shop, exiting comfort station, commercial tram staging area, and existing roads and parking areas that are located on or near the site would also impact the site.

Some traditionally associated tribal representatives have questioned the need to construct a new road through a section of older growth forest when one already exists (the historic road). To damage the old growth mixed conifer forest to benefit sequoia restoration seemed inappropriate because the forest habitat had already begun recovery from previous road construction.

Impact Significance. Removal, road and facility construction, and reclamation of areas for ecological restoration in the lower Grove area under Alternative 3 would have a short-term, minor to moderate adverse impact on one archeological site that is traditionally significant to associated American Indians who expressed concern about protecting such resources from future development, and in particular about creating a second road corridor that would damage and degrade the natural setting.

Restoration-related Impacts. Restoration activities under Alternative 3 would improve the overall health of the giant sequoias at the Mariposa Grove. These actions, which include increasing habitat area, decompaction of soils, improving hydrology, reforestation, and prescribed fires, would enhance values important to American Indians with a cultural association to the groves, some of whom are interested in the restoration and preservation of flora and fauna species for traditional uses. The use of prescribed burns to restore habitat in particular is supported by traditionally associated American Indians. The Park would work with tribes and groups to improve conditions in the Grove for flora and fauna important to American Indians. Alternative 3 ecological restoration in the lower portion of the Grove would, on the other hand, have short-term, minor adverse effects on traditionally important archeological site CA-MRP-0661/H due to contouring, soil reconditioning, and the re-establishment of native flora.

Impact Significance. Improved giant sequoia habitat through restoration, especially prescribed burns, would have a beneficial impact on those characteristics of the Grove that are important to the traditionally associated American Indians by restoring native vegetation, which, in turn, would attract native fauna. Short-term, minor adverse impacts on traditionally significant site CA-MRP-0661/H would occur due to restoration actions in the lower portion of the Grove.

Operation-related Impacts. Operations under Alternative 3 would continue to allow traditionally associated American Indians to have access to the Mariposa Grove and the South Entrance for traditional practices. There is the potential for continued unauthorized collection of surface archeological artifacts from site CA-MRP-0661/H under Alternative 3. American Indians traditionally associated with these sites have expressed a desire that they be protected from vandalism. Improved information about native cultures and traditional resources and practices would also occur under Alternative 3.

Impact Significance. Archeological site CA-MRP-0661/H, which is of interest to traditionally associated American Indian tribes and groups, would likely be subject to long-term, minor adverse impacts by unauthorized collection of artifacts. Use of the new bypass road and Grizzly Giant Hub would have direct, moderate to major long-term adverse impacts on the archeological site and on forested areas at the edges of the giant sequoia groves. However, improved interpretation would

have a long-term beneficial impact on traditional cultural resources by improving visitor understanding and appreciation of these resources.

Conclusion. Restoration activities to improve the health of the giant sequoia ecosystem at the Mariposa Grove would have a long-term beneficial impact on those values attributed to the Grove by American Indians who have a cultural association with the Grove, Alternative 3 would continue to allow traditionally associated American Indian tribes to have access to the Mariposa Grove and the South Entrance for traditional practices, and the consolidation and expansion of visitor education at Grizzly Giant would enhance the interpretation of archeological and traditional cultural resources at the Mariposa Grove. These actions would have long-term, moderate beneficial impacts on traditional cultural resources.

Alternative 3 construction actions would have a short-term, minor to moderate, adverse impact on archeological site CA-MRP-0661/H, for which traditionally associated American Indian tribes and groups have specifically expressed concern about future development. Continued use of the new bypass road to Grizzly Giant would also have a long-term moderate to major long-term impact on archeological site CA-MRP-0661/H and traditional cultural resources, as it would introduce high volumes of visitor traffic into an area of known cultural use by American Indian people, as indicated by the presence of archeological resources.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting traditional cultural resources would be the same as those under Alternative 1 (No Action)—an overall long-term minor adverse impact on traditional cultural resources in the Mariposa Grove area. Under Alternative 3, there would be a long-term beneficial impact on the giant sequoia ecosystem with respect to restoration of giant sequoia habitat. The NPS would work with tribes and groups to improve accessibility to important resources and enhance the interpretation of American Indian traditions and practices in Mariposa Grove. The reduction of automobile traffic within the Grove's giant sequoia habitat would improve the overall Grove experience. The loss of trees required during construction of the Grizzly Giant hub and access road would be a long-term major adverse impact on traditional cultural resources. Overall, there would be a long-term major impact on traditional cultural resources under Alternative 3.

The impacts of Alternative 3, in conjunction with the impacts from other past, present, and reasonably foreseeable projects affecting traditional cultural resources, would have an overall long-term moderate to major adverse impact on traditional cultural resources in the Mariposa Grove area. Mitigation developed in consultation with traditionally associated tribes and groups would be applied during project implementation, as described in a project-specific MOA (Appendix G).

Alternative 4: South Entrance Hub with Modified Commercial Tram Service

Alternative 4 would remove the tram staging, gift shop, and the majority of visitor parking from Mariposa Grove, and would relocate primary visitor parking and tram staging to the new South Entrance Hub. New visitor services at the South Entrance area would include visitor information, educational, and other sales items. The commercial tram would continue to operate on a reduced schedule and route, originating at South Entrance and extending to the Mariposa Grove Museum, with stops at the lower and mid-Grove areas. The water tank and chlorination unit on the loop road in the upper portion of the Grove would be moved to a location near the museum building, and existing comfort stations at Grizzly Giant and in the upper portion of the Grove would be renovated, rehabilitated, or replaced. Numerous other repair, renovation, and ecological restoration actions, such as water line repair or replacement, replacement of the comfort station and installation of a new septic tank and leach field in the lower Grove area, historic rehabilitation of Wawona Point features, hydrologic improvements, and soil decompaction and revegetation would be components of this

alternative. An accessible trail would be developed in the lower Grove area, and accessible overlook at Grizzly Giant would be provided. The intersection of Mariposa Grove and Wawona roads at South Entrance would be realigned and a roundabout would replace the existing T-intersection if traffic conditions warrant this action.

Construction-related Impacts. Alternative 4 would affect two archeological sites for which local American Indians have expressed a vital connection and a desire for better protection from development and vandalism.

Construction of a new parking area at the South Entrance would impact nearly half of site CA-0660/H. In addition, extensive clearing required prior to construction would be a moderate adverse impact on traditional cultural resources. Actions in the lower Grove area that have the potential to adversely impact CA-MRP-0661/H include installation of a new shuttle turnaround, removal of existing roads and parking areas, and ecological restoration of modified areas. Parking reconfiguration in this area would seek to avoid excavation and rely on use of fill material to avoid impacting surface features. Black oak trees would be left in place in the vicinity of existing vegetated island west of the gift shop, and elsewhere where feasible. The main parking area and gift shop at the lower portion of the Grove would be removed from the vicinity of the site CA-MRP-0661/H.

Impact Significance. Construction activities under Alternative 4 would adversely affect two archeological sites important to culturally associated American Indian tribes and groups who have expressed concern about protecting these resources from future development. There is potential for moderate adverse impacts to site CA-MRP-0660/H from construction of the parking lot at the South Entrance. In addition, extensive clearing of the site would be a moderate adverse impact on traditional cultural resources.

Impacts on site CA-MRP-00661/H in the lower Grove area would be minor, as design would avoid ground disturbance and impacts to black oaks in the vicinity of the site. Removal of the parking area and gift shop away from CA-MRP-0661/H at the lower portion of the Grove would be a beneficial impact.

Restoration-related Impacts. Ecological restoration activities under Alternative 4 would improve the overall health of the giant sequoia at Mariposa Grove. These actions, which include increasing habitat area, reconditioning soils, improving hydrology, reforestation, and prescribed burns, would enhance values important to American Indians with a cultural association to the Grove, some of whom are interested in the restoration and preservation of flora and fauna species for traditional uses. The use of prescribed burns to restore habitat in particular is supported by traditionally associated American Indians. The Park would work with tribes to improve conditions in the Grove for flora and fauna species important to American Indian tribes and groups. Alternative 4 restoration in the lower portion of the Grove would, on the other hand, have adverse impacts on traditionally significant archeological site CA-MRP-0661/H through recontouring, reconditioning of soils, and revegetation where facilities have been removed and the planting of native vegetation. These impacts would be considered temporary adverse impacts.

Impact Significance. Improved giant sequoia habitat through ecological restoration would have a positive impact on those characteristics of the Grove that are important to the traditionally associated American Indians by restoring native vegetation, which, in turn, would attract native fauna. Traditionally significant site CA-MRP-0661/H would be subject to short-term minor adverse

impacts by restoration actions in the lower portion of the Grove. Revegetation of areas at Wawona Point also would be beneficial.

Operation-related Impacts. Operations under Alternative 4 would continue to allow traditionally associated American Indian tribes to have access to the Mariposa Grove and the South Entrance for traditional practices. There is the potential for continued unauthorized collection of surface archeological artifacts from sites CA-MRP-0660/H and CA-MRP-0661/H under this alternative. American Indian tribes and groups traditionally associated with these sites have expressed a desire that they be protected from vandalism. If construction and operation of a leach field cannot be designed to avoid impacts to the traditionally significant archeological site (CA-MRP-0661/H), then vault toilets or a sewer line to South Entrance would be installed instead. Reduced concentration of visitor parking at the lower Grove area would enhance the natural ambience of the Grove, and thus enhance the features of the Grove that are important to traditionally associated American Indians. Also, improved information about native cultures would also occur under Alternative 4. Alternative 4 would provide for additional public information about American Indian traditional culture, which would be a beneficial impact. The need for increased public information about American Indian history and cultural practices has been repeatedly expressed by tribal representatives during project consultation.

Impact Significance. Potential vandalism is a long-term, minor, adverse impact on significant traditional cultural resources. Enhanced interpretation of traditional cultural resources and practices would have a long-term, beneficial impact on these resources at both the lower Grove area and at South Entrance. Removal of the parking area and gift shop away from CA-MRP-0661/H at the lower portion of the Grove would be a beneficial impact.

Conclusion. Restoration activities to improve the health of the giant sequoia ecosystem at the Mariposa Grove would have long-term, moderate to major beneficial impacts on those values attributed to the Grove by American Indians with cultural associations to the Grove. Alternative 4 would continue to allow traditionally associated American Indians to have access to the Mariposa Grove and the South Entrance for traditional practices, and the enhancement of visitor education would enhance the understanding and appreciation of traditional cultural values and archeological resources at Mariposa Grove. These would be long-term, beneficial impacts. Other beneficial impacts included removal of the parking area and gift shop away from CA-MRP-0661/H at the lower portion of the Grove.

Alternative 4 construction actions, including to the removal of structures and paved areas, would have a long-term, moderate to major adverse impact on archeological site CA-MRP-0660/H. In addition, extensive clearing of the site would be a moderate adverse impact on traditional cultural resources.

There would be a short-term, minor adverse impact on archeological site CA-MRP-0661/H. Final design of facilities in the vicinity of this site would avoid or minimize potential impacts on the site. Any parking reconfiguration in this area would seek to avoid excavation and rely on use of fill material to avoid impacting surface features. Mature black oak trees would be left in place in the vicinity of the site CA-MRP-0661/H and elsewhere where feasible. Traditionally associated American Indian tribes and groups have specifically expressed concern about future development at these sites.

Overall, there would be a long-term moderate to major adverse impact on traditional cultural resources, largely from the loss of site CA-MRP-0660/H at the South Entrance, and the extensive clearing required as part of the South Entrance parking lot construction. Adverse effects would be

resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be developed in consultation with the SHPO, ACHP, and associated American Indian tribes and groups.

Cumulative Impacts. The regional past, present, and reasonably foreseeable projects affecting traditional cultural resources would be the same as those under Alternative 1 (No Action)—an overall long-term minor adverse impact on traditional cultural resources in the Mariposa Grove area. Under Alternative 4, there would be a long-term beneficial impact on the giant sequoia ecosystem with respect to restoration of giant sequoia habitat. The NPS would work with tribes and groups to improve accessibility to important resources and enhance interpretation of American Indian traditions and practices in Mariposa Grove. The reduction of automobile traffic within the Grove's giant sequoia habitat would improve the overall Grove experience. There would be major adverse impacts to the historic archeological site at the South Entrance in the lower Grove area, and minor impacts to the archeological site in the lower Grove area. In addition, the loss of trees required during construction of the South Entrance parking lot would be a long-term adverse impact on traditional cultural resources. Overall, there would be a long-term moderate to major impact on traditional cultural resources under Alternative 4.

The impacts of Alternative 4, in conjunction with the impacts from other past, present, and reasonably foreseeable projects affecting traditional cultural resources, would have an overall long-term moderate to major adverse impact on traditional cultural resources in the Mariposa Grove area. Mitigation developed in consultation with traditionally associated tribes and groups would be applied during project implementation, as described in a project-specific MOA (Appendix G).

ARCHEOLOGICAL RESOURCES

Affected Environment

To date, at least 10 percent of Yosemite National Park lands, including the Mariposa Grove, have been inventoried for cultural resources, and more than 1,700 archeological sites have been documented. Most of the inventories have focused on lower-elevation, developed areas and road corridors, however, some wilderness and higher-elevation areas also have been surveyed. In most cases, inventories have been conducted in support of park development projects as part of the environmental and historic preservation compliance processes. The park-wide archeological research design developed by Hull and Moratto (1999), titled *Archeological Synthesis and Research Design for Yosemite National Park, California,* provides guidance for assessing the research potential of these sites. This document provides the most recent comprehensive overview of Yosemite National Park's archeological resources and their informational value.

Yosemite National Park Archeology

Prehistoric archeological sites within Yosemite National Park include lithic scatters and milling stations (granite boulders with mortar cups or milling slicks), the most common site features documented to date; 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, and trails. Individual sites vary by type, size, depth, complexity, length of occupation, variety of remains, and potential to yield important scientific information.

James Bennyhoff of the University of California at Berkeley presented the first cultural chronology for prehistoric sites in the park, which was based on his excavations at Crane Flat that were conducted in the early 1950s (Bennyhoff 1956). Bennyhoff identified three cultural complexes for the region. Though the dating was tenuous, from oldest to youngest, these were the Crane Flat (circa A.D. 500), Tamarack (circa A.D. 500-circa 1200), and Mariposa (circa A.D. 1200-circa 1850) complexes. Since that initial effort to characterize temporal associations of archeological resources in the park, numerous studies have contributed to improved understanding of the past human occupation. These studies have included cultural resource management studies within the Park; overviews of the southern and central Sierra; and excavations of sites at Mariposa Grove, Glacier Point Road, Dana Meadows, Tuolumne Meadows, Tamarack Flat, Crane Flat, Yosemite Valley, and El Portal.

Based on the expanded database of archeological information, Hull and Moratto (1999) proposed a new cultural chronology that reflects the complexity of human occupation throughout the park over the millennia. The periods of occupation identified by Hull and Moratto (1999:182) include: the Early Prehistoric (>9500-6000 B.C.), represented by the El Portal and other as-yet-unidentified complexes or phases; the Intermediate Prehistoric (6000-1200 B.C.), as reflected by the Merced, Clyde, Wawona, and other unidentified phases; the Late Prehistoric (3500-1200 B.C.- A.D. 1800), expressed by the Crane Flat, Cowhorn, Tamarack, Baker, Mariposa, and Klondike complexes; the Protohistoric (A.D. 1800-1847), representative of the cultural changes in response to the Gold Rush and the "discovery" of Yosemite, and identified as the Yosemite phase; and the Historic period (post A.D. 1848), referred to as the Tenaya complex, which encompasses the ethno-historic period following the Gold Rush. Hull and Moratto (1999:181) cautioned that "the culture history ... must be viewed as tentative and subject to revision as archeological research continues."

Archeological studies conducted at three sites within the area of potential effect established for this project at South Entrance and in the Mariposa Grove of Giant Sequoias (figure 3-18; Hull 1989) indicate that the area has been inhabited by American Indians for at least 3,500 years (Bane 2012:5). Site CA-MRP-660/H, located at the South Entrance, was occupied between 500 A.D. and 1500 A.D., while materials recovered at Mariposa Grove sites CA-MRP-199 and CA-MRP-661/H reflect a different pattern of use. Three periods of occupation were identified at CA-MRP-199; two were dated between 1500 B.C. and A.D. 500, and the third was from A.D. 1500 to A.D. 1850. The CA-MRP-661/H deposits, on the other hand, suggest sporadic occupation since 1500 B.C.

Historical archeology is closely tied to the nineteenth and twentieth century development of Yosemite, beginning with vestiges from early explorers and continuing through NPS management of the park. In addition to Anglo-American historical use of Yosemite, a subset of historical archeology represented at the park includes historical American Indian sites. Hull and Moratto (1999:507-510) present an integrated list of historical archeological resource types documented in Yosemite National Park that include transportation, exploration and survey, historical Native American, hunting/trapping, residential, water diversion/use, mine and quarry, logging, ranching/herding/farming, environmental management, tourism, park operations and administrative, and other types such as cemeteries. Hull and Moratto (1999:511-531) then developed Yosemite-specific themes oriented to historical archeology. Themes relevant to the Mariposa Grover ecological restoration project include transportation, national resource management (e.g., Civilian Conservation Corps), and industrial (e.g., logging).

During the nineteenth century, the Yosemite area and its natural resources were used and exploited by individuals for private gain, and included mainly mining, herding, logging, and tourism. The progression of such development was particularly evident in the transportation and lodging infrastructure. At the end of the nineteenth century, the area became the first major parcel of federal

land to be set aside for preservation purposes as a result of the movement to preserve the natural wonders of Yosemite Valley and the Mariposa Grove of Big Trees. Congressional passage of the Yosemite Grant in 1864 protected the Grove as a state land grant until 1890, when it was designated a national park by Congress. The creation of this park and its policies on the nature of acceptable land use fostered tensions between private entrepreneurs, who used public lands for their own profit, and state and federal governments. These tensions resulted in a number of lawsuits that tested the rights of private individuals versus the federal government. Ultimately, the federal government prevailed in preserving Yosemite Valley and the surrounding lands for the public. The preservation of this area reduced the environmental impacts caused by private enterprises, such as livestock grazing, logging, cultivation, and mining, within and adjacent to the park.

The historic-era archeology of Mariposa Grove is strongly related to the tourism that developed out of the establishment of the park, as it was among the initial lands set aside for protection in 1864. Historic-era archeological remains at South Entrance also reflect tourism after 1932, when the Wawona Basin was included in the park boundaries. Prior to that date, the area was heavily used as a center for logging by the Madera Sugar Pine Company, which operated there from 1908 to 1931. Many of the historic-era archeological sites at South Entrance reflect the lumber industry from that period.

Mariposa Grove Archeology

Since the mid-1950s, eight cultural resources studies have been conducted at the Mariposa Grove. These have primarily included archeological surveys (Bennyhoff 1956; Napton and Greathouse 1976; Hull and Mundy 1985; Jackson 2002; Bane 2012), but limited site test excavation (Hull 1989) and a cultural landscape inventory (Caywood and Homstad 2004a) have also been completed. The Mariposa Grove Archeological District, which was listed in the National Register in 1980, was established as the result of some of the earliest studies (NPS 1980b). The Mariposa Grove Archeological District consists of three noncontiguous areas (Areas 1 through 3) ranging in size from 10 acres (Areas 1 and 3) to 15 acres (Area 2) that surround three discrete prehistoric archeological sites with bedrock mortars. These include sites CA-MRP-198 (Area 1), CA-MRP-199 (Area 2), and CA-MRP-372 (Area 3). Altogether, 21 archeological resources have been recorded within Mariposa Grove: 4 prehistoric archeological sites, 15 historic-era sites, and 1 multicomponent site that contain both prehistoric and historic-era constituents (table 3-9).

Nine of the 21 sites have been evaluated for National Register eligibility; the remaining 12 sites have not yet been evaluated, as summarized in table 3-9. Four of the historic-era sites (CA-MRP-2109H, P-22-002384, P-22-002385, and P-22-002386) are small, diffuse trash scatters adjacent to the Mariposa Grove Road, and likely represent single episodes of discard from the road shoulder. The NPS (Bane 2012) evaluated these sites and recommended that they be considered ineligible for listing in the National Register, as they do not meet any of the eligibility criteria. The California SHPO concurred with a determination of ineligibility for these four sites in February 2013. Hull (1989) conducted test excavations at multicomponent site CA-MRP-661/H in 1985, and recommended the site as eligible for inclusion in the National Register. Hull also conducted test excavations at prehistoric site CA-MRP-199 in 1985, and, as noted above, this site is National Register-eligible as part of the Mariposa Grove Archeological District. CA-MRP-1618H, the Mariposa Grove Road, also is considered eligible for the National Register as a contributing element of the Mariposa Grove Historic District. This historic feature extends between Mariposa Grove and its intersection with Wawona Road at South Entrance.

Table 3-9 – Mariposa Grove Archeological Resources

Site Number	Site Type	National Register of Historic Places Eligibility
CA-MRP-198	Prehistoric	Eligible*
CA-MRP-199	Prehistoric	Eligible*
CA-MRP-372	Prehistoric	Eligible*
CA-MRP-661/H	Multi-Component	Eligible
CA-MRP-662	Prehistoric	Not evaluated
CA-MRP-1611H	Historic-Era	Not evaluated
CA-MRP-1612H	Historic-Era	Not evaluated
CA-MRP-1613H	Historic-Era	Not evaluated
CA-MRP-1614H	Historic-Era	Not evaluated
CA-MRP-1615H	Historic-Era	Not evaluated
CA-MRP-1616H	Historic-Era	Not evaluated
CA-MRP-1617/H	Historic-Era	Not evaluated
CA-MRP-1618H	Historic-Era	Eligible
CA-MRP-1843H	Historic-Era	Not evaluated
CA-MRP-2109H	Historic-Era	Not Eligible
P-22-002376	Historic-Era	Not evaluated
P-22-003284	Historic-Era	Not Eligible
P-22-003285	Historic-Era	Not Eligible
P-22-003286	Historic-Era	Not Eligible
P-22-003287	Historic-Era	Not evaluated
YOSE 1998 W-02		Not evaluated

* = Site is a contributor to the Mariposa Grove Archeological District

South Entrance Archeology

The South Entrance area has been subject to seven cultural resources studies: 6 archeological surveys (Hull and Mundy 1985; Hull and Hale 1997; Jackson 2002; Peabody and Bevill 2009; URS n.d.; Bane 2012), 1 limited site test excavation (Hull 1989), and a cultural landscape inventory (Caywood and Homstad 2004b). Ten archeological sites (8 historic-era, 2 multicomponent,) have been recorded in this area (table 3-10). Hull (1989) recommended CA-MRP-660/H as eligible for the National Register after conducting test excavations at the site in 1985. As previously noted in table 3-9, the Mariposa Grove Road (CA-MRP-1618H) was determined eligible for the National Register as a contributing element of the Mariposa Grove Historic District. The remaining 8 sites, including CA-MRP-1620H, the Washburn Wagon Road, is currently under evaluation for National Register eligibility.

Table 3-10 – South Entrance Archeological Resources

Site Number	Site Type	National Register of Historic Places Eligibility
CA-MRP-660/H	Multi-Component	Recommended Eligible
CA-MRP-716H	Historic-Era	Not evaluated
CA-MRP-1361H	Historic-Era	Not evaluated
CA-MRP-1618H	Historic-Era	Eligible
CA-MRP-1620H	Historic-Era	Recommended Eligible
CA-MRP-1850/H	Multi-Component	Not evaluated
CA-MRP-2105H	Historic-Era	Not evaluated
CA-MRP-2107H	Historic-Era	Not evaluated
CA-MRP-2108H	Historic-Era	Not evaluated
CA-MRP-2110H	Historic-Era	Not evaluated

Environmental Consequences

Impact/Effects Assessment Methodology. Historic properties, as defined by the implementing regulations of the NHPA, are any districts, buildings, structures, sites, or objects eligible for inclusion in the National Register because they are significant at the national, state or local level in American history, architecture, archeology, engineering, or culture. Historic properties also include resources considered by American Indians to have cultural and/or religious significance. The term "eligible for inclusion" includes both properties formally determined eligible and all other properties that meet National Register listing criteria.

Effects on archeological resources considered eligible for inclusion in the National Register were analyzed in accordance with 36 CFR 800.5(a)(1) effects criteria. Archeological sites are most often determined eligible for the National Register under 36 CFR 60.4, Criterion (d), as resources that have "yielded, or may be likely to yield information important in prehistory or history."

Adverse effects result when it is determined that a proposed action would diminish the characteristics that make a historic property eligible for inclusion in the National Register. For archeological sites, these actions generally include physical destruction of, or damage to, all or part of the property.

National Historic Preservation Act Methods for Assessing Effect. Pursuant to Director's Order 12 (Sections 2.14(6)(3), 6.2 F, and 6.3 F and Appendix 3); 40 CFR 1508.7, 1508.8, and 1508.27; and 36 CFR 800.8), effect intensity, duration, context, and type as they relate to historic properties, are determined using the criteria established in 36 CFR Part 800. When the effect of an action results in an alteration of the characteristics of a cultural resource that qualify it for inclusion in the National Register as a historic property, the action is considered to have an adverse effect under Section 106 of the NHPA. Per 36 CFR 800.5(a)(1), an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

The cultural resources investigations and reports for the project were undertaken in accordance with the NHPA Section 106 implementing regulations, 36 CFR 800, Protection of Historic Properties. As amended, Section 106 of the NHPA requires federal agencies with either direct or indirect jurisdiction over a proposed undertaking to take into account the effect of the undertaking on historic properties. As part of Section 106 compliance, a four-step process is typically implemented, and consists of the following: initiate consultation (36 CFR 800.3); identify historic properties (36 CFR 800.4); assess adverse effects (36 CFR 800.5); and resolve adverse effects (36 CFR 800.6). These steps involve a range of activities, such as defining the undertaking, identifying the proper consulting parties (e.g., SHPO and American Indian tribes and groups), delineating the APE, identifying and evaluating properties in the APE, applying the effects criteria, and resolving any adverse effects.

Under this four-step process, there are three possible effects determinations:

No Historic Properties Affected – A "no historic properties affected" determination indicates that no historic properties are in the APE, or that there are historic properties in the APE, but the undertaking would not alter the characteristics that qualify it for inclusion in or eligibility for the National Register.

No Adverse Effect – A "no adverse effect" determination indicates that there would be an effect on the historic property by the undertaking, but the effect does not meet the criteria of adverse effect in 36 CFR 800.5(a)(1) and would not alter any of the characteristics that make it eligible for listing in the National Register in a manner that would diminish the integrity of the historic property.

Adverse Effect – An adverse effect indicates that the undertaking would alter, directly or indirectly, any of the characteristics that qualify it for inclusion in the National Register in a manner that would diminish the integrity of the property.

Adverse effects may be resolved by developing a memorandum of agreement or programmatic agreement among the project proponent, the SHPO, and the ACHP, and in consultation with associated American Indian tribal governments and traditionally affiliated groups, and other consulting parties, such as American Indian tribes (36 CFR 800.6). The agreement would specify the mitigating actions that must be taken to resolve the adverse effects, and the implementation and documentation protocols to be followed.

As previously noted (see American Indian Traditional Cultural Resources section, above), impacts on cultural resources that are deemed ineligible for listing in the National Register are also addressed under NEPA. NEPA states that, in considering whether an action may "significantly affect the quality of the human environment," an agency must consider, among other things, the unique characteristics of the geographic area, such as proximity to historic or cultural resources [40 CFR 1508.27(3)], and the degree to which the action may adversely affect districts, sites, linear features, landscapes, buildings, structures, or objects listed, or eligible for listing, in the National Register, or may cause loss or destruction of significant scientific, cultural, or historical resources [40 CFR 1508.27].

However, the evaluation of project impacts under NEPA is not the same as the evaluation of those effects under Section 106. The ACHP stated in the preamble for the revised Section 106 regulations (ACHP 2001: 49) that the rules contain "no significance or materiality limitations," such as those contained in the NEPA that limit most of that statute's key provisions only to actions that might significantly affect the environment. In contrast, the ACHP Section 106 rules seek to require agencies to examine all effects of any intensity, whether or not the effects are significant. Where there is an alteration of a historic property, any diminishment of any aspect of its historic integrity, however measured and however great or small, can support a finding of "adverse effect." As a result, any reduction in the intensity of an impact through mitigation would not necessarily reduce an adverse effect to a "no effect." That is, although actions determined to have an adverse effect under Section 106 and 36 CFR 800 may be mitigated, the effect remains adverse. An adverse effect finding under Section 106 could be an impact with moderate or substantial intensity under NEPA.

NEPA impacts are evaluated based on the criteria of context and intensity. Context means the affected environment in which a proposed project occurs. Intensity refers to the severity of the impact, which is examined in terms of the type, quality, and sensitivity of the resource involved, location and extent of the impact, duration of the effect (short- or long-term), and other consideration of context. Beneficial effects are also considered. When no measurable effect exists, there is no impact. The intensity of an impact is the degree or magnitude of a potential impact, described as negligible, minor, moderate, or major. Context and intensity are considered together when determining whether an impact is significant under NEPA. Thus, it is possible that a significant adverse effect under Section 106 may still exist when the intensity of the impact is determined to be negligible or even if the impact is beneficial.

The following defines the impact intensities for those cultural resources within the project area that are not eligible for listing in the National Register:

- Negligible Impact Intensity – the impact would be at the lowest levels of detection, barely measurable, with no perceptible consequences either adverse or beneficial to the resources.
- Minor Impact Intensity – the impact is measurable or perceptible, but it is slight and affects a limited area of a resource or group of resources.
- Moderate Impact Intensity – the impact is measurable and perceptible.
- Major Impact Intensity – the impact is substantial, noticeable, and permanent.

Area of Potential Effects

The APE for a federal undertaking under the NHPA is defined at 36 CFR 800.16(d) 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 APE for the current project includes the Mariposa Grove and South Entrance vicinities, including the transportation corridor linkages (i.e. the Washburn Wagon Road route and the Mariposa Grove Road) between the two areas, as depicted in figure 3-18. The APE encompasses the Mariposa Grove Archeological District, as well as the Mariposa Grove and South Entrance Station historic districts. As described above, the APE incorporates historic properties, archeological resources deemed ineligible for inclusion in the National Register, and archeological resources not yet evaluated for National Register eligibility. In accordance with NPS policy, resources for which eligibility has not been determined are considered potentially eligible for inclusion in the National Register.

Alternative 1: No Action

Under Alternative 1, current infrastructure, concessioner services and maintenance, and park management would remain as is. No repair, renovation, or ecological restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be implemented.

Operation-related Impacts. Under Alternative 1, the existing conditions for archeological resources within the project area would not be altered, including the four sites in the Mariposa Grove Archeological District. Portions of site CA-MRP-1361/H, which has not yet been evaluated for National Register eligibility, are currently beneath the parking area at the South Entrance. Similarly, the existing gift shop and shuttle staging area at the lower portion of the Grove overlie parts of site CA-MRP-0661/H, which has been found to be eligible for listing in the National Register. A historic-era artifact scatter associated with this site also is in close proximity to gift shop, which may result in the unauthorized collection of artifacts by park visitors. Unauthorized collection is considered an adverse effect. Other current operational impacts that exist within the boundaries of CA-MRP-0661/H include concessioner parking, picnicking facilities next to the gift shop, burn piles, and hazard fuel thinning. Furthermore, there is little interpretation of archeological resources within the Mariposa Grove.

Impact Significance and Determination of Effect. The potential for unauthorized collection of artifacts at site CA-MRP-0661/H would continue under Alternative 1, and constitutes an adverse effect on this historic property under Section 106 of the National Register. Portions of CA-MRP-1361/H lie beneath the existing parking lot at the South Entrance. This site has not yet been evaluated for National Register eligibility, but is assumed eligible until determined otherwise.

Areas of this site beneath the parking lot currently are protected from further disturbance, and features adjacent to the parking lot lie outside of areas likely to be subject to disturbance by park visitors. Alternative 1 would have no adverse effect on CA-MRP-1361/H.

Conclusion. Under Alternative 1, the No Action Alternative, the condition, routine maintenance, and operations of the Mariposa Grove and the South Entrance would remain unchanged. The potential for adverse effects through unauthorized collection of artifacts would continue in the lower portion of the Grove at site CA-MRP-0661/H, and portions of site CA-MRP-1316/H would remain protected by the parking lot at the South Entrance. None of the other archeological resources identified in the project APE, including those sites that contribute to the Mariposa Grove Archeological District, would be impacted under Alternative 1. Routine or emergency repairs that could occur during concessioner and park operation of Mariposa Grove and South Entrance (e.g., repairs to existing septic systems and leach fields or buried utilities; excavation of fire breaks) could result in disturbance of archeological deposits. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance. There would continue to be limited interpretation of archeological resources in this area of the park.

Cumulative Impacts. The following cumulative effect discussion on archeological resources considers the past, present, and reasonably foreseeable actions in the Mariposa Grove area, in combination with potential effects of Alternative 1 (No Action). Archeological resources in the area were disturbed in the past by construction, operation, and maintenance activities through time. There have been eight archeological studies in the Mariposa Grove area and seven studies at the South Entrance since the mid-1950s. These studies identified a number of sites as eligible for the National Register, though many sites were not evaluated.

Present and future projects in the Mariposa Grove area with ground-disturbing components and the potential for archeological effects include: placement of riprap along historic road shoulders after flood events, Mariposa Grove Comfort Station Log Replacement and Repair, Mariposa Grove Interpretive Sign Installation, Mariposa Grove Trails and Asphalt Removal, Replace Mariposa Grove Remote Access Weather Station with Standard Tower, South Entrance Boundary Marker Stabilization, South Entrance Leach Field Repair, South Entrance Office Reroute Telephone Line, South Entrance Station Reestablish Exit Lane, South Entrance Safety Improvements, South Entrance Station Reestablish Exit Lane, South Entrance Traffic Safety Improvements, South Entrance Station Kiosks Replacement, Tachyon Satellite Equipment Installation. Appendix B describes these projects in more detail. During project implementation, the NPS avoided adverse effects or otherwise carried out mitigation to minimize potential effects on cultural resources. With application of mitigation, which may include consultation, survey, testing, monitoring, and data recovery prior to each project, adverse effects of these projects were resolved.

Alternative 1 (No Action) would result in no change in the current treatment and management of archeological resources. Maintenance activities would have no effect on archeological resources, as appropriate mitigation measures would be enacted. Unauthorized collection of archeological artifacts from the ground surface by visitors could continue. Overall, there would be no adverse effects.

In summary, past, present and foreseeable future actions would have a no effect on archeological resources in the Mariposa Grove area. Under Alternative 1, there would be no adverse effect on archeological resources in the Mariposa Grove area. Present and future effects, in conjunction with the effects of Alternative 1 (No Action), would result in no adverse effects on archeological resources in the Mariposa Grove area.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the commercial tram operations and reduce the amount of impervious surfaces and structures in the lower portion of the Grove, while relocating primary visitor parking to South Entrance. New visitor services at the South Entrance area would include visitor information, educational, and other sales items. The water tank and chlorination unit on the loop road in the upper portion of the Grove would be relocated to a nearby location outside of sequoia habitat The gift shop in the lower portion of the Grove, the existing vault toilets at the Grizzly Giant, and the existing vault toilet in the upper portion of the Grove (near the old lodge site) would be removed. Numerous other repairs, renovations, and ecological restoration actions, such as water line repair or replacement, renovation of the comfort station and installation of a new septic system and leach field in the lower portion of the Grove, historic rehabilitation of Wawona Point features, and soil decompaction would be components of this alternative. Visitor orientation would be improved and interpretation of natural and cultural/archeological resources would be expanded. Modifications to enhance accessibility would be made at South Entrance parking, the restored lower Grove area and the Grizzly Giant. The intersection of Mariposa Grove Road and Wawona Road at South Entrance would be realigned and, if needed, to address congestion, a roundabout could replace the existing T-intersection.

Construction-related Impacts. Construction of a new parking area at the South Entrance would impact nearly half of site CA-0660/H, which has been recommended eligible for listing in the National Register. Modification of the existing South Entrance paved parking lot to serve as a bus turnaround would impact the southernmost extent of site CA-MRP-1361/H. This site has not been evaluated for listing in the National Register, and evaluation would be necessary, but until then, CA-MRP-1361/H is assumed eligible. The portion of the site that would be impacted has been previously disturbed and contains no intact features or recorded artifacts. Alternative 2 also proposes to convert the majority of the1.5-mile-long historic-era Washburn Wagon Road, CA-MRP-1620H, to a pedestrian trail that would lead from the South Entrance to the Mariposa Grove. The remaining 1,100 feet of the wagon road would be removed during construction of the proposed South Entrance hub parking lot. The road was identified as a contributing resource to an amended determination of eligibility for the Mariposa Grove Historic District Determination in 2012.

Actions at the lower portion of the Grove that have the potential to adversely impact CA-MRP-0661/H include installation of a new shuttle turnaround, removal of the gift shop and modification of existing parking areas, and ecological restoration of modified areas. Any parking reconfiguration in this area would seek to avoid excavation and rely on use of fill material to avoid impacting surface features. The new proposed trail would be designed to run outside of known historic sites, and data recovery would be conducted as appropriate during trail construction.

Ground-disturbing activities associated with removal and construction of facilities under Alternative 2 also would have a potential to disturb previously undocumented archeological resources and/or archaeological deposits that are not visible on the ground surface. The potential effect of these activities on such resources would depend on the significance of the resource, and the extent and magnitude of disturbance of such resource during project implementation. Alternative 2 construction would not affect sites included in the Mariposa Grove Archeological District.

Impact Significance and Determination of Effect. Construction of new parking and the realignment of Wawona Road at the South Entrance would have an adverse effect on site CA-MRP-0660/H. The NPS would ensure that installation of a leach field and removal of the gift shop and appurtenant facilities in the lower Grove area would not adversely affect CA-MRP-0661/H.

Neither site CA-MRP-1361/H nor CA-MRP-1620H has been evaluated for National Register eligibility, but until evaluation studies are complete, these resources are assumed to be eligible. The portion of CA-MRP-1361/H that would be affected by construction has been previously disturbed, and contains no intact features or recorded artifacts. Portions of the site that would be disturbed by construction of Alternative 2 components are not likely to contribute to the significance of the site, and therefore would not result in an adverse effect. Approximately 1,100 feet of the historic-era Washburn Wagon Road (CA-MRP-1620H) would be removed during parking lot construction, which would result in an adverse effect on the resource. However, rehabilitation of the remaining segment of CA-MRP-1620H (between the proposed South Entrance parking lot and the picnic area along Mariposa Grove Road) for use as a pedestrian trail would restore its circulation function. Rehabilitation actions, such as clearing deadfall and brush and regarding to arrest erosion, would have no adverse effect on this linear historic property.

Impacts to site CA-MRP-0661/H would be minor, as design would avoid ground disturbance in the vicinity of the site. The parking area and gift shop at the lower portion of the Grove are being removed to specifically move them away from CA-MRP-0661/H. Removal of the parking area and gift shop away from CA-MRP-0661/H at the lower portion of the Grove would be a beneficial impact.

Ground disturbance during habitat restoration-related activities (e.g., soil decompaction, drainage improvements, removal of undesirable plant species, new plantings or transplanting) under Alternative 2 has the potential to disturb buried archeological deposits that are undocumented. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance.

Sites associated with the Mariposa Grove Archeological District would not be impacted by Alternative 2 restoration-related activities.

Operations-related Impacts. Continued public access to sites CA-MRP-0660/H and CA-MRP-0661/H during the operation of Alternative 2 could potentially lead to unauthorized collection of surface artifacts by park visitors. Such collection would be considered an adverse effect on National Register-eligible historic properties. However, Alternative 2 would reduce public access to CA-MRP-0661/H relative to the Alternative 1, which would be a beneficial action.

Routine or emergency repairs that could occur during operation of Alternative 2 at the Mariposa Grove and the South Entrance (e.g., repairs to septic systems and leach fields or buried utilities; excavation of fire breaks) could result in disturbance of archeological deposits, including those that are not visible on the ground surface. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance.

Impact Significance and Determination of Effect. Unauthorized collection of artifacts potentially could occur at sites CA-MRP-0660/H and CA-MRP-0661/H as a result of ongoing park and concessioner operations and visitor use under Alternative 2. Such collection of archeological materials at resources that are eligible for the National Register would be an adverse effect. Reduced public access to CA-MRP-0661/H under Alternative 2, relative to Alternative 1, would be a beneficial action.

Routine or emergency repairs that could occur during operation of Alternative 2 at the Mariposa Grove and the South Entrance could result in disturbance of archeological deposits. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance.

Conclusion. Two archeological sites that have previously been determined eligible for the National Register would be adversely affected by construction activities under Alternative 2. CA-MRP-0660/H would be disturbed by development of a new parking lot at the South Entrance, and the realignment of Wawona Road. Alternative 2 construction actions would have a short-term, minor adverse impact on archeological site CA-MRP-0661/H. Final design of facilities in the vicinity of this site would avoid or minimize potential impacts on the site. Any parking reconfiguration in this area would seek to avoid excavation and rely on use of fill material to avoid impacting surface features.

Sites CA-MRP-1361/H and CA-MRP-1620H require further evaluation, but are considered eligible for listing in the National Register for the purposes of this assessment. Because portions of CA-MRP-1361/H have been previously disturbed and no intact features or artifacts remain in the proposed construction area, a finding of no adverse effect may be appropriate for this resource under Alternative 2, pending further evaluation. However, approximately 1,100 feet of the historic-era Washburn Wagon Road would be removed by construction of the parking area at South Entrance, which would result in an adverse effect on site CA-MRP-1620H. The consolidation and expansion of visitor education at a South Entrance hub would enhance the interpretation of archeological resources at Mariposa Grove and at South Entrance.

Temporary, minor adverse impacts on traditionally significant site CA-MRP-0661/H would occur from restoration actions at the lower portion of the Grove, and there would be increased potential for operations-related adverse effects on sites CA-MRP-0660/H and CA-MRP-0661/H in the form of unauthorized collection of surface artifacts.

Actions having no adverse effects under Alternative 2 include the clearing of deadfall and brush from approximately 1.3 miles of the Washburn Wagon Road (CA-MRP-1620H), reducing public access to CA-MRP-0661/H, and expanding public information about archeological resources.

Cumulative Impacts. Present and reasonably foreseeable projects affecting archeological resources would be the same as those under Alternative 1 (No Action)—no adverse effect on archeological resources in the Mariposa Grove. Under Alternative 2, there would be an adverse effect on site CA-MRP-0660/H at the South Entrance, adverse effect on site CA_MRP-1620H, to the Washburn Wagon Road, and may have an adverse effect on site CA-MRP-0661/H in the lower Grove area. The effects of Alternative 2, in conjunction with past, present, and reasonably foreseeable projects, would have an adverse effect on archeological resources in the Mariposa Grove area. Adverse effects would be resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be developed in consultation with the SHPO, ACHP, and associated American Indian tribes and groups.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, including two new bridges and a new, larger parking lot near the Grizzly Giant outside of giant sequoia habitat. This alternative would make the Grizzly Giant the primary departure point for visitors to the Grove. The existing road from Grizzly Giant to Wawona Point would be narrowed and converted to a hardened trail. A new grove bypass road would be constructed between lower portion of the Grove and Grizzly Giant and the current road would be removed and vegetation restored. The loop road in the upper portion of the Grove would be decommissioned and converted into a pedestrian trail. The parking lot in the lower portion of the Grove would largely be removed and replaced by a significantly smaller parking lot for ABAAS parking. Additional facilities to be removed from the lower portion of the Grove include the gift shop, visitor information kiosks, the commercial tram

staging area, and the existing comfort station. Other changes at the lower portion of the Grove would include a new trailhead and loop trail that would serve ABAAS visitors, and installation of new comfort station. Visitor orientation would be improved and interpretation of natural and cultural/ archeological resources would be expanded. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, and soil decompaction, would be components of this alternative. The current South Entrance parking lot would remain as is.

Construction-related Impacts. Under Alternative 3, the new Grove bypass road would pass through the center of site CA-0661/H, which is a National Register-eligible property. Development of the ABAAS-compliant accessible parking lot and removal of the gift shop, access road, and parking area in the lower portion of the Grove also could disturb this site. These activities could have an adverse effect on site CA-0661/H.

The establishment of new parking lot and bypass road at the Grizzly Giant has the potential to impact site CA-MRP-2109H, a small, diffuse, historic trash scatter. The site has been determined to be ineligible for listing in the National Register, and construction of the new parking lot and new Grove bypass road would have no effect on a known historic property under Section 106 of the NHPA. Impacts on this site under NEPA, however, would be long-term and adverse, but given the site's lack of significance, the impact would be considered negligible. Modifications to Mariposa Grove Road (CA-MRP-1618H), which is a contributing element of the Mariposa Grove Historic District, also would have an adverse effect on an alignment of the road that was in place by 1879. These effects are more thoroughly discussed in the Historic Structures section of this document.

Ground-disturbing activities associated with removal and construction of facilities under Alternative 3 would have a potential to disturb previously undocumented archeological resources. The potential effect of these activities on such resources would depend on the significance of the resource, and the extent and magnitude of disturbance of such resource during project implementation. The Mariposa Grove Archeological District would not be affected by construction-related activities under Alternative 3.

Impact Significance and Determination of Effect. Alternative 3 construction activities would have an adverse effect on site CA-MRP-0661/H, because construction of the New Grove Bypass Road and ABAAS-compliant parking and removal of facilities in the lower portion of the Grove would directly impact this National Register-eligible site. Site CA-MRP-1618H or Mariposa Grove Road also would be adversely affected because proposed modifications would alter characteristics that contribute to its National Register eligibility. Impacts on CA-MRP-2109H would be site-specific, long-term, negligible, and adverse under NEPA; this site has been determined to be ineligible for the National Register.

Ground-disturbing restoration activities related to the restoration of existing bus parking and the gift shop area would impact near- and sub-surface archeological materials at site CA-MRP-0661/H. Furthermore ground disturbance during habitat restoration-related activities (e.g., soil decompaction, drainage rehabilitation, removal of undesirable plant species, new plantings or transplanting) under Alternative 3 have the potential to disturb archeological deposits that have not been documented. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance.

Sites associated with the Mariposa Grove Archeological District would not be impacted by Alternative 3 restoration-related activities.

Operations-related Impacts. Operations-related impacts under Alternative 3 would be the direct result of construction activities at site CA-MRP-0661/H, which would likely bring previously buried artifacts to the surface where they could be subject to unauthorized collection by park visitors during park operations. Such collection is considered an adverse effect. Routine or emergency repairs that could occur during operation of Alternative 3 at Mariposa Grove and South Entrance (e.g., repairs to leach fields or buried utilities; excavation of fire breaks) could result in disturbance of undocumented archeological deposits. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance.

Impact Significance and Determination of Effect. The increased potential for unauthorized collection of artifacts at National Register-eligible site CA-MRP-0661/H as a result of visitor use under Alternative 3. Such collection of archeological materials at resources that are eligible for the National Register would be an adverse effect.

Routine or emergency repairs that could occur during operations under Alternative 3 at Mariposa Grove and South Entrance could result in disturbance of archeological deposits. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance.

Conclusion. Alternative 3 would have an adverse effect on archeological site CA-MRP-0661/H as the result of construction activities proposed for the lower Grove area, including building the new Grizzly Giant bypass road and the removal of the gift shop and other facilities. Development of parking near the Grizzly Giant would not impact National Register-eligible archeological resources. The consolidation and expansion of visitor education at Grizzly Giant would enhance the interpretation of archeological resources at the Mariposa Grove, which would be a beneficial impact under NEPA.

Restoration activities could have an adverse effect on CA-MRP-0661/H under Alternative 3, and a potential increased opportunity for unauthorized artifact collection during post-construction operations would also be an adverse effect on site CA-MRP-0661/H. There would be site-specific, long- and short-term, major adverse impacts on archeological site CA-MRP-2109H under NEPA; this site was determined to be ineligible for the National Register.

Cumulative Impacts. Present and reasonably foreseeable projects affecting archeological resources would be the same as those under Alternative 1 (No Action)—no adverse effect on archeological resources in the Mariposa Grove. Under Alternative 3, there would be no adverse effect on site CA-MRP-0661/H in the lower Grove area. There would be an adverse effect on site CA-MRP-1618H (the Mariposa Grove Road) because proposed modifications would alter characteristics that contribute to its National Register eligibility. The effects of Alternative 3, in conjunction with past, present and reasonably foreseeable projects, would have an adverse effects on archeological resources in the Mariposa Grove area. Adverse effects would be resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be developed in consultation with the SHPO, ACHP, and associated American Indian tribes and groups.

Alternative 4: South Entrance Hub with Modified Commercial Tram Service

Alternative 4 would maintain commercial tram service on a limited route and reduced hours of operation, and would relocate tram staging and the majority of parking from the lower Grove area to the South Entrance. The water tank and chlorination unit in the loop road in the upper portion of the Grove would be moved to a location near the museum building in the upper portion of the Grove, and the gift shop in the lower portion of the Grove and existing comfort stations at the

Grizzly Giant and in the upper portion of the Grove would be removed. New visitor services at the South Entrance area would include visitor information, educational, and other sales items. Numerous other rehabilitation and restoration actions, such as water line repair or replacement, replacement of the comfort station and installation of a new septic tank and leach field in the lower portion of the Grove, historic rehabilitation of features at Wawona Point, and soil decompaction would be components of this alternative. The intersection of Mariposa Grove and Wawona roads at the South Entrance would be realigned, and a roundabout could replace the existing T-intersection if traffic conditions warrant this action.

Construction-related Impacts. Construction of a new parking area at the South Entrance would affect nearly half of site CA-0660/H, which has been recommended eligible for listing in the National Register. Modification of the existing South Entrance paved parking lot to serve as a bus turnaround would impact the southernmost extent of site CA-MRP-1361/H. This site has not been evaluated for listing in the National Register, and evaluation would be necessary, but until then, CA-MRP-1361/H is assumed eligible. The portion of the site that would be impacted has been previously disturbed, and contains no intact features or recorded artifacts.

Alternative 4 also would remove approximately 1,100 feet of the historic Washburn Wagon Road (CA-MRP-1620H) through construction of the parking lot at South Entrance, and would rehabilitate the remaining 1.4 miles of the wagon road for use as a pedestrian trail between South Entrance and the picnic area on the Mariposa Grove Road. The road has not yet been evaluated for National Register eligibility, but pending evaluation, is assumed eligible. Rehabilitation of this road would affect the resource, but the effect would not be adverse under Section 106, but removal of 1,100 feet of the road for parking lot construction would have an adverse effect on the integrity of the road. Lastly, the consolidation and expansion of visitor education at the South Entrance would enhance the interpretation of archeological resources at Mariposa Grove and South Entrance.

Actions at the lower portion of the Grove that have the potential to adversely impact CA-MRP-0661/H include installation of a new shuttle turnaround, removal of existing roads and parking areas, and ecological restoration of modified areas. Any parking reconfiguration in this area would seek to avoid excavation and rely on use of fill material to avoid impacting surface features. The new proposed trail would be designed to run outside of known historic sites, and data recovery would be conducted as appropriate during trail construction. The parking area and gift shop at the lower portion of the Grove are being removed to specifically move them away from CA-MRP-0661/H.

Ground-disturbing activities associated with removal and construction of facilities under Alternative 4 also could have a potential to disturb previously undocumented archeological resources. The potential effect of these activities on such resources would depend on the significance of the resource, and the extent and magnitude of disturbance of such resource during project implementation. Alternative 4 construction would not affect sites within the Mariposa Grove Archeological District.

Impact Significance and Determination of Effect. Construction of new parking and the realignment of Wawona Road at the South Entrance would have an adverse effect on site CA-MRP-0660/H. Similarly installation of a leach field and removal of the gift shop and appurtenant facilities at the lower Grove area would have an adverse effect on CA-MRP-0661/H. Adverse effects on historic properties as a result of implementation of this project alternative would be resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be developed in consultation with the SHPO, ACHP, and associated American Indian tribes and groups.

Neither site CA-MRP-1361/H nor CA-MRP-1620H has been evaluated for National Register eligibility, but until evaluation studies are complete, these resources are assumed to be eligible. That portion of CA-MRP-1361/H that would be affected by construction has been previously disturbed, and contains no intact features or recorded artifacts. Portions of the site that would be disturbed by construction of Alternative 4 components are not likely to contribute to the significance of the site, and therefore the alternative would not result in an adverse effect. Approximately 1,100 feet of the historic-era Washburn Wagon Road, CA-MRP-1620H, would be removed during parking lot construction, which would result in an adverse effect on the site. However, clearance of deadfall and brush from CA-MRP-1620H between South Entrance and the picnic area along Mariposa Grove Road for use as a pedestrian trail would restore that segment of the site as a transportation corridor in the park, which would have no adverse effect on the site.

Ground-disturbing restoration activities related to the restoration of existing bus parking and the gift shop area could have an adverse effect on near- and sub-surface archeological materials at site CA-MRP-0661/H, which could result in an adverse effect. Ground disturbance during habitat restoration-related activities (e.g., soil decompaction, recontouring, drainage rehabilitation, removal of undesirable plant species, new plantings or transplanting) under Alternative 4 has the potential to disturb archeological deposits that are undocumented. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance.

Sites associated with the Mariposa Grove Archeological District would not be impacted by Alternative 4 restoration-related activities.

Operations-related Impacts. Continued public access to sites CA-MRP-0660/H and CA-MRP-0661/H during the operation of Mariposa Grove and South Entrance under Alternative 4 would potentially lead to unauthorized collection of surface artifacts by park visitors. Such collection would be considered an adverse effect on National Register-eligible historic properties. However, Alternative 4 could reduce public access to CA-MRP-0661/H relative to Alternative 1, which would be a beneficial effect.

Routine or emergency repairs that could occur during operation of Alternative 4 at the Mariposa Grove and the South Entrance (e.g., repairs to septic systems and leach fields or buried utilities; excavation of fire breaks) could result in disturbance of archeological deposits, including those that are not visible on the ground surface. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance.

Impact Significance and Determination of Effect. Unauthorized collection of artifacts potentially could occur at sites CA-MRP-0660/H and CA-MRP-0661/H as a result of ongoing park and concessioner operations and visitor use under of Alternative 4. Such collection of archeological materials at resources that are eligible for the National Register would be an adverse effect under Section 106 of the NPA. Reduced public access to CA-MRP-0661/H under Alternative 4, relative to Alternative 1, would have a beneficial impact under NEPA.

Routine or emergency repairs that could occur during operation of Alternative 4 at the Mariposa Grove and the South Entrance could result in disturbance of archeological deposits. The level of effect on such deposits would depend on the significance of the resource, and the extent and magnitude of the disturbance.

Conclusion. Two archeological sites that have previously been determined eligible for the National Register would be adversely affected by construction activities under Alternative 4. CA-MRP-0660/H would be disturbed by development of a new parking lot at the South Entrance

and the realignment of Wawona Road. Alternative 4 construction actions would have a short-term, minor adverse impact on archeological site CA-MRP-0661/H. Final design of facilities in the vicinity of this site would avoid or minimize potential impacts on the site. Any parking reconfiguration in this area would seek to avoid excavation and rely on use of fill material to avoid impacting surface features. Sites CA-MRP-1361/H and CA-MRP-1620H would require evaluation, but are considered eligible for the National Register for the purposes of this assessment. Because portions of CA-MRP-1361/H have been previously disturbed and no intact features or artifacts remain in the proposed construction area, a finding of no adverse effect may be appropriate for this resource under Alternative 4, pending further evaluation. However, approximately 1,100 feet of the historic-era wagon road would be removed by construction of a new trail along this route, which would result in an adverse effect on site CA-MRP-1620H. Improved visitor education would enhance the interpretation of archeological resources at the Mariposa Grove, which would have a long-term moderate beneficial impact under NEPA.

Temporary, minor adverse impacts on traditionally significant site CA-MRP-0661/H would occur from restoration actions at the lower portion of the Grove, and there could be increased potential for operations-related adverse effects on sites CA-MRP-0660/H and CA-MRP-0661/H in the form of unauthorized collection of surface artifacts. These actions would have long-term, minor to moderate adverse impacts under NEPA.

Beneficial impacts under NEPA for Alternative 4 would include the clearing of deadfall and brush from CA-MRP-1620H, reducing public access to CA-MRP-0661/H, and expanded public information about archeological resources.

Cumulative Impacts. Present and reasonably foreseeable projects affecting archeological resources would be the same as those under Alternative 1 (No Action)—no adverse effect on archeological resources in the Mariposa Grove. Under Alternative 4, there would be an adverse effect on site CA-MRP-0660/H at the South Entrance and no adverse effect on site CA-MRP-0661/H in the lower Grove area. The effects of Alternative 4, in conjunction with past, present, and reasonably foreseeable projects, would have an adverse effect on archeological resources in the Mariposa Grove area. Adverse effects would be resolved through consultation with the California SHPO in accordance with the NHPA implementing regulations at 36 CFR Part 800, and implemented through a project-specific MOA to be developed in consultation with the SHPO, ACHP, and associated American Indian tribes and groups.

SOCIOCULTURAL RESOURCES

VISITOR EXPERIENCE AND RECREATION

Affected Environment

Yosemite National Park, as guided by its enabling legislation and the NPS Organic Act of 1916, has two interwoven purposes: (1) the preservation of the resources that contribute to Yosemite National Park's uniqueness and attractiveness—its exquisite scenic beauty; outstanding wilderness values; a nearly full diversity of Sierra Nevada environments, including the special-giant sequoia groves; the awe-inspiring domes, valleys, polished granites, and other evidences of the geologic processes that formed the Sierra Nevada; cultural resources, especially those relating to the beginnings of a national conservation ethic; and evidence of the American Indians who lived on the land; and (2) to make the varied resources of Yosemite National Park available to people for their individual enjoyment, education, and recreation, now and in the future (NPS 1980a).

Recent visitor surveys taken during the peak summer season indicate that viewing scenery and taking scenic drives are the two most popular activities within Yosemite National Park with 93 percent and 64 percent of respondents participating in those activities, respectively (NPS 2008). For many visitors, driving through the park is the primary means for experiencing the spectacular views. Driving to and within Yosemite National Park is usually a pleasurable experience, contributing to visitors' enjoyment of the park. The ability to make informal stops along park roads to take advantage of the unique and varied scenery contributes to each visitor's opportunity to experience the park on his or her own terms. Some visitors, depending on season and arrival time, have opportunities to stop en route at small visitor contact stations such as the Wawona Information Station. However, during the peak visitation season, travelers sometimes experience traffic congestion within the park. Congestion issues are exacerbated near the South Entrance due to traffic conditions at the intersection at Wawona and Mariposa Grove Roads and the park entrance station at the South Entrance.

Visitor experiences in Yosemite National Park are highly diverse. Some come simply to see Yosemite National Park's icons—its waterfalls and geologic features. Others visit to experience a place they have found unique, for personal challenges, timelessness, a place and pace different from their day-to-day experiences, or a personal connection with the grandeur or intricacies of Yosemite National Park. The continuum of visitor experiences extends from highly social to isolated, from independent to directed, from spontaneous to controlled, from easy to challenging, and from natural to more urban (NPS 2000b).

Park Recreation and Visitor Services

Yosemite National Park provides a range of recreation opportunities, including sightseeing and tours, picnicking, walking, hiking, bicycling, stock use, climbing, camping, water activities such as rafting, swimming, fishing, and winter activities such as cross-country and downhill skiing and snowshoeing. Camping throughout Yosemite National Park is regulated differently depending on whether the activity occurs in the developed or wilderness areas.

According to a study of visitors, 54 percent of visitor groups participated in day hiking, and 43 percent noted wildlife viewing or bird watching as an element of their trip. A greater proportion of park visitors hike during off-peak seasons. Sitting or standing quietly, absorbed in thought or in awe of one of Yosemite National Park's majestic views, was found to be basic to the park experience. Artistic pursuits were also important to the enjoyment of the park (NPS 2010c).

Private vehicles are the predominant means of access to and through the park. Over 84 percent of visitors arrive by private car, with the remaining arriving on a commercial tour bus, on buses operated by the Yosemite Area Regional Transportation System, by foot, or by bicycle (NPS 2011h). While within the park, most visitors (62 percent) use the existing park shuttle service at least part of the time.

The park or its concessioners provide several visitor services, including but not limited to overnight lodging, camping, interpretive services and events, retail sales, food service, post office, and shuttle service. The Wawona area has lodging and food service, shuttle service, campground, picnic area, gas station, and ranger station. The Mariposa Grove area has parking, shuttle and commercial tram services, a retail gift shop, museum, and a picnic area, as well as restrooms in the upper and lower groves.

Park Orientation and Interpretation



Figure 3-26 – Orientation Sign at Lower Grove

Visitors to Yosemite National Park have a number of information resources available to plan their visits (figure 3-26). Yosemite National Park's website provides information about trip planning, current conditions, other park resources and pertinent news. The park's public information office mails pre-visit materials to those requesting them by phone or mail. Yosemite Conservancy and NatureBridge also have interactive websites, offering more in-depth orientation and the sale of books and maps. The park also provides assistance (updated information, publications, and seasonal staffing) to local, multiagency visitor centers where visitors can stop en route. Once at park entrance stations, visitors receive park publications with trip and activity planning information. During the summer and early fall, information stations in Wawona and Big Oak Flat are staffed to provide additional assistance. In summer, the Tuolumne Meadows Visitor Center introduces the area to visitors traveling to this region of the park. Each of these facilities provides a selection of helpful park guidebooks, maps, and other resources sold by Yosemite Conservancy, a nonprofit partner of Yosemite National Park.

Park interpreters serve a primary resource preservation role by conveying information and educational programs to visitors and park/concessioner employees about the importance and sensitivity of park ecosystems and the relationships among various park resources. This includes educational programs provided by park rangers and park partners such as NatureBridge. The interpretive staff provides information to visitors about wilderness resources, wildlife, policies, regulations, conditions, and trails at information centers, in programs, on roving contact assignments, and open-air tram tours in Yosemite Valley and at the Mariposa Grove. The primary information source for recreational opportunities in the park's wilderness is the wilderness centers in Yosemite Valley, Tuolumne, Big Oak Flat, and Wawona, which are staffed by wilderness rangers.

A wide range of interpretive programs are available. Throughout Yosemite National Park, NPS interpreters provide ranger-led walks, talks, and evening programs. Interpreters help visitors connect to the park and our American heritage. Interpretation also serves as a catalyst for inspiring visitors to gain a greater understanding of themselves and the world through their park experience. In summer, rangers also lead multiday High Sierra Camp loop trips in the Yosemite Wilderness area. Wilderness programs can focus on bears, wildflowers, the natural history of the wilderness, the hydrologic attributes of the Merced and Tuolumne watersheds, minimum-impact camping techniques, wilderness safety, park policies, and other related topics. Park partners, including Yosemite Conservancy and park concessioners, offer guided wilderness trips and a wide range of interpretive opportunities throughout the park. The Sierra Club and The Ansel Adams Gallery also provide interpretive opportunities within Yosemite Valley.

Park locations for these orientation and interpretation opportunities include visitor centers, the Yosemite Museum, the Nature Center at Happy Isles in Yosemite Valley, Parsons Lodge and Soda Springs in Tuolumne Meadows, the Pioneer Yosemite History Center in Wawona, and the Mariposa Grove Museum in the Mariposa Grove.

Mariposa Grove Setting



Figure 3-27 – Commercial Tram

Visitor facilities in the Mariposa Grove operate during snow-free months of the year, typically opening in April or May and closing in October or November. Park visitor facilities include comfort stations in the lower and upper Grove, the Mariposa Grove Museum, paved roads and unpaved trails, paved visitor parking in the lower Grove, paved shuttle bus parking, and commercial tram staging area. Concessioner-operated and maintained facilities at the Mariposa Grove include the gift/snack shop and the commercial tram and its ticket booth (figure 3-27). Other Grove amenities include sitting areas, wayside exhibits, signs, trailheads, drinking fountain, and trash containers.

The Mariposa Grove can offer a sense of profound awe and beauty to the visitor. The unique natural setting can inspire reverence and respect. It can induce contemplation and pleasure. The Mariposa Grove is part of the "front country" area of the park and provides easy access to a variety of activities including sightseeing, nature study, horseback riding, and hiking. The lower Grove area is near the parking lot, shuttle drop-off, commercial tram staging area, and gift/snack shop and is more widely used. The upper Grove area includes the Mariposa Grove Museum and is accessible by commercial tram as well as by hiking trail (an 850-foot elevation gain from the lower Grove parking lot to the museum). Wawona Point is a historic scenic overlook near the upper Grove, and affords dramatic views of varied topography. There are trail connections from the Mariposa Grove area into designated wilderness and to the Studhorse trailhead between Wawona and the South Entrance.

Visitation is highest at the Mariposa Grove from Memorial Day through Labor Day. During the winter, the Mariposa Grove may be used for snow play, skiing, and snowshoeing. During the winter when heavy snow falls, the Mariposa Grove road is closed and visitors park near the South Entrance and proceed to the Grove on foot, skis, or snowshoes. The commercial tram does not operate in the winter.

The tram is operated by a commercial vendor from May through October. The commercial tram service connects the lower Grove parking lot with the upper Grove, with a 10-minute stop at the Grizzly Giant on the return trip. Many riders do not remain on the tram for the entire trip. In one study two-thirds of the tram users ride into the upper Grove, but either hike in the upper Grove, or to Wawona Point or hike from the Grizzly Giant back to the parking lot. Each tram vehicle can accommodate up to 40 passengers. Data suggest that between 8 and 12 percent of visitors to the Grove take the tram during the peak season (Leslie et al. 2012). Multiple commercial trams operate concurrently between 9:30 a.m. and 5:00 p.m. Over the approximate five-month season, it is estimated that the commercial trams accommodate approximately 50,000 passengers. Visitors with limited mobility can pay to ride the wheelchair accessible tram, or they may follow the tram up to the museum and then down to the Grizzly Giant in their private vehicles at no cost.

Visitor Use in the Mariposa Grove

Per a visitor survey conducted in 2011, the average stay for visitors in the Mariposa Grove was about 2 hours, and 84 percent of all visitors spent at least part of that time visiting the Grizzly Giant (74 percent hike and 10 percent arrive by tram), one of the largest trees in the Grove (Leslie et al. 2012). The highest visitation in the lower Grove occurred on the Grizzly Giant Trail from the lower Grove parking lot, and averaged approximately 2,510 people per weekend day (2,300 per weekday) in July. Average daily visitor use on the Outer Loop Trail heading toward the Grizzly Giant was

approximately 140 visitors per day (all days), as measured in July 2011. Figures 3-28 and 3-29 illustrate the data gathered for daily trail use over a three-month period in 2011. Use of the Grizzly Giant and Outer Loop trails heading to the Grizzly Giant Tree sharply increased around 9:00 a.m. and remained high until about 7:00 p.m. On the Grizzly Giant Trail, usage peaked on average at around 10:00 a.m. (approximately 240 visitors per hour) and 3:00 p.m. (220 visitors per hour).

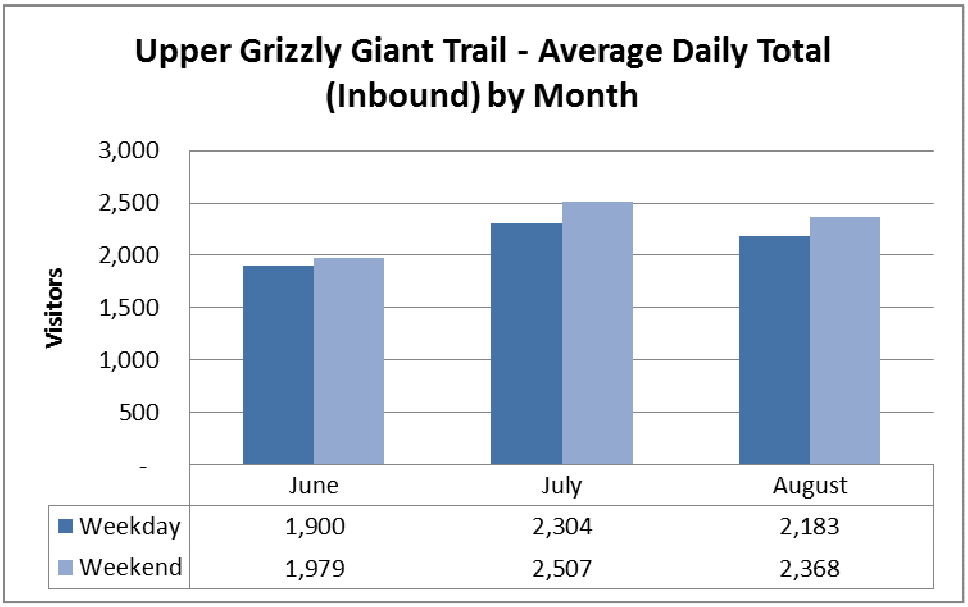


Figure 3-28 – Average Daily Total of Inbound Visitors at the Upper Grizzly Giant Counter

Source: Leslie et al. 2012

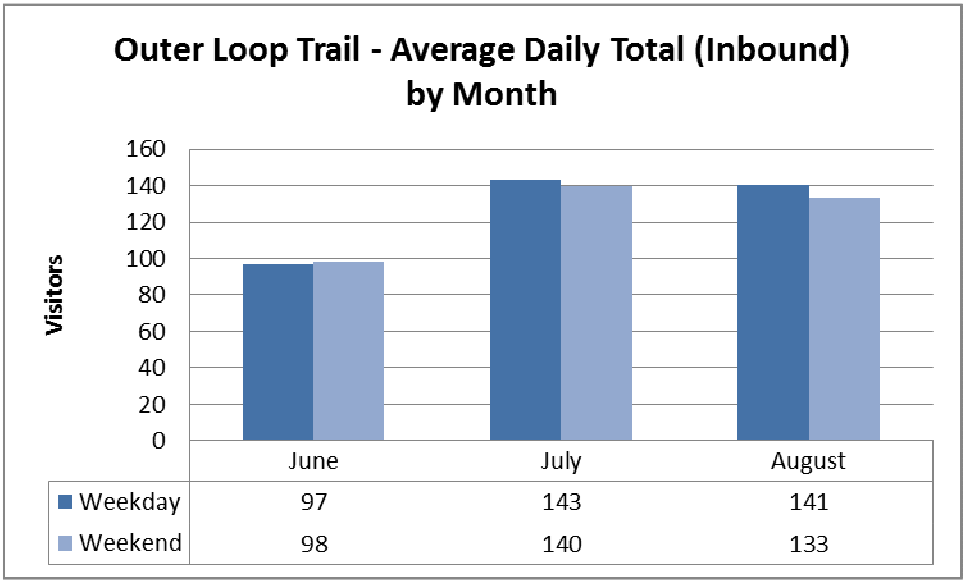


Figure 3-29 – Average Daily Total of Inbound Visitors at the Outer Loop Trail Counter

Source: Leslie et al. 2012

Note: The Outer Loop Trail counter located near the parking lot shows that very few people hike to the Grizzly Giant via the Outer Loop Trail.

About 37 percent of visitors to the Grove spend at least some time in the upper Grove. Most Mariposa Grove visitors reach the upper Grove by hiking (27 percent), while about 10 percent arrive on the commercial tram service. There is more than one hiking route to the upper Grove. A counter placed on a primary path to the upper Grove via the Grizzly Giant and California Tunnel trees found approximately 740 people hiked that route on weekend days (650 people per weekday) in August. Peak volume heading toward the upper Grove occurs between 11:00 a.m. and 2:00 p.m. (approximately 150 visitors per hour) for all days (Leslie et al. 2012). During the survey period, visitors typically spent about 7 minutes at the Grizzly Giant and 5 minutes at the California Tunnel Tree.

Visitor Experience

The upper Grove is quieter and more contemplative compared to the atmosphere of the lower Grove with its parking lot, commercial services, and larger numbers of visitors (NPS 2011i). A survey was conducted in 2010 and 2011 to assess crowding standards to understand visitors' perceptions of and thresholds for crowding at the Grizzly Giant in the lower Grove. The results are as follows:

- Preferred number of people at one time with in a 1,400 square foot area: 7 (density of 197 square feet per person)
- Maximum acceptable number of people at one time: 18 (density of 76 square feet per person)
- Maximum number of people the NPS should allow: 20 (density of 69 square feet per person)
- Maximum number of people that visitors would tolerate, before going somewhere else: 26 (density of 53 square feet per person).

To provide a sense of the densities that respondents indicated they would accept, figures 3-30 and 3-31 provide photographs used in the research that illustrated hypothetical use levels.

During 2010, the maximum number of people that survey respondents thought the NPS should allow (20 people per 1,400-square-foot area) was exceeded at the Grizzly Giant 16 percent of time on the busiest day (approximately 2,200 people); 12 percent of the time on the 7th busiest day (approximately 2,010 people); and 2 percent of time on the 50th busiest day (approximately 1,440 people) (Leslie et al. 2012). Public scoping comments related to visitor experience included suggestions to limit the number of visitors to the Grove as some felt the site was too crowded.



Figure 3-30 – Grizzly Giant Visitor Use Hypothetical Use Level – 18 people, approximately 77 square feet per person

Source: Leslie et al. 2012



Figure 3-31 – Grizzly Giant Visitor Use Hypothetical Use Level – 24 people, approximately 58 square feet per person

Source: Leslie et al. 2012

Visitors to the Grove can be grouped according to various considerations such as interests and abilities. Table 3-11 presents visitor typologies based on limitations (mobility and time) and transportation mode, timeframe, relative number of visitors, and representative experiences.

Table 3-11 – Visitor Typologies

Limitations (Mobility & Time) Transportation Mode	Time-frame	Representative Experiences
Limited mobility (including visitors with small children and wheeled strollers) Road (and other fully accessible routes)	Varies	Trailhead Road/lower Grove
Paying commercial tram riders and persons with accessible parking placard in private vehicles following behind Road	1.5 hours	Mariposa Grove Road including Big Trees tour
Moderate limited mobility (such as elders and people with children) AND visitors with strict time limitations Road and some trails (may require some level of accessibility)	1-1.5 hours	Trailhead lower Grove Grizzly Giant and California Trees
Relatively agile with a moderate amount of time Road and some trails including a slightly wide trail loop	1.5-3.5 hours	Grizzly Giant and California Tunnel trees
Agile with a substantial amount of time Road and all trails including winter use	3.5 + hours	upper Grove Mariposa Museum Wawona Point Outer Loop Trail

Trailhead

Interpretive and orientation kiosks are located at the main trailhead in the lower Grove parking lot. Beyond the parking lot, information often is difficult to find and is not accessible to all visitors. Along with problems getting to the parking lot due to traffic congestion and limited spaces, visitors who arrive at the trailhead often feel stressed, disoriented, and time-constrained (Yosemite Conservancy 2012). Public scoping comments related to the trailhead area included suggestions to add picnic tables and to add a visitor center either at the trailhead or at Fish Camp (just outside the park boundary to the south). Other scoping comments noted a preference for a natural, wilderness-oriented experience in the Grove that would be characterized by no- or less-intrusive infrastructure or transportation activities.

Accessibility, Trails, and Signs

Universally accessible routes through the Grove are limited to the paved roadways, which are used by pedestrians, commercial tram riders, maintenance vehicles, and visitors in private vehicles displaying an accessible parking placard who follow behind the commercial trams. Besides being important for accessibility, the road is also used by hikers who become lost or disoriented on the trails that intersect the roadway, and visitors with time constraints who take the commercial tram to their destination, and then hike back down the road (Yosemite Conservancy 2012). Only certain portions of Mariposa Grove Road meet accessibility standards (less than 5 percent grade without

resting intervals) for those who wish to get out of their cars. Public scoping comments related to accessibility include suggestions to maintain or improve accessibility for visitors with mobility limitations, including use of the commercial tram.

Visitors also use the 10-mile trail system to experience the Grove (figure 3-32 and figure 3-33). From the trailhead the Grizzly Giant is a steady climb of 0.8 mile, the upper Grove is 1.7 miles, and the Grove Museum is 1.8 miles. Visitors encounter poorly signed trail junctions and road crossings, and are often left confused, disoriented, and feeling lost; in fact, they may even miss their planned destinations (figure 3-34) (Yosemite Conservancy 2012).

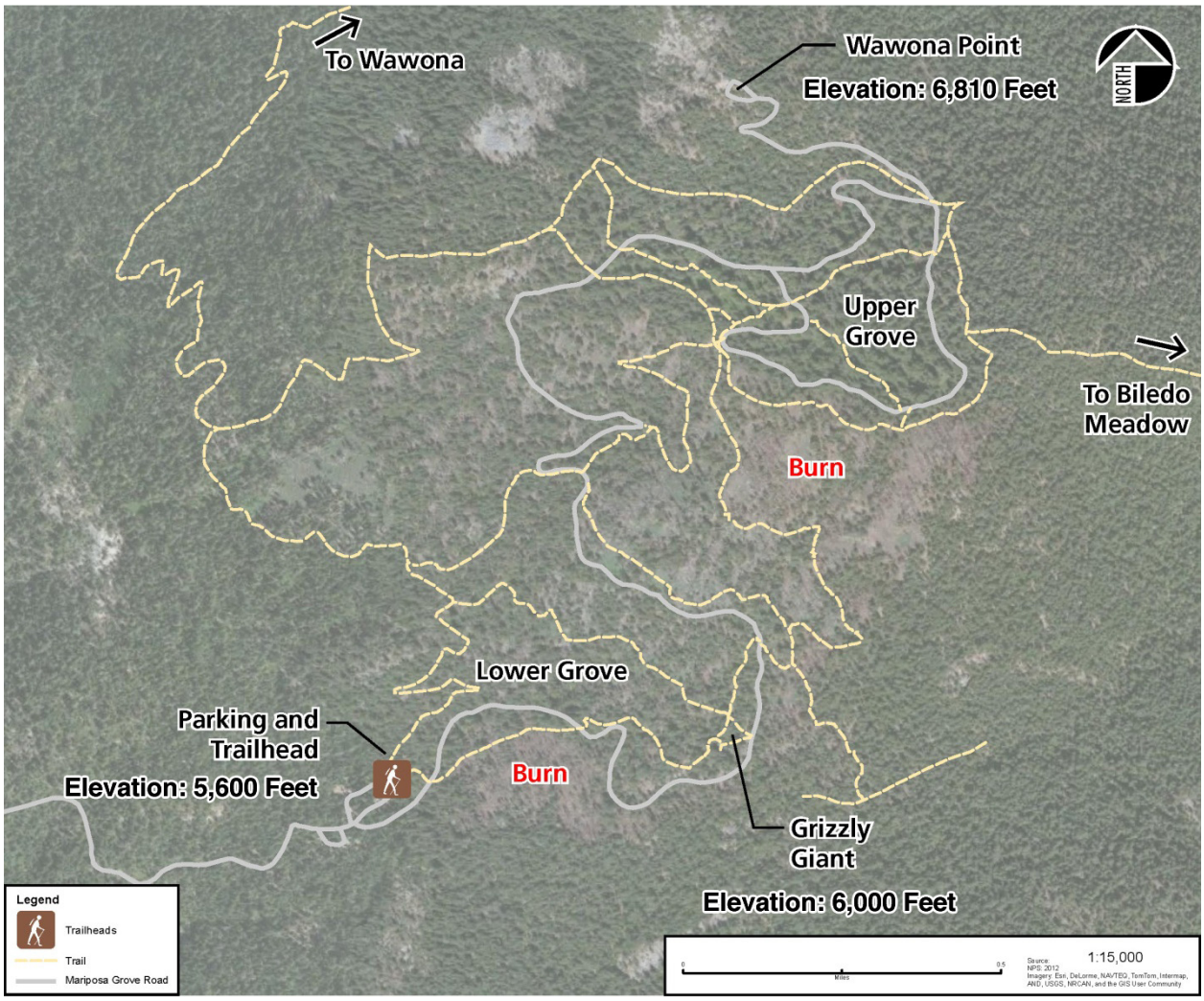


Figure 3-32 – Trails of the Mariposa Grove



Figure 3-33 – Stonework along Mariposa Grove Trail



Figure 3-34 – Trail Sign

Public scoping comments related to trails state that signs are inadequate and/or confusing.

Trail users who cross the road and pedestrians on the road may encounter commercial trams. Other hikers may hear the tram engine noise from many areas within the Grove. The noise from the commercial tram engine can obscure the quiet, natural sounds of the Grove, such as birds calling or wind in the tree branches. Commercial trams may cause pedestrians to stop and step off the road. The commercial tram noise, movement, and emissions from the diesel engines distract the thoughts and attention of many pedestrian visitors. Although the trams provide access for visitors with limited mobility, because they are a fee-based service, the commercial trams do not meet requirements for universal accessibility.

Mariposa Museum and Wawona Point

Destinations in and near the upper Grove include the Grove Museum and Wawona Point. The museum includes exhibits on ecology and history of the giant sequoias, and books and postcards for sale. The Wawona Point overlook is the Grove destination farthest from the trailhead, and is at the end of the road. Wawona Point has broad views of the surrounding mountains, Wawona Dome, and the meadow at Wawona. The vista is in sharp contrast to the closed-in forest environment with its massive trees and limited views experienced en route to Wawona Point. The vista is the location of park-wide communications equipment visible to visitors at the overlook, including propane tanks, a communication tower, and an equipment shed. The equipment at Wawona Point serves multiple agencies and their vehicles including the NPS, the concessioner in Mariposa Grove, and cell companies. Periodic, year-round maintenance access is needed for both Wawona Point and the Mariposa Grove Museum.

Vehicular Access and Circulation

Transportation-related factors have important effects on visitor use and experience at the Mariposa Grove, and include vehicular access to the Grove, parking capacity, and shuttle service to the Grove. It is estimated that about 58.5 percent of visitors to the Grove park their private vehicles at the Mariposa Grove parking lot (113 car capacity) (Leslie et al. 2012). The remainder of the visitors typically arrive on a shuttle from either the South Entrance parking area or Wawona Store (figure 3-35). A 2012 *Visitor Use and Transportation Assessment* concluded that parking is saturated at the lower Grove, and Wawona Store during the peak summer visitation season – meaning parking is at capacity all days of the week (Leslie et al. 2012).

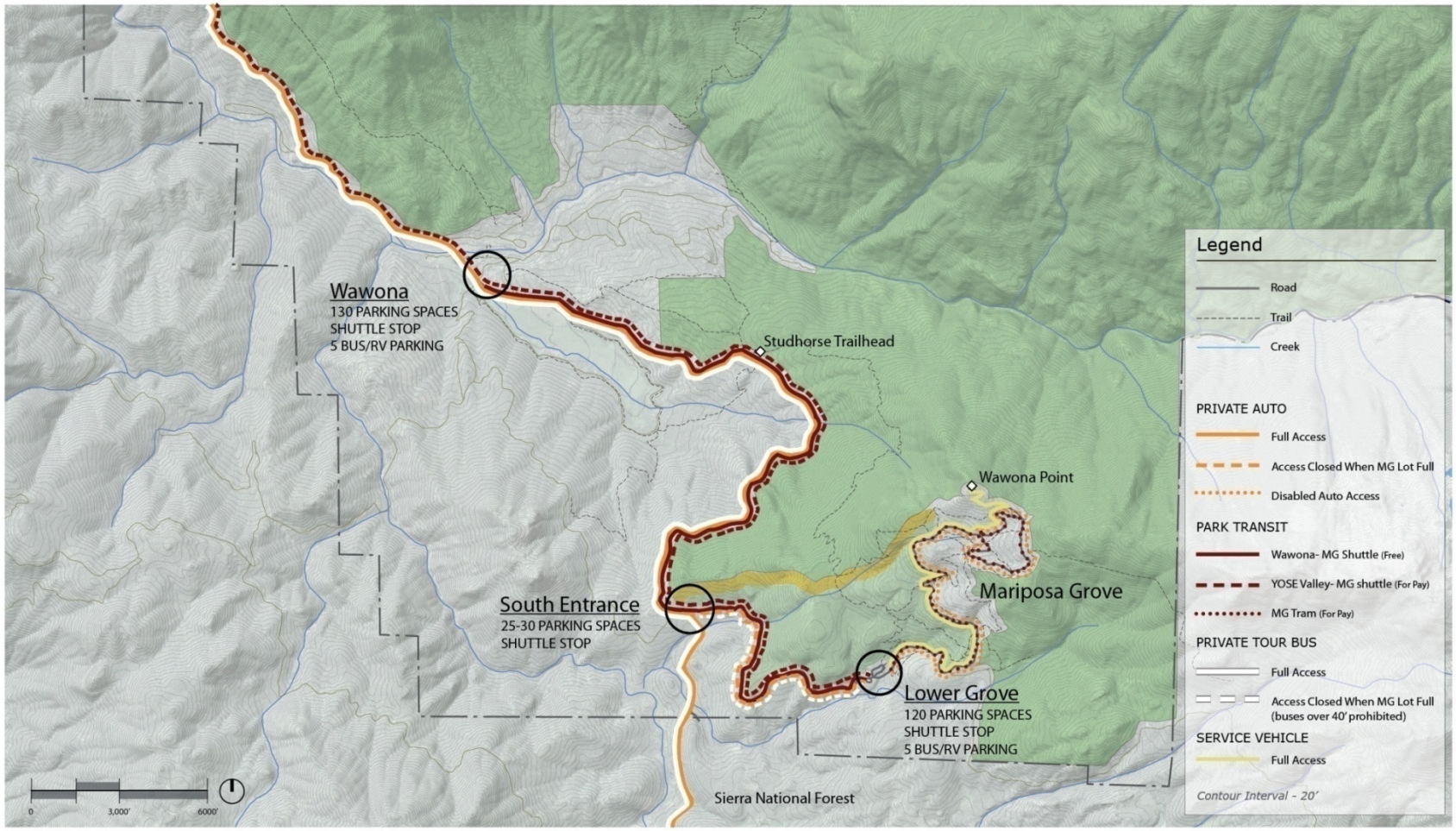


Figure 3-35 – Traffic Circulation between Wawona and the Mariposa Grove

Parking reaches capacity at the Mariposa Grove often, and generally early in the day. On a typical day during the peak summer season, the lot fills and the gate to Mariposa Grove Road is first closed between 9:00 and 10:00 a.m. During a summer-long sampling period, the gates were closed 52 percent of the day on average. The gate opened and closed an average of 5.5 times a day (Leslie et al. 2012). When the gates close on the road to the lower Grove, visitors park elsewhere and take a shuttle to the Grove. Additional parking spaces are available at Wawona and the South Entrance. Input collected via scoping suggests that some members of the public consider the shuttle wait times to be excessive and that this negatively affects the visitor experience. During the high use season, the average wait is 12 minutes to board the shuttle at both Wawona and the Mariposa Grove. According to a 2011 study conducted by the NPS, 75 percent of all shuttle bus waits are 20 minutes or less.

When the Mariposa Grove Road is closed because the Grove parking lot has reached its capacity, traffic circulation is challenged near the South Entrance, as visitors must proceed to Wawona to park their cars, wait for a shuttle bus, and backtrack to the Grove.

South Entrance Setting

The South Entrance to Yosemite National Park is used by visitors for orientation, fee payment, and as a rest stop. Park visitor infrastructure at the South Entrance include the fee kiosks, parking lot, the paved Mariposa Grove Road, comfort station, and shuttle stop. Periodic heavy traffic volume during the summer months leads to a variety of issues. During peak seasons and holidays, visitors commonly endure long wait times to reach the fee-booth kiosks as traffic backs up to the south along Wawona Road toward Fish Camp. Upon reaching the fee booth and entering the park, visitors are often routed away from the Mariposa Grove Road toward Wawona, leading to frustration if the Grove is on a visitor's itinerary. If the lower Grove parking lot is full, park concessioner staff must stand at the junction of the closed Mariposa Grove Road and Wawona Road and use hand signals and verbal communication to reroute traffic westward, leading to poor traffic circulation and confusion, and creating safety hazards for concessioner staff. The existing Wawona Road – Mariposa Grove Road T-intersection and three-way stop further exacerbates traffic congestion. During the off-season, the visitor experience at the South Entrance is typically more favorable, as park visitors can readily reach the fee booth and then drive up to the Mariposa Grove (when the road is snow-free), or toward Wawona with minimal wait times and traffic.

Environmental Consequences

Impact Assessment Methodology

This analysis addresses transportation and mobility considerations as part of the visitor experience in accordance with the objectives and guidance in Yosemite's General Management Plan (NPS 1980a). Assumptions used in evaluating visitor experience and recreation impacts for the alternatives include the following:

- Existing infrastructure has been constructed in response to visitor demands and needs. This includes roads, trails, turnouts, and viewpoints. Private vehicles are the preferred mode of travel for most visitors.
- Anticipated changes in visitor participation would represent an impact, including changes in ABAAS-accessible areas.
- Anticipated changes in visitor experience quality would represent an impact. Way finding, sound, visitor crowding, and aesthetic changes are among the potential factors influencing trip quality.

- Anticipated changes in service level (such as reductions in parking, changes in frequency of shuttle service, or changes in safety conditions) would represent an impact.

Beneficial impacts would occur as a result of enhanced visitor participation, quality of visitor experience, and service level. Adverse impacts would occur as a result of reduced visitor participation, quality of visitor experience, and service level.

Impact Intensity Level Definitions

The impact thresholds are as follows.

Negligible – Impacts would result in no change or little noticeable change to visitor experience.

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 backpackers to be able to drive to a trailhead).

Moderate – Impacts would change the desired experience appreciably (i.e. changes to one or more critical characteristics, or appreciable reduction/increase in the number of participants).

Major – Impacts would eliminate or greatly enhance multiple critical characteristics or greatly reduce/increase participation.

Alternative 1: No Action

Under Alternative 1, current infrastructure, concessioner services, maintenance, and park management would remain as is. No rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, or improvements to visitor orientation and interpretation, would be implemented.

Operation-related Impacts. Visitor experiences in the Mariposa Grove would remain the same. Parking would continue to reach capacity in the lower Mariposa Grove parking lot, and about 40 percent of summer visitors would take the shuttle from Wawona or the South Entrance. About 60 percent of visitors would be able to park directly in the lower Grove parking lot. Some visitors would travel to the Mariposa Grove, find the parking lot full, and backtrack 5 to 7 miles to Wawona to catch the shuttle (which would return on the same 7-mile route). Visitors could end up parking ¼-mile or more from the Wawona shuttle stop. Visitors with limited mobility could continue to follow the tram to the Grizzly Giant and museum in the upper Grove area in their private vehicles (with a placard). Estimates of current daily visitation and projections of use levels under each alternative are shown in table 3-12 for a busy summer day.

During the off-season, when the lower Grove parking lot and Mariposa Grove Road are free of snow, 115 parking spaces would be available for visitors to drive directly to the lower Grove, including two accessible spaces. Twenty year-round parking spaces would continue to be provided at the South Entrance.

Pedestrians and hikers in the Grove would continue to be distracted by the commercial tram noise, motion, and emissions in the vicinity of roads. Trail users would encounter poorly signed trail junctions and road crossings. The interpretive materials located in the museum in the upper Grove area would not be available to visitors who only have the time or ability to view the lower Grove area.

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

Conclusion. Impacts on visitor use and experience would continue for peak season travelers to the Mariposa Grove. During peak season, vehicular circulation would continue to be adversely affected by inadequate parking near the Grove, and about 40 percent of visitors would need to take a shuttle about 7 miles from Wawona to experience the Grove. Visitors would continue to be distracted by the commercial tram noise and emissions. During the off-season when the lower Grove parking lot and Mariposa Grove Road are free of snow, 115 parking spaces would be available for visitors to drive directly to the lower Grove, including two accessible spaces.

Table 3-12 – Estimated Daily Visitors by Mode of Arrival on a Busy Summer Day (85th Percentile, Design Day)

Mode of Arrival	Alt 1 – No Action	Alt 2 – South Entrance Hub	Alt 3 – Grizzly Giant Hub	Alt 4 – South Entrance with Modified Tram
Parked at Mariposa Grove	2,109	0	3,498	0
Shuttle from Wawona Store	1,401	145	0	145
Shuttle from South Entrance	326	3,815	0	3,815
Tour bus to Mariposa Grove	100	0	450	0
TOTAL VISITORS	**3,936**	**3,960**	**3,948**	**3,960**

SOURCE: Data analysis by Nelson Nygaard, 2012 and Yosemite National Park staff, 2013.

Cumulative Impacts. The cumulative impacts on visitor experience and recreation discussed in this section consider the past, present, and reasonably foreseeable future actions in the Mariposa Grove area (including Wawona) in combination with potential effects of Alternative 1 (No Action). This analysis considers recreation opportunities, access to recreational sites, visitor facilities and services, visitor safety, and transportation-related factors. In the past, visitor facilities and services have changed considerably in the Mariposa Grove area. For example, the NPS removed the historic campground in the lower Grove area and replaced it with a parking lot that accommodated more visitors, constructed a gift shop, and added commercial tram operations.

Present and future plans and projects related to visitor experience include the Comprehensive Interpretive Plan, Mariposa Grove Interpretive Sign Installation, Mariposa Grove Museum Lighting Installation, South Entrance Leach Field Repair, South Entrance Station Reestablish Exit Lane, and the South Entrance Traffic Safety Improvements. The South Entrance Station Kiosks Replacement project will reduce congestion at the South Entrance and confusion at the intersection of the Mariposa Grove and Wawona Roads. The *Scenic Vista Management Plan* will restore two views in the Mariposa Grove, one at the museum and one at the Grizzly Giant. Transportation-related actions proposed in the Parkwide Traffic Management and Information System, the Transit Passenger Information System, and Wawona Road Rehabilitation would facilitate travel throughout the park by alerting visitors to real-time travel conditions.

The *Draft Merced Wild and Scenic River Comprehensive Management Plan* (*Merced River Plan*) proposes to formalize parking at the Wawona store and relocate bus and other parking off the Wawona Road. Under the preferred alternative in the *Merced River Plan*, a traffic diversion at the El Capitan Cross-over would divert traffic away from east Yosemite Valley to other places in the park when Yosemite Valley reaches visitor capacity. Based on 2011 park visitation levels, the diversion would take place about four days a year for an average of about 3 hours per diversion (about 12 hours total). The peak days when visitors are diverted from Yosemite Valley under the *Merced River Plan* are likely to be high use days for the Mariposa Grove as well, and visitors could

encounter congestion and crowding at the Mariposa Grove and in Wawona. The Parkwide Traffic Management and Information System and the Transit Passenger Information System would help to alert the visiting public to areas of congestion, allowing visitors to avoid congested areas on peak visitation days.

Regional transit would expand under the *Merced River Plan*; there would be up to12 additional round-trip regional transit runs on the Highway 41 corridor. Public transit would connect communities south of Yosemite (such as Fresno and Oakhurst) with the Mariposa Grove, Yosemite Valley, and other park destinations. Shuttle service between Wawona and Yosemite Valley would be discontinued in favor of this new service. Overall, past, present, and future projects would have a long-term minor beneficial impact on the visitor.

Under Alternative 1 (No Action), congestion and confusion would be reduced at the South Entrance with the South Entrance Station Kiosks Replacement project, but some visitors would continue to travel to the Mariposa Grove, find the parking lot full, and backtrack to Wawona to catch the shuttle (which would return on the same 7-mile route). The commercial tram, generator, and parking-related sounds from the lower Grove would continue to impact soundscapes. Visitors traveling to Wawona as a destination could also be impacted as they compete for parking with those taking the shuttle to the Mariposa Grove. Impacts under Alternative 1 on visitor experience and recreation would be long-term, moderate, and adverse on peak visitation days.

In summary, past present and future plans and projects would have a local, long-term, minor, beneficial impact on the visitor experience in the Mariposa Grove area. Under Alternative 1 (No Action), there would be a long-term moderate adverse impact on the visitor experience and recreation due to inadequate parking and circulation near the Grove and commercial tram noise, and emissions within the Grove. Past, present and future impacts, in conjunction with the impacts of Alternative 1, would result in long-term, minor, adverse effect on the visitor experience and recreation in the Mariposa Grove area, including Wawona.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the commercial tram operation and the lower Grove parking area and restore those areas to giant sequoia and wetland habitat. Peak season visitor parking would be consolidated at the South Entrance, which would be the departure point for visitor access to the Grove. Numerous other rehabilitation and restoration actions would take place, such as improvement of hydrologic flow and universal access, soil decompaction, and improvements to visitor orientation and interpretation.

Construction-related Impacts. Construction at the South Entrance and in the Mariposa Grove could cause short-term inconvenience for vehicles and pedestrians, and possible temporary closures of facilities such as trails. Repaving the Mariposa Grove Road to the lower Grove area would cause 15 to 30 minute traffic delays for one summer, as sections of the road are reduced to one-lane traffic. There would be noise, dust, and motion associated with the construction of the South Entrance parking area.

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

Restoration-related Impacts. Ecological restoration actions in the Mariposa Grove could cause short-term inconvenience to vehicular and pedestrian traffic, possible temporary closures of facilities including trails, and noise and dust associated with restoration activities. In the long-term, the lower Grove area would change from a busy parking area to a natural giant sequoia grove that sustains and highlights the large mature giant sequoia trees that currently grow in the parking lot, as

well as the native understory and young sequoia trees that would be planted. Visitors would encounter an intact giant sequoias ecosystem as they first enter the Mariposa Grove, rather than a parking lot and gift shop. The lower Grove is relatively flat compared with the rest of the Grove, and travel through this part of the Grove would be relatively easy along the footpaths or the new accessible trail. Ecological restoration would provide an opportunity for visitors with mobility impairments to experience the Grove outside of their cars on accessible trails.

Impact Significance. Local, short-term, minor, adverse impacts and long-term, moderate, beneficial impacts.

Operation-related Impacts. Under Alternative 2, the South Entrance would be the primary departure point for visitors to the Grove. The NPS would provide a shuttle from the South Entrance along the 2-mile road to the lower Grove area. Limited shuttles from Wawona would continue (table 3-12). All visitors during peak visitation periods would park in the new South Entrance parking hub and take the shuttle into the lower Mariposa Grove area, where they would disembark next to the restored giant sequoia grove (which currently is a parking lot). This may be perceived as an inconvenience to some of the 60 percent of visitors who currently drive their personal vehicles directly to the lower Grove parking lot. However, others may appreciate the shuttle ride as an opportunity to "shift gears" to the unique environment they are about to visit. The 40 percent of visitors who currently ride the shuttle from Wawona Store would enjoy a shorter shuttle ride (about 5 miles shorter each way). Some visitors would take advantage of the new hiking trail between the South Entrance and the lower Grove.

During the off-season, when the Mariposa Grove Road is open and no shuttles are operating, visitors will be able to access the Grove by either parking in the lower Grove parking area (which is used for shuttles in the summer) or expanded parking area near the existing picnic area (located about one mile from the Grove). A combined total of about 80 off-season spaces will be available in these two areas, a reduction in about 35 personal vehicle spaces from the current off-season parking in the lower Mariposa Grove. Traffic management may be required during these off-season periods.

Peak season visitors would arrive at the lower Grove in a shuttle that would provide direct access to the trailhead with its improved interpretation and orientation. Consolidation and reconfiguration of trails and improved trail signs would improve way finding. Signs at the short section of road below the Grizzly Giant would encourage visitors to use the pedestrian trail instead of the road and assist in separating pedestrians from vehicles with accessible parking placards going to the Grizzly Giant. Overall, visitor safety would be improved as a result of reduced vehicular traffic within the Grove.

Removal of the commercial tram service may have a negative impact on the 10 percent of visitors to the Mariposa Grove who utilized the service. It would also result in the loss of the audio tour that accompanies the tram. Those who hike to the upper Grove area would benefit from more opportunities for solitude because of reduced visitation and enjoy a more natural experience without the intrusion of the mechanized tram. Reduced visitation to the upper Grove is also likely to reduce visitor impacts on the ecosystem. Visitors to the lower Grove would experience similar improvements related to the removal of noise and emissions, particularly in the vicinity of the iconic Grizzly Giant (see *Soundscapes* section).

The need for the shuttle system from Wawona would be greatly reduced. This would help alleviate congestion in Wawona.

There would be about 285 private vehicle parking spaces at the South Entrance. As this alternative accommodates current visitation levels, some visitors could be turned away on peak visitation days given the demand to visit the Grove and the physical constraints on parking capacity.

Under Alternative 2, the consolidation of arrival and parking facilities at the South Entrance would enable all visitors to have a more natural experience within the Grove. Facilities at the South Entrance and in the lower portion of the Grove would be brought into compliance with ABAAS to improve accessibility and the visitor experience for all visitors, regardless of their level of mobility. This would include the addition of ABAAS-compliant trails, comfort stations and vault toilets, and additional parking spaces at the South Entrance, lower Grove area, and Grizzly Giant. The existing road and a portion of the parking lot in the lower Grove area would be replaced with an accessible loop trail, which would allow visitors of all abilities to disperse throughout most of the newly restored, lower portion of the Grove. Another accessible trail would take visitors past the Grizzly Giant and California Tunnel Tree to an overlook which would allow visitors to view a portion of the Grove in a more isolated context. Associated benches, small spurs to viewpoints and interpretive signs, and slightly wider places in the trail, would offer all visitors places to stop to rest or enjoy the Grove just outside of the main path of travel. All visitors would be able to experience the giant sequoias, wetlands and wildlife of the Grove in a much less mechanized and more natural setting, without the motion, sounds and smells from the existing parking lot adjacent to the lower portion of the Grove, or from trams driving throughout the Grove. The quieter, more natural visitor experience would be especially noticeable to visitors with limited time, mobility or with young children who do not travel far from the shuttle stop or accessible parking spaces. Visitors with accessible parking placards would be able to drive to and through the Grove in their own vehicles up to the Grizzly Giant trailhead. Road access beyond the Grizzly Giant would be limited to service vehicles only as the road would be narrowed to restore these areas.

Impact Significance. Local, long-term minor, adverse impacts and major long-term beneficial impacts.

Conclusion. Under Alternative 2, visitors during peak visitation periods would park in the new South Entrance parking hub and take the shuttle into the lower Mariposa Grove area, where they would disembark into a restored giant sequoia grove (which currently is a parking lot). This would have an adverse impact on travel and access for peak season visitors who currently drive their personal vehicles directly to the lower Grove parking lot (60 percent), and a beneficial impact on visitors who take the shuttle from Wawona (40 percent). Parking when the shuttle is not in operation would be reduced in the lower Grove area, but a new parking area will be constructed near the picnic area that will result in about 80 total spaces between the lower Grove area and the picnic area (when the shuttle is not in operation). All visitors would encounter an intact giant sequoia ecosystem as they first enter the Mariposa Grove, rather than a parking lot and gift shop, which would be a beneficial impact. Visitors will also enjoy the beneficial impacts of a more natural soundscape. Construction of the new accessible trail will provide an opportunity for visitors with mobility impairments to experience the Mariposa Grove outside of their cars. Overall, there would be minor short-term construction-related impacts on the visitor experience, and long-term beneficial impacts on the visitor experience from ecological restoration of the sequoia grove, improvement in soundscapes, consolidated parking, and reduction in shuttle travel time to the Grove.

Cumulative Impacts. Past, present, and reasonably foreseeable projects affecting the visitor experience and recreation would be the same as those under Alternative 1 (No Action)—a long-term minor beneficial effect on the visitor experience and recreation in the Mariposa Grove area, including Wawona.

Transportation projects and other present and future actions would work in conjunction with actions proposed in Alternative 2. The new parking area at the South Entrance proposed under Alternative 2 would substantially decrease the demand for parking in Wawona and reduce driving on the Wawona Road for Grove visitors who backtrack to the Wawona shuttle if they found the existing lot at the Grove full. The new parking area at the South Entrance would provide shuttle parking that is 5-miles closer to the Mariposa Grove than the shuttle parking in Wawona. A shuttle to the Mariposa Grove would be available for visitors arriving to the South Entrance on public transit. Peak visitation days, when visitors could be diverted to manage user capacity from east Yosemite Valley under the *Merced River Plan*, are likely to be high use days for the Mariposa Grove as well. Based on 2011 park visitation levels, the diversion would take place about four days a year for an average of about 3 hours per diversion (about 12 hours total). Visitors could encounter times when they would be diverted from Yosemite Valley and encounter congestion at the Mariposa Grove and in Wawona. The Parkwide Traffic Management and Information System and the Transit Passenger Information System would help to alert the visiting public to real-time areas of congestion, allowing visitors to avoid congested areas on peak days. Overall, Alternative 2 would have a long-term beneficial impact on visitor experience and recreation from consolidated parking, reduction in shuttle travel time to the Grove, and improvement in soundscapes from removal of the tram, generator, and sound related to the Lower grove parking area.

In summary, past, present and future plans and projects would have local, long-term, minor, beneficial impacts in the Mariposa Grove area. Under Alternative 2, there would be a long-term beneficial impact on visitor experience and recreation from consolidated parking, reduction in shuttle travel time to the Grove, and improvement in soundscapes. Past, present and future impacts, in conjunction with the impacts of Alternative 2, would result in long-term beneficial impacts on the visitor experience and recreation in the Mariposa Grove area, including Wawona.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, including two new bridges, and a new parking lot near the Grizzly Giant. This alternative would make the Grizzly Giant the primary departure point for visitors to the Grove. The current South Entrance parking lot would remain as is and the lower Grove parking lot would be largely removed; a small lot of ABAAS-only spaces would be developed, increasing the number of ABAAS-compliant accessible parking spaces from 2 to 10 in the lower Grove area. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvements to visitor orientation and interpretation, are components of this alternative.

Construction-related Impacts. The nature of the impacts would be similar to Alternative 2 but the focus of most of the disturbance would be at the Grove itself, instead of at the South Entrance. If the changes were made all at once, it would be a short-lived but major disruption to movement in the Grove, and the experience of the Grove. If the construction and rehabilitation was undertaken in stages, then the overall impact could be long-term, with a sequence of short-term disruptions in varying sections of the Grove.

Impact Significance. Local, short- to long-term, moderate, adverse impacts.

Restoration-related Impacts. Similar to Alternative 2.

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

Operation-related Impacts. Grove visitors would stage at the new parking area near the Grizzly Giant, and would not be delayed by taking a shuttle from the South Entrance or Wawona, as would occur with Alternatives 1, 2 and 4 (table 3-12).

There would be no change in parking capacity at the South Entrance under this alternative. The addition of 233 parking spaces (including spaces for cars, tour buses, recreational vehicles, and ABAAS spaces) and the visitor contact facilities at the Grizzly Giant location would respond to the large proportion of users who want to visit that location. However, some visitors who would be anticipating a more natural, contemplative, and inspirational setting for their experience may have a negative perception of the increased level of development at the site. Even though they would not see the structures, people, and motorized vehicles (including tour buses) as they travel on the trail, they may still be able to hear and smell them to a certain distance. The reduction of activity that would occur at the lower Grove area and improvements such as wetland restoration would promote restoration at the lower Grove and change the nature of the visitor experience there. The existing Wawona Road – Mariposa Grove Road T-intersection and three-way stop would remain under this alternative.

As this alternative accommodates current visitation levels, some visitors could be turned away on peak visitation days given the demand to visit the Grove and the physical constraints on parking capacity. The lack of shuttle service under this alternative may result in unsafe conditions and resource impacts if cars are parked along the roadway or in other undesirable locations. Signage or other traffic management strategies could mitigate unsafe or resource impactful parking practices. It is expected that all visitors would arrive by car or tour bus under this alternative, which may lead to vehicular congestion. Visitors may appreciate the direct access to the Grove afforded by locating a large parking lot at Grizzly Giant, although the expansion of developed infrastructure would change the visitor experience and perception of the entry to the Grizzly Giant. In addition, the direct access to Grizzly Giant could promote crowding as more visitors can arrive at the site concurrently, and nearly all visitors would visit the Grizzly Giant, instead of the 84 percent who currently visit that area of the Grove. Parking access at the Grizzly Giant would significantly increase visitation to the upper Grove because it would shorten hiking distance to that area. This would have the benefit of providing easier hiking access to the upper Grove to more visitors, but the increased access could result in diminished experiences due to more visitors using the area. Higher visitor use in the upper Grove could also result in increased impacts on the environment and increased pressure on existing facilities.

Under Alternative 3, the accessibility of all facilities at the new transportation hub at the Grizzly Giant would be in compliance with ABAAS. Seven ABAAS-compliant parking spaces would be available at Grizzly Giant and ten available in the lower portion of the Grove. A 0.3-mile accessible loop trail would be constructed in the lower portion of the Grove, and a 0.25-mile accessible trail would be constructed to the Grizzly Giant and California Tunnel Tree. Placarded access to the upper Grove would be discontinued.

Impact Significance. Local, permanent, minor, adverse impacts; and local, permanent, major, beneficial impacts.

Conclusion. While both Alternatives 2 and 3 are designed to consolidate parking for Grove visitors, Alternative 3 would locate this infrastructure closer to the heart of the Grove. In comparison to Alternative 2, Alternative 3 provides a more auto/personal vehicle-centered option for accommodating visitors because it is focused on expanding parking closer to the Grove and eliminating shuttle service. Alternative 3 would reinforce personal vehicle access as the primary mode of access to the Grove, which some visitors may appreciate, whereas Alternative 2 relies on

expanded shuttle service to deliver visitors to the Grove. While some visitors may be more comfortable navigating the park from their cars, this alternative would serve to introduce the noise, emissions, and other effects of car use directly adjacent to the most popular visitor destination. Increased crowding at Grizzly Giant could result from direct access for vehicles and commercial tour buses to the site. Location of parking at the Grizzly Giant would likely impact other areas of the Grove as well. Less vehicular travel and visitor use in the lower Grove area could result in higher quality experiences and lower impacts to resources than exists under Alternatives 1, 2, or 4; however, the anticipated increased visitor use of the upper Grove could result in a decline in visitor experience quality and increased resource impacts.

Grove visitors expecting a more natural start to their experience may experience moderate impacts on the visitor experience due to the change in experience at the Grizzly Giant due to the expansion of developed infrastructure and overall less perceived naturalness in that location. However, visitors to the lower Grove area would benefit from reduced infrastructure and a greater perceived natural experience in that area.

Cumulative Impacts. Past, present, and reasonably foreseeable projects affecting the visitor experience and recreation would be the same as those under Alternative 1 (No Action)—a long-term minor beneficial effect on the visitor experience and recreation in the Mariposa Grove area, including Wawona.

Transportation projects and other present and future actions would work in conjunction with actions proposed in Alternative 3. The new parking area at the Grizzly Giant hub would substantially decrease the demand for parking in Wawona by Grove-bound visitors and reduce driving on the Wawona Road for Grove visitors who backtrack to the Wawona shuttle if they found the existing lot at the Grove full. There would be no shuttle service available from Wawona or the South Entrance, even for visitors arriving to the South Entrance on public transit.

Peak visitation days, when visitors could be diverted from Yosemite Valley under the *Merced River Plan* to manage user capacity, are likely to be high use days for the Mariposa Grove as well. Visitors could encounter times where they would be diverted from east Yosemite Valley and encounter congestion at the Mariposa Grove and in Wawona. The Parkwide Traffic Management and Information System and the Transit Passenger Information System would help to alert the visiting public to real-time areas of congestion, allowing visitors to avoid congested areas on peak days. Overall, Alternative 3 would have a long-term beneficial impact on visitor experience and recreation from consolidated parking at the Grove.

In summary, past, present and future plans and projects would have local, long-term, minor, beneficial impacts in the Mariposa Grove area. Under Alternative 3 there would be a long-term beneficial impact on visitor experience and recreation from consolidated parking and direct access to the Grove. Past, present and future impacts, in conjunction with the impacts of Alternative 3, would result in long-term beneficial impacts on the visitor experience and recreation in the Mariposa Grove area.

Alternative 4: South Entrance Hub with Modified Commercial Tram Access

Alternative 4 would maintain the commercial tram but with a limited route and hours of operation while also relocating the majority of the parking to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvements to visitor orientation and interpretation, are components of this alternative.

Construction-related Impacts. Similar to Alternative 2, except that the road between the lower and upper Grove areas would not be narrowed and converted to a hardened trail.

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

Restoration-related Impacts. Similar to Alternative 2.

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

Operation-related Impacts. Changes to parking and number of visitors served would be similar in Alternatives 2 and 4 (table 3-12). The only change in travel conditions between Alternative 2 and 4 would be the inclusion of the commercial tram, which would provide an additional mode to access the upper Grove area for some. The commercial tram would run between the South Entrance and the upper Grove, providing a non-hiking option for access to the Grizzly Giant and upper Grove area. The upper Grove tram terminus would also provide a staging area for visitors who want to go to Wawona Point but would not or could not walk to the overlook from the lower Grove area.

Under this alternative, almost all visitors to the Grove would arrive via shuttle from the South Entrance. Limited shuttle service would still be available from Wawona to South Entrance for those staying overnight in the Wawona area. Visitor use levels and associated impacts in the upper Grove area would be similar to Alternative 1. A modified Wawona Road – Mariposa Grove Road T-intersection would slightly improve traffic flow and safety.

The commercial tram noise, motion, and emissions would distract pedestrians on or crossing the road and at the trailhead, as well as on trails in the vicinity of the road, similar to conditions under Alternative 1. The slower-moving tram may also adversely impact shuttle operations between the South Entrance and the lower Grove.

For those with mobility constraints, vehicles with placards would be allowed to follow the tram to the Grizzly Giant and upper Grove area and have similar access as under Alternative 1. Accessibility would be improved by constructing an accessible loop trail in the lower portion of the Grove and an accessible overlook near the Grizzly Giant and California Tunnel Tree.

Impact Significance. Local, permanent, minor, adverse impacts; and local, permanent, moderate, beneficial impacts.

Conclusion. Impacts on visitor use and experience would be similar to Alternative 2, except conditions would be somewhat more adverse to pedestrians desiring a more natural, contemplative and inspirational setting, and somewhat more beneficial to visitors who wish to experience the Grove on the commercial tram.

Cumulative Impacts. Past, present, and reasonably foreseeable projects affecting the visitor experience and recreation would be the same as those under Alternative 1 (No Action)—a long-term minor beneficial effect on the visitor experience and recreation in the Mariposa Grove area, including Wawona.

Transportation projects and other present and future actions would work in conjunction with actions proposed in Alternative 4. The new parking area at the South Entrance proposed under Alternative 4 would substantially decrease the demand for parking in Wawona and reduce driving on the Wawona Road for Grove visitors who backtrack to the Wawona shuttle if they found the existing lot at the Grove full. The new parking area at the South Entrance would provide shuttle parking that

is five miles closer to the Mariposa Grove than the shuttle parking in Wawona. A shuttle would be available for visitors arriving to the South Entrance on public transit. Peak visitation days, when visitors could be diverted from Yosemite Valley to manage user capacity under the *Merced River Plan*, are likely to be high use days for the Mariposa Grove as well. Visitors could encounter times where they would be diverted from Yosemite Valley and encounter congestion at the Mariposa Grove and in Wawona. The Parkwide Traffic Management and Information System and the Transit Passenger Information System would help to alert the visiting public to areas of congestion, allowing visitors to avoid congested areas on peak days. Overall, Alternative 4 would have a long-term beneficial impact on visitor experience and recreation from consolidated parking, reduction in shuttle travel time to the Grove, and improvement in soundscapes from removal of the generator and sound related to the Lower grove parking area, though sounds related to the commercial tram would remain.

In summary, past, present, and future plans and projects would have local, long-term, minor, beneficial impacts in the Mariposa Grove area. Under Alternative 4, there would be a long-term beneficial impact on visitor experience and recreation from consolidated parking, and reduction in shuttle travel time to the Grove. Past, present and future impacts, in conjunction with the impacts of Alternative 4, would result in long-term beneficial impacts on the visitor experience and recreation in the Mariposa Grove area, including Wawona.

PARK OPERATIONS

Affected Environment

Sound park operations help maintain a safe, functional, and orderly environment that provides compatible opportunities for resource preservation and enjoyment by visitors and employees to Yosemite National Park. The park supports an integrated system of compatible land uses providing opportunities for recreation, community development, preservation, and economic use of resources. NPS Resource Management and Science staff are responsible for protecting the natural and sociocultural resources of the park. The NPS Division of Facilities Management performs preventive and corrective maintenance on utility infrastructure throughout the park, which includes water supply systems, wastewater disposal infrastructure, power systems, telecommunications systems, and roads and parking lots. The NPS Divisions of Visitor Protection, Interpretation and Education, and Facility Management maintain a physical or operational presence at the Mariposa Grove and the South Entrance. NPS law enforcement rangers perform essential functions and responsibilities, including law enforcement and resource protection, search and rescue, emergency medical response, wilderness management, and oversight of concession services at the Grove.

Mariposa Grove Setting

Mariposa Grove visitor facilities are operated seasonally during snow-free months of the year, typically opening in April or May and closing in October or November. Park facilities and infrastructure within the Mariposa Grove include comfort stations in the lower and upper Grove areas, a small office and storage area, the Mariposa Grove Museum, two water tanks, paved roads and unpaved trails, paved shuttle bus parking, and commercial tram staging area.

Concessioner-operated and maintained facilities at the Mariposa Grove include the gift/snack shop and its diesel-powered generator, and commercial tram ticket booth. Other Grove amenities include sitting areas, wayside exhibits, signs, trailheads, drinking fountain, and trash containers. The park owns the shuttle buses and commercial trams that serve the Mariposa Grove (figure 3-36); Delaware North Companies operates and maintains the shuttle buses and commercial trams. The NPS Division of Facilities Management maintains the roads, parking lot, and all non-concessioner-

operated buildings throughout the Grove. The park also maintains the communications systems and associated solar and propane generator power systems, scenic overlook, and comfort station at Wawona Point.



Figure 3-36 – Park Shuttle Bus

A domestic water supply system constructed in the 1930s supplies water to the upper Grove area, lower Grove area, and the South Entrance and is a designated alternate water source to the community of Wawona. A water line from the upper Grove settling tank to a hydrant near Mariposa Tree and Rattlesnake Creek is approximately 2700 feet in length and is leaking in several areas, resulting in a loss of water of 27.5 gallons per minute. The 450-foot water line segment from the hydrant at Mariposa Tree leaks at joints and pin holes at various locations throughout Rattlesnake Creek. Static tests show leakage rates at 1.5 gallons per minute through the creek bed. Over the years many repairs have been made on the water lines throughout the system but leaks remain. In addition to maintenance activities on the lines of the water supply system, the water tanks were replaced at the South Entrance and the lower Grove area in 2007-2008.

Delaware North Companies Parks and Resorts at Yosemite, Inc. is currently Yosemite National Park's primary concessions contractor, providing lodging, retail, food and beverage, commercial recreation, and transportation services to visitors at Yosemite National Park. Delaware North Companies is the only concessioner operating in the Mariposa Grove. Delaware North Companies is responsible for operating and maintaining the park shuttle buses, commercial trams (4 at Mariposa Grove and 3 in Yosemite Valley), and the Grove gift shop from May through October. Concessioner staff also assist with traffic management when the lower Grove parking lot is full.

South Entrance Setting

Park facilities at the South Entrance include a single-story ranger building, garage, entrance office, kiosk, parking lot, the paved Mariposa Grove Road, comfort station, and shuttle stop. Infrastructure systems at the South Entrance include a water supply and distribution system, and a leach field septic system. Power to the comfort station and ranger residence is provided by Pacific Gas and Electric Company via above- and below-ground electrical lines. The ranger building also has a satellite dish, propane-powered generator, propane tanks, hazardous materials storage, and electrical transformer. The South Entrance operates year-round, and is staffed by NPS rangers; no concession services other than the shuttle stop are provided at the South Entrance.

Transportation and Public Safety

The current configuration of the Wawona Road/Mariposa Grove Road T-intersection at the South Entrance has resulted in inefficient traffic flow as well as safety concerns for motorists and pedestrians using or passing through the area. Inadequate road design, width, striping, and signs were noted by the public during the scoping period. These concerns are documented in the 2011 Parkwide Safety Study/Review Report which indicates that this intersection now has the highest overall accident index in the park (given completion of work at the Chinquapin intersection). Due to the limited parking at the Grove, its popularity, and overall high visitation of the park, the Mariposa Grove Road is periodically closed by concessioner employees who must reroute motorists, using hand signals, to Wawona. The congestion and resultant confusion is not optimal for public safety or the visitor experience. A turn-off lane was constructed heading southward through the South Entrance toward Fish Camp to alleviate traffic congestion. Separate NPS modifications to the kiosk area at the South Entrance are expected to improve circulation at the intersection by allowing

visitors the space to select a right or left turn lane. The design for the Restoration of the Mariposa Grove of Giant Sequoias includes additional long-term plans for improving transportation, traffic flow, and pedestrian and motorist safety in this area, if needed.

Environmental Consequences

Impact Assessment Methodology

Impacts on park operations were considered to determine how each alternative would affect park management strategies, methods, and costs.

Impact Intensity Level Definitions

Negligible – Impacts on park operations would be largely unnoticed by staff and the visiting public. Existing programs and activities would remain essentially unchanged. There would not be a measurable difference in costs from existing levels.

Minor – Park operations would be affected, but the impacts would be limited and not generally noticed by visitors. Increases or decreases in operating costs and staffing workload would require some realignment of funds, but would not require substantial changes to the overall operating budget. Measurable additions or reductions in cost would be less than 10 percent of existing levels.

Moderate – Park operations would be measurably affected, and the impacts would be noticeable to some visitors. Increases or decreases in operating costs and/or workload would require realignment of funds and would alter the scope and/or quality of some programs. Additions or reductions in cost would be between 10 percent and 20 percent of existing levels.

Major – Impacts on park operations 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 alter the scope and quality of multiple programs or basic operational activities. Additions or reductions in cost would exceed 20 percent of existing levels.

Type of Impact. Impacts were evaluated as either beneficial or adverse to park operations. Adverse impacts represent an increase in operating costs or management activities, and beneficial impacts represent a decrease in operating costs or management activities.

Alternative 1: No Action

Operation-related Impacts. Under the No Action Alternative, the Mariposa Grove would remain in its existing condition and park operations and management would not change. The dispersal of facilities and equipment and the aging infrastructure within the Grove would continue to require ongoing maintenance and repairs and increased facilities management time, staff, and resources.

The existing septic system at the South Entrance and restroom facilities throughout the Grove would continue to be inadequate and the wastewater system would continue to generate odor complaints and service calls. The leaking water supply line from the upper Grove area to the hydrant near Mariposa Tree and Rattlesnake Creek would not be replaced, resulting in more maintenance costs for repairs. The deteriorating alternative Wawona water supply system would not be repaired and the water tank would remain adjacent to the upper Grove loop. Water system operators would continue to be challenged with repairing and rehabilitating an already degraded and deteriorated water system.

Under the No Action Alternative, buildings, structures, and roads would not be upgraded or replaced, which could result in ongoing repair and maintenance work. The park would continue to operate the shuttles between Wawona, the South Entrance, and lower Grove area from May through October. The park would continue to collect franchise fees generated by the concessioner-operated tram and gift shop.

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

Conclusion. The aging buildings and infrastructure at the Grove would continue to place demands on facilities management staff for repair and maintenance work, resulting in overall increases to the operating budget. Under the No Action Alternative, the Grove would have an adverse impact on park operations and facilities.

Cumulative Impacts. This cumulative impact analysis on park operations considers the past, present, and reasonably foreseeable future actions in the Mariposa Grove area, in combination with potential effects of Alternative 1. Past park operations have a negligible impact on the operational conditions of today. Development of the Parkwide Traffic Management and Information System, the Transit Passenger Information System, and completion of the Wawona Road Rehabilitation may reduce traffic-related operational burdens by contributing to transportation management solutions within the park. Completion of the Parkwide Communication Data Network could improve operational efficiency through faster and more secure network capabilities, while reducing the demand on existing telecommunications infrastructure. The Wawona Meadow Restoration project may reduce the operational burdens of future restoration efforts in this area. The South Entrance Station Kiosk Replacement could enhance traffic flow and reduce congestion at the South Entrance, thereby reducing the park's overall transportation management burdens. In the future, park visitation is expected to continue growing at the present rate of 3 percent annually. As a result, the operational burden associated with managing large numbers of park visitors, including those associated with the provision of visitor services; the management of park resources; and the demands on and maintenance of administrative facilities, employee housing, and utilities; among other aspects of park operations would continue to increase. Present and future operational plans and projects would have a long-term minor beneficial impact on park operations.

Alternative 1 (No Action) does not propose changes to existing park and concessioner operations and facilities. Aging buildings and infrastructure at the Grove would continue to place demands on facilities management staff for repair and maintenance, resulting in overall increase in time and staffing. There would be a local, long-term moderate adverse impact on park operations under Alternative 1.

The long-term minor beneficial impact of past, present, and future actions, in conjunction with the long-term moderate adverse impacts of Alternative 1, would be long-term, minor, and adverse.

Alternative 2: South Entrance Hub (Preferred Alternative)

Construction-related Impacts. Alternative 2 would have temporary, short-term, and minor adverse impacts on facilities management staff and park operations during the construction phase. Additional demands would be placed on park staff to coordinate construction activities and visitor use, and construction work and traffic delays would disrupt normal traffic patterns, parking, and visitor activities. The park would need to take additional measures to notify visitors of the status of the roads, potential traffic delays, and the location of designated parking areas.

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

Restoration-related Impacts. Restoration of the Mariposa Grove would not interfere with or impact park operations. Existing operations and activities would remain essentially unchanged.

Impact Significance. Local, short-term, negligible impact.

Operation-related Impacts. Under Alternative 2, the commercial tram would be removed, lower Grove parking would be reduced, and primary visitor parking would be relocated to the South Entrance. Some Grove facilities and infrastructure would be removed and consolidated at the South Entrance to improve access and serviceability. Restrooms would be added, the existing water supply system repaired, and a new septic system would be installed. The consolidation of parking at the South Entrance, in conjunction with the support of traffic management staff, would improve traffic flow and reduce back-tracking and confusion by visitors. Alternative 2 would reduce the need for continual maintenance repairs to deteriorating utility infrastructure; however, the addition of new facilities and infrastructure and more complex utility systems would offset the savings. Alternative 2 would consolidate visitor education at the South Entrance indoor/outdoor visitor contact area, which would include interpretive program elements.

The NPS would need to increase the number of bus hours of the Mariposa Grove shuttle by about 35 percent under Alternative 2, with a proportional increase in transit costs. This estimate considers the reduced shuttle service between Wawona and the lower Grove area, additional service between the South Entrance and the lower Grove area, and expansion of shuttle operations into the shoulder seasons.

Elimination of the commercial tram service would result in a local adverse impact on the existing concessioner. The revenue generated by the tram is a very small percentage of the overall revenue generated by concessioner activities in the park. Although the NPS would no longer collect franchise fees generated by the commercial tram, these fees represent a small fraction of the park's overall operating budget.

Impact Significance. Local, long-term, minor, negligible adverse impact with respect to maintenance of facilities and septic systems, and long term, moderate adverse impact with respect to the increased cost of shuttle operations.

Conclusion. Consolidation of infrastructure and improvements to facilities and utilities would result in a negligible impact on park operations and facilities staff over the long term by reducing timely and costly maintenance repairs. Elimination of the tram service would result in a local adverse impact on the existing concessioner, although the revenue generated by the tram is a very small percentage of the overall revenue generated by concessioner activities in the park. Additional long-term costs would be incurred from the expansion of the shuttle service and infrastructure that must be maintained.

Cumulative Impacts. The impact of past, present, and reasonably foreseeable projects affecting park operations would be the same as Alternative 1 (No Action)—a long-term minor beneficial impact on park operations in the Mariposa Grove area. Under Alternative 2, elimination of the tram service would result in a local adverse impact on concessioner revenues. This loss would constitute a very small percentage of the overall revenue generated by concessioner income in the park. The impacts of Alternative 2 on park operations would generally be local, long-term, and moderate, adverse from expansion of the shuttle service and infrastructure that must be maintained. The cumulative effect of past, present, and future actions, in conjunction with the long-term minor beneficial impacts of Alternative 2, would be long-term, moderate, and adverse.

Alternative 3: Grizzly Giant Hub

Construction-related Impacts. Alternative 3 would remove the commercial tram operation and consolidate the facilities and infrastructure at Grizzly Giant, but outside of giant sequoia habitat. Construction-related impacts would be similar to Alternative 2 except that Alternative 3 proposes to construct a new bypass road, two new bridges, and a new parking lot near Grizzly Giant. The increase in project components and associated construction would result in higher initial short-term impacts on operating costs compared to Alternative 2. Increased demands would be placed on park staff due to a larger area of construction, a longer time period for construction, and the potential for more traffic delays. The park would need to take additional measures to notify visitors of the status of the parking areas, bypass road, bridges, and potential traffic delays.

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

Restoration-related Impacts. Restoration of the Grove would not interfere with or impact park operations. Existing operations and activities would remain essentially unchanged.

Impact Significance. Local, short-term, negligible impact.

Operation-related Impacts. Consolidating the infrastructure and facilities at Grizzly Giant, upgrading existing facilities and utilities, simplifying traffic flow, and removing the commercial tram and shuttle operations would reduce the demand on park facilities staff over the long term and on the overall park operations and maintenance costs compared to the No Action Alternative. Traffic congestion related to the occasional closure of the Mariposa Grove Road during periods of heavy visitation would occur less frequently. This would reduce demands on park facilities staff to provide traffic control measures. Alternative 3 would eliminate the park's transit costs related to operating the shuttle between Wawona, the South Entrance and the lower Grove area. Although the park would no longer collect franchise fees generated by the commercial tram, these fees represent a small fraction of the total revenue generated by concessioner services in the park and the park's overall operating budget.

Elimination of the tram service would result in a local adverse impact by the existing concessioner, although the revenue generated by the tram is a very small percentage of the overall revenue generated by concessioner activities in the park.

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

Conclusion. The construction of a new bypass road, two bridges, and a new parking lot would result in an initial short-term increase in park operating costs. However, in the long term, Alternative 3 would improve and simplify operations in the Grove and reduce park operating and maintenance costs compared to the No Action Alternative.

Cumulative Impacts. The impact of past, present, and reasonably foreseeable projects affecting park operations would be the same as Alternative 1 (No Action)—a long-term minor beneficial impact on park operations in the Mariposa Grove area. Under Alternative 3, elimination of the tram service would result in a local adverse local impact on concessioner revenues. This loss would constitute a very small percentage of the overall revenue generated by concessioner income in the park. Construction of a new bypass road, two bridges, and a new parking lot would result in an initial short-term increase in park operating costs. In the long term, Alternative 3 would improve and simplify operations in the Grove and reduce the cost of maintenance on deteriorating infrastructure. The impacts of Alternative 3 on park operations would generally be local, long-term, and minor beneficial from consolidation of infrastructure and improvements to facilities and utilities. The cumulative effect of past, present, and future actions, in conjunction with the long-term minor beneficial impacts of Alternative 3, would be long-term, moderate, and beneficial.

Alternative 4: South Entrance Hub with Modified Commercial Tram Access

Construction-related Impacts. Construction-related impacts under Alternative 4 would result from the consolidation of most infrastructure and facilities to the South Entrance, realignment of the commercial tram access road, and construction of new restrooms and a leach field (if feasible). Short-term impacts would be minor and similar to Alternative 2, except that the road realignment may require additional park facilities staff and resources to monitor traffic conditions in local areas.

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

Restoration-related Impacts. Restoration of the Grove would not interfere with or impact park operations. Existing operations and activities would remain essentially unchanged.

Impact Significance. Local, short-term, negligible impact.

Operation-related Impacts. The facilities and infrastructure would be removed from the lower Grove area and consolidated at the South Entrance to improve access and serviceability. The existing ranger station at the South Entrance and existing restroom access would be rehabilitated, a new comfort station built, the existing water supply system repaired, and a new septic system would be installed. The addition of new facilities and infrastructure and more complex utility systems would off-set the savings from upgrading facilities that currently require frequent maintenance.

The NPS would need to increase the bus hours of the Mariposa Grove shuttle by about 35 percent under Alternative 4, with a proportional increase in transit costs. Although shuttle service would be reduced between Wawona and lower Grove area, additional service would be provided between the South Entrance and the lower Grove area and shuttle operations would be expanded into the shoulder seasons. Although the revenue generated by the commercial tram franchise fees would be reduced, this represents a small fraction of the total revenue generated by concessioner services in the park and the park's overall operating budget.

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

Conclusion. Consolidation of infrastructure and improvements to facilities and utilities would result in a beneficial impact on park operations and facilities staff over the long term by reducing timely and costly maintenance repairs, but additional costs would be incurred from the expansion of the shuttle service and infrastructure that must be maintained.

Cumulative Impacts. The impact of past, present, and reasonably foreseeable projects affecting park operations would be the same as Alternative 1 (No Action)—a long-term minor beneficial impact on park operations in the Mariposa Grove area. The impacts of Alternative 4 on park operations would generally be local, long-term, moderate and adverse from expansion of the shuttle service, facilities and utilities. The cumulative effect of past, present, and future actions, in conjunction with the long-term minor beneficial impacts of Alternative 4, would be long-term, moderate, and adverse.

Energy Use and Sustainability

Affected Environment

One of the management objectives for park operations, as outlined in previous planning efforts and Executive Order 13123, is to install facilities and utility systems that conserve energy. Design

techniques and application of new technology to reduce energy and water consumption should be incorporated in the design of new facilities or replacement of existing facilities.

In April 1999, the U.S. Department of the Interior entered into a formal Memorandum of Understanding with the U.S. Department of Energy to promote the use of energy-efficient and renewable energy technologies and practices in national parks, and to educate the visiting public about these efforts. This partnership officially inaugurated the program titled "Green Energy Parks: Making the National Parks a Showcase for a Sustainable Energy Future." This initiative would help to fulfill provisions of the Energy Policy Act of 1992, which directs the use of energy-efficient building designs and equipment and the use of alternative motor fuels where practicable. The Energy Policy Act of 2005 incorporates previous Energy Policy Acts and directs the federal government to increase its renewable energy use, with a goal of using 3 percent, 5 percent, and 7.5 percent of total energy consumption in incremental years through 2013.

NPS *Management Policies 2006* includes a section (Section 9.1.1.6) on sustainable energy design in the operation of park facilities. Section 9.1.1.6 states that any facility development must include improvements in energy efficiency and reduction in greenhouse gas emissions, and that such efficiency should be achieved using solar thermal and photovoltaic application, as well as appropriate insulations, energy-efficient lighting and appliances, and renewable energy technologies. Furthermore, this section states that energy-efficient construction projects should be used as an educational opportunity, and that those built primarily for visitors must incorporate Leadership in Energy and Environmental Design® (LEED®) standards to achieve a silver rating (NPS 2006).

NPS *Management Policies 2006* also includes a section (Section 9.1.7) on energy management in the operation of park facilities. Section 9.1.7 states that the NPS shall conduct its activities in ways that use energy wisely and economically, and that encourages the implementation of alternative transportation programs and the use of bio-based and alternative fuels. It also calls for the use of renewable sources of energy and new developments in energy-efficiency technology, including products from the recycling of materials and waste, where appropriate and cost-effective over the life cycle of a facility. Lastly, the management policies call for the interpretation of resource protection benefits resulting from the efficient use of energy, and education of park personnel and visitors to encourage use of sustainable practices in conserving energy (NPS 2006). These policies are derived from the laws that have been enacted to establish and guide the administration of the national park system, including

- Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management
- Executive Order 13123, Greening the Government through Efficient Energy Management, which calls on federal agencies to take the lead in implementing energy conservation, maximizing the use of renewable resources, and reducing greenhouse gas emissions; and
- Executive Order 13514: Federal Leadership in Environmental, Energy, and Economic Performance, signed in October 2009, which required federal agencies to set a 2020 greenhouse gas emissions reduction target; increase energy efficiency; reduce fleet petroleum consumption; conserve water; reduce waste; support sustainable communities; and leverage federal purchasing power to promote environmentally responsible products and technologies.

Sustainable Design

President Obama's Executive Order 13514 provides a unique opportunity for federal agencies and facilities to improve sustainability across their operations. The executive order, in addition to its call for agencies to implement sustainable practices when constructing and operating high-performance Federal buildings, and establishes goals for the conservation of water resources at federal facilities, including potable, industrial, landscaping, and agricultural water. The executive order also calls for pollution prevention through a variety of landscape management practices (CEQ 2012).



Figure 3-37 – Solar-powered Sign at South Entrance

To help achieve these policy goals, on October 31, 2011 CEQ issued *Guidance for Federal Agencies on Sustainable Practices for Designed Landscapes*, which describes strategies to achieve sustainable Federal landscape practices. This guidance is to be used by federal agencies for landscape practices when constructing new, or rehabilitating existing, owned or leased facilities, or when landscaping improvements are otherwise planned (CEQ 2012). This guidance is based in part on the Sustainable Sites Initiative.

The Sustainable Sites Initiative (SITES) is an interdisciplinary effort by the American Society of Landscape Architects and partners to create voluntary national guidelines and performance benchmarks for sustainable land design, construction, and maintenance practices. The U.S. Green Building Council, a stakeholder in the initiative, anticipates incorporating these guidelines and performance benchmarks into future iterations of the LEED® Green Building Rating System. SITES is not intended to be a restoration tool; it is most appropriate as a tool to guide the development of designed landscapes. However portions of the project that would be designed, such as parking areas, shuttle infrastructure, and other facilities/utilities, could use SITES guidelines to provide the most sustainable strategies and practices. As stated in the SITES guidelines, "agencies should strive to balance natural resource management priorities with development needs (energy, security, infrastructure) while considering cultural, recreational, and environmental resources inherent in the landscape. These guidelines are intended to enhance, not inhibit, planning, operations and maintenance" (SITES 2012).

Mariposa Grove Energy Use

Park facilities and infrastructure within the Grove include comfort stations, small office and storage area, the Mariposa Museum, concession gift/snack shop, commercial tram ticket booth structure, two water tanks, restroom facilities, paved road, and a paved shuttle bus parking and commercial tram staging area. Other amenities include sitting areas, wayside exhibits, trailheads, drinking fountain, and trash containers. The NPS Division of Facilities Management performs preventive and corrective maintenance on utility infrastructure throughout Mariposa, which includes the water supply system, wastewater disposal infrastructure, power, and communications. Electricity at the gift shop is supplied by a portable diesel generator and communications equipment at Wawona Point is supplied by propane and solar power.

The concessioner at Mariposa Grove is one of the first such companies in the United States – and the first operating in a national park – to be registered to the ISO 14001 environmental management standard (Eaton 2012). The use of tractors with clean-diesel engines in Mariposa Grove has reduced vehicle emissions (Eaton 2012). The shuttle buses that transport visitors from Wawona and the South Entrance to the Mariposa Grove are also alternatively fueled.

Energy consumption at the Mariposa Grove occurs largely from May through October. Energy sources at the Mariposa Grove include electricity (from an onsite, diesel-fueled generator), propane, and diesel fuel. The communications equipment at Wawona Point is supplemented with propane during the winter months when meteorological conditions prohibit sole reliance on solar power. Waste recycling occurs at both the Grove and at the South Entrance.

South Entrance Energy Use

Park facilities and infrastructure at the Yosemite National Park South Entrance area include a single-story ranger building, garage, entrance office, kiosk, parking lot, paved road, comfort stations, shuttle stop, and entrance comfort station. Electricity for the South Entrance comfort station and ranger building is supplied by Pacific Gas and Electric Company via above- and below-ground power lines. The ranger building also contains a generator, satellite dish, propane tanks, hazardous materials storage, and electrical transformer.

The South Entrance and ranger residence operate year-round. Energy consumption at the South Entrance includes electricity (ranging from 996 kilowatt hours per month in the summer up to 3,800 kilowatt hours per month in the winter), propane, and diesel fuel.

Environmental Consequences

Intensity Level Definitions

The analysis of energy was based on a qualitative comparison of energy use for the operation, construction, and maintenance (including repairs) of each alternative. The evaluation is based on available data and forecasts. For purposes of this analysis, implementation of an alternative is assumed to have an impact on energy if it results in the following:

Adverse impact:

- Increased overall per capita energy consumption
- Increased reliance on natural gas and oil
- Continued use of inefficient building design

Beneficial impact:

- Decrease in overall per capita energy consumption
- Decrease reliance on natural gas and oil
- Increase use of renewable energy (e.g., photovoltaic cells, wind, geothermal)
- Energy-efficient design for new infrastructure
- Incorporation of energy-efficient features into existing infrastructure

Negligible – Energy use would not be affected, or effects would not be measurable.

Minor – Effects on energy use, such as increase/decrease in overall consumption, would be measurable.

Moderate – Effects on energy use, such as increase/decrease in overall consumption, would be apparent.

Major – Effects on energy use, such as increase/decrease in overall consumption, would be readily apparent.

Alternative 1: No Action

Under Alternative 1 current infrastructure, concessioner services and maintenance, and park management would remain as is. No rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be implemented.

Operation-related Impacts. Consumption of non-renewable energy (propane and diesel fuel) at the lower Grove gift shop and commercial tram would continue. The current dispersed transit and access patterns among the Mariposa Grove, the South Entrance, and Wawona result in extraneous vehicular mileage, particularly for those visitors who are turned away from the Mariposa Grove when parking is full and who then board a shuttle bus and drive all back to the Mariposa Grove from Wawona. This dispersal also adversely impacts maintenance and service expenditures. Long lines at the South Entrance kiosks and visitor disorientation result in consistent engine idling. There are no planned improvements to building design in terms of energy and water efficiency.

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

Conclusion. Under Alternative 1 there would be no concerted effort to decrease energy consumption through sustainable design and no impetus to use alternative energy sources, resulting in local, long-term, moderate adverse impacts on energy use and sustainability.

Cumulative Impacts. This cumulative impact analysis considers the present and reasonably foreseeable future actions related to energy use and sustainability in the Mariposa Grove area, in combination with the impacts of Alternative 1. The potential impacts from the operation, construction, and maintenance of most of the present plans and projects listed in Appendix B would result in a small increase in overall per capita energy consumption. Overall, these actions constitute a short-term negligible adverse impact on energy use and sustainability in the area. Under Alternative 1, there would be no actions taken to decrease energy consumption through sustainable design and no use of alternative energy sources, resulting in local, long-term, moderate adverse impacts on energy use and sustainability.

Alternative 2: South Entrance Hub (Preferred Alternative)

Alternative 2 would remove the commercial tram operation and reduce the amount of lower Grove parking while expanding and relocating primary visitor parking to the South Entrance, making the South Entrance the departure point for visitors accessing the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction energy expenditures for the development of the new parking lot and visitor contact area at the South Entrance and the Three Sentinels Bridge under Alternative 2 would include both direct and indirect uses of energy. Combustion of petroleum products needed to operate construction equipment would be included in the direct energy use during the construction period. The energy consumed through mining and extraction of raw materials, manufacturing, and transportation to produce the construction materials is considered indirect energy use. Indirect energy typically represents about three-quarters of total construction

energy, while direct energy represents about one-quarter of the total construction energy (Hannon et al. 1978). Though construction energy would be consumed only during the construction period, it would represent the irreversible consumption of finite natural energy resources.

Construction activities under Alternative 2 would consume fuel and electricity, along with indirect energy for materials used in constructing development components. Construction equipment, including haul trucks and vehicles onsite, is expected to consume a majority of the energy resources. Electricity would be used by construction equipment, such as welding machines and power tools. Energy consumed by construction power equipment would be relatively minimal.

The amount of energy consumed each day would vary depending on a number of factors, such as the number and types of equipment in operation on a given day, usage rates, the number of construction workers needed, the number of haul trips, and trip length. Construction energy consumption would occur for the duration of the construction period and therefore would not be an ongoing drain on finite natural resources. Construction energy consumption would primarily be in the form of fuel, would not have a significant effect on the energy resources of the park, and would not require new infrastructure. The design plan under Alternative 2 includes measures that would reduce construction energy expenditure through the use of recycled materials. BMPs for air quality and noise would help reduce fuel consumption by construction equipment (e.g., ensuring all construction equipment is properly tuned and maintained, turning off equipment when not in use). Furthermore, materials removed as part of the demolition of existing campus facilities would be sorted and salvaged for reuse or recycling.

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

Restoration-related Impacts. Restoration energy consumption would occur as pavement is ripped up along the Mariposa Grove Road and in the lower Grove parking lot and during culvert work and installation. However, this would not be an ongoing drain on finite natural resources. Restoration energy consumption would primarily be in the form of fuel, would not have a significant effect on the energy resources of the park, and would not require new infrastructure.

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

Operation-related Impacts. The consumption of non-renewable energy (propane and diesel fuel) and electricity in the lower Grove area would be eliminated. Under this alternative there is an option to be "off the grid." Consolidation of Mariposa Grove facilities and infrastructure at the South Entrance would result in improved access and serviceability, reducing expenditures. The South Entrance intersection congestion would be alleviated by installation of a roundabout if needed, and current plans to move the entrance kiosks southward away from the Wawona Road/Mariposa Grove Road intersection. This improvement in traffic flow would result in fewer or shorter back-ups and less idling by vehicles. Vehicle miles traveled would also be reduced as fewer visitors would be driving to Wawona and "backtracking" to the Mariposa Grove on the park shuttle bus system.

Under Alternative 2, a new visitor contact area at the South Entrance would be designed in accordance with the NPS *Guiding Principles of Sustainable Design* (1993). These principles include the orientation of buildings to maximize sun exposure for heat gain and to minimize the effects of prevailing winds, design that incorporates the use of natural ventilation, entry vestibules to reduce heat loss, energy-efficient lighting, and the installation of energy- and water-efficient features and utilities. Other "green" elements to be incorporated include energy-efficient construction design, sustainability and "green" technology, lighting, site drainage, water conservation, wastewater management, and energy conservation.

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

Conclusion. Under Alternative 2 there would be a concerted effort to decrease energy consumption through sustainable design while using alternative energy sources, resulting in local, long-term, moderate beneficial impacts on energy use and sustainability.

Cumulative Impacts. The impact of past, present and reasonably foreseeable projects affecting energy use and sustainability would be the same as Alternative 1 (No Action)—a long-term negligible adverse impact on energy use and sustainability in the Mariposa Grove area. Under Alternative 2, there would be a concerted effort to decrease energy consumption through sustainable design while using alternative energy sources, resulting in local, long-term, moderate beneficial impacts on energy use and sustainability. Present and past plans and projects, in conjunction with the moderate beneficial impacts of Alternative 2, would result in an overall long-term moderate beneficial impact on energy use and sustainability in the Mariposa Grove area.

Alternative 3: Grizzly Giant Hub

Alternative 3 would remove the commercial tram operation and build a new bypass road, including two new bridges, and a new larger parking lot near the Grizzly Giant, but outside of giant sequoia habitat. This alternative would make the Grizzly Giant the primary departure point for visitors to the Grove. The current South Entrance parking lot would remain as is and the lower Grove parking lot would be removed; a small lot of ABAAS-compliant parking spaces would be constructed. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow and universal access, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction energy expenditures for the new access road, two bridges, and parking lot near the Grizzly Giant under Alternative 3 would include both direct and indirect uses of energy. Combustion of petroleum products needed to operate construction equipment would be included in the direct energy use during the construction period. The energy consumed through mining and extraction of raw materials, manufacturing, and transportation to produce the construction materials is considered indirect energy use. Indirect energy typically represents about three-quarters of total construction energy, while direct energy represents about one-quarter of the total construction energy (Hannon et al. 1978). Though construction energy would be consumed only during the construction period, it would represent the irreversible consumption of finite natural energy resources.

Construction activities under Alternative 3 would consume fuel and electricity, along with indirect energy for materials used in constructing development components. Construction equipment, including haul trucks and vehicles onsite, is expected to consume a majority of the energy resources. Electricity would be used by construction equipment, such as welding machines and power tools. Energy consumed by construction power equipment would be relatively minimal.

The amount of energy consumed each day would vary depending on a number of factors, such as the number and types of equipment in operation on a given day, usage rates, the number of construction workers needed, the number of haul trips, and trip length. Construction energy consumption would occur for the duration of the construction period and therefore would not be an ongoing drain on finite natural resources. Construction energy consumption would primarily be in the form of fuel, would not have a significant effect on the energy resources of the park, and would not require new infrastructure. The design plan under Alternative 2 includes measures that would reduce construction energy expenditure through the use of recycled materials. BMPs for air quality and

noise would help reduce fuel consumption by construction equipment (e.g., ensuring all construction equipment is properly tuned and maintained, turning off equipment when not in use). Furthermore, materials removed as part of the demolition of existing campus facilities would be sorted and salvaged for reuse or recycling.

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

Restoration-related Impacts. Restoration energy consumption would occur as pavement is ripped up along the Mariposa Grove Road and in the lower Grove parking lot and during culvert work and installation. However, this would not be an ongoing drain on finite natural resources. Restoration energy consumption would primarily be in the form of fuel, would not have a significant effect on the energy resources of the park, and would not require new infrastructure.

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

Operation-related Impacts. This alternative would include a reduction in the use of non-renewable energy (propane and diesel fuel) as the proposed Grizzly Giant visitor contact area would be completely "off the grid." All development would showcase sustainable design and establish precedence. No shuttle infrastructure would be required. The simplified access pattern to the Mariposa Grove directly from the South Entrance would likely reduce vehicular mileage due to visitor confusion and back-tracking from Wawona, but this would likely be offset by the lack of alternative transit to the Grove and additional vehicle miles traveled to the Grizzly Giant Hub. Consolidation of Mariposa Grove facilities and infrastructure at the Grizzly Giant Hub would clarify access and improve serviceability. Most winter access would be from the South Entrance and plowing of the Mariposa Grove Road would be minimal. Seasonal shuttle operations would be extended. Service access to Wawona Point and the upper Grove comfort station and repurposed museum would be via hardened narrow road.

Under Alternative 3, a new visitor contact area at the Grizzly Giant would be "off the grid" and designed in accordance with the NPS *Guiding Principles of Sustainable Design* (1993). These principles include the orientation of buildings to maximize sun exposure for heat gain and to minimize the effects of prevailing winds, design that incorporates the use of natural ventilation, entry vestibules to reduce heat loss, energy-efficient lighting, and the installation of energy- and water-efficient features and utilities. Other "green" elements to be incorporated include energy-efficient construction design, sustainability and "green" technology, lighting, site drainage, water conservation, wastewater management, and energy conservation.

Impact Significance. Local, short-term, moderate, and beneficial.

Conclusion. Under Alternative 3 there would be a concerted effort to decrease energy consumption through sustainable design and to use alternative energy sources, resulting in local, long-term, moderate beneficial impacts on energy use and sustainability but slightly less than that described for Alternative 2.

Cumulative Impacts. The impact of past, present and reasonably foreseeable projects affecting energy use and sustainability would be the same as Alternative 1 (No Action)—a long-term negligible adverse impact on energy use and sustainability in the Mariposa Grove area. Under Alternative 3, there would be a concerted effort to decrease energy consumption through sustainable design while using alternative energy sources, resulting in local, long-term, moderate beneficial impacts on energy use and sustainability. Present and past plans and projects, in conjunction with the moderate

beneficial impacts of Alternative 3, would result in an overall long-term moderate beneficial impact on energy use and sustainability in the Mariposa Grove area.

Alternative 4: South Entrance Hub with Modified Commercial Tram Service

Alternative 4 would maintain the commercial tram but with a limited route and hours of operation while also relocating the majority of the parking to the South Entrance, making the South Entrance the primary departure point for visitors to the Grove. Numerous other rehabilitation and restoration actions, such as improvement of hydrologic flow, project-specific prescribed fire and hazardous fuel reduction treatments, soil decompaction, and improvement of visitor orientation and interpretation, would be components of this alternative.

Construction-related Impacts. Construction energy expenditures for the development of the new parking lot and visitor contact area at the South Entrance under Alternative 4 would include both direct and indirect uses of energy. Combustion of petroleum products needed to operate construction equipment would be included in the direct energy use during the construction period. The energy consumed through mining and extraction of raw materials, manufacturing, and transportation to produce the construction materials is considered indirect energy use. Indirect energy typically represents about three-quarters of total construction energy, while direct energy represents about one-quarter of the total construction energy (Hannon et al. 1978). Though construction energy would be consumed only during the construction period, it would represent the irreversible consumption of finite natural energy resources.

Construction activities under Alternative 4 would consume fuel and electricity, along with indirect energy for materials used in constructing development components. Construction equipment, including haul trucks and vehicles onsite, is expected to consume a majority of the energy resources. Electricity would be used by construction equipment, such as welding machines and power tools. Energy consumed by construction power equipment would be relatively minimal.

The amount of energy consumed each day would vary depending on a number of factors, such as the number and types of equipment in operation on a given day, usage rates, the number of construction workers needed, the number of haul trips, and trip length. Construction energy consumption would occur for the duration of the construction period and therefore would not be an ongoing drain on finite natural resources. Construction energy consumption would primarily be in the form of fuel, would not have a significant effect on the energy resources of the park, and would not require new infrastructure. The design plan under Alternative 4 includes measures that would reduce construction energy expenditure through the use of recycled materials. BMPs for air quality and noise would help reduce fuel consumption by construction equipment (e.g., ensuring all construction equipment is properly tuned and maintained, turning off equipment when not in use). Furthermore, materials removed as part of the demolition of existing campus facilities would be sorted and salvaged for reuse or recycling.

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

Restoration-related Impacts. Restoration energy consumption would occur as pavement is ripped up in the lower Grove parking lot and during culvert work and installation. However, this would not be an ongoing drain on finite natural resources. Restoration energy consumption would primarily be in the form of fuel, would not have a significant effect on the energy resources of the park, and would not require new infrastructure.

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

Operation-related Impacts. In-park vehicular mileage for visitors would be reduced through much improved transit and access patterns and improved transit communication through the proposed electronic parking availability system. Consolidation of Mariposa Grove facilities and infrastructure at the South Entrance would result in improved access and serviceability, reducing expenditures. The South Entrance congestion would be alleviated by modifying the existing T-intersection moving the entrance kiosks southward away from the Wawona Road/Mariposa Grove Road intersection. This improvement in traffic flow would result in fewer or shorter back-ups and less idling by vehicles. New flush restrooms for lower Grove area would replace existing vault toilets. Most winter access would be from the South Entrance and plowing of the Mariposa Grove Road would be minimal Seasonal shuttle operations would be extended. Service access the upper Grove comfort station and repurposed museum would be via a paved road. Access to Wawona Point would be via a hardened narrow road.

Under Alternative 4, a new visitor contact area at the South Entrance would be designed in accordance with the NPS *Guiding Principles of Sustainable Design* (1993). These principles include the orientation of buildings to maximize sun exposure for heat gain and to minimize the effects of prevailing winds, design that incorporates the use of natural ventilation, entry vestibules to reduce heat loss, energy-efficient lighting, and the installation of energy- and water-efficient features and utilities. Other "green" elements to be incorporated include energy-efficient construction design, sustainability and "green" technology, lighting, site drainage, water conservation, wastewater management, and energy conservation.

Impact Significance. Local, short-term, minor, and beneficial.

Conclusion. Under Alternative 4 there would be a concerted effort to decrease energy consumption through sustainable design and to use alternative energy sources; however, these would be partially offset by the continued use of the commercial tram which would result in local, long-term, minor beneficial impacts on energy use and sustainability.

Cumulative Impacts. The impact of past, present and reasonably foreseeable projects affecting energy use and sustainability would be the same as Alternative 1 (No Action)—a long-term negligible adverse impact on energy use and sustainability in the Mariposa Grove area. Under Alternative 4, there would be a concerted effort to decrease energy consumption through sustainable design while using alternative energy sources; however, these would be partially offset by the continued use of the commercial tram which would result in local, long-term, minor beneficial impacts on energy use and sustainability. recent and past plans and projects, in conjunction with the minor beneficial impacts of Alternative 4, would result in an overall long-term minor beneficial impact on energy use and sustainability in the Mariposa Grove area.



Chapter 4: Consultation, Coordination, and Preparers

CHAPTER 4: CONSULTATION, COORDINATION, AND PREPARERS

HISTORY OF PUBLIC INVOLVEMENT

The public planning process for the *Restoration of the Mariposa Grove of Giant Sequoias / Final Environmental Impact Statement* (*Mariposa Grove FEIS*) helped the NPS to understand and fully consider the interests of the public. Individuals, other public agencies, traditionally associated Indian tribes and groups, organizations, and businesses identified various issues and opportunities regarding the *Mariposa Grove FEIS* as part of this comprehensive process. This section describes the public involvement process and summarizes the public comments received during public scoping and review of the *Mariposa Grove Draft EIS*.

PROJECT SCOPING

The purpose of scoping is to conduct an early and open process to identify issues and concerns related to the planning process and to determine the scope of issues to be addressed in the environmental analysis. The National Park Service (NPS) public scoping period for the *Mariposa Grove Plan* was open from August 31, 2011, through February 3, 2012. The NPS held public open houses on August 31, September 28, and December 7, 2011 and January 25, 2012, to inform interested parties about the proposed project and to solicit comments from members of the public in order to understand the spectrum of concerns, interests, and issues that should be considered in the planning process. The park also conducted a public site visit at the Mariposa Grove on October 14, 2011. Approximately 20 interested individuals attended.

The NPS accepted public comments by mail, fax, email, through the Planning, Environment, and Public Comment (PEPC) system, and on comment forms available at public scoping meetings. During the public scoping period, the park received 43 letters from 41 individuals and 2 organizations. Analysis of these letters identified 126 discrete substantive comments, from which 15 general concern statements were generated. All comments received during the scoping period were carefully read and considered, and are now part of the administrative record for this project. The public scoping letters and a report summarizing comments are available on the PEPC database at *http://parkplanning.nps.gov/mariposagrove*.

On June 27, 2012, the park held its monthly open house in Yosemite Valley and shared results of the Choosing By Advantages (CBA) workshop for the *Mariposa Grove Plan* with the public. Design drawings and scoring for each preliminary alternative were presented, and input received led to the reconsideration of some alternatives.

During this period, internal scoping was conducted in consultation with NPS managers and staff, traditionally associated American Indian tribes and groups, affected state and federal agencies, and local and state governments.

PUBLIC REVIEW OF THE *MARIPOSA GROVE* DRAFT *EIS*

The *Mariposa Grove Draft EIS* was available to the public, federal, state, and local agencies and organizations for a 61-day public review period from March 8, 2013 through May 7, 2013. A Notice of Availability was published in the *Federal Register* on March 8, 2013. Electronic copies of the *Mariposa Grove Draft EIS* were posted to the park's website at

www.nps.gov/yose/parkmgmt/mgrove.htm and hard copies and/or CDs of the document were distributed to individuals that requested them, as well as to congressional delegations, state and local elected officials, federal agencies, traditionally associated American Indian tribes and groups, organizations and local businesses, public libraries, and the news media. The NPS provided notice of the plan's availability for public comment via a press release distributed to a wide variety of news media and announcements placed on the park's website, online newsletters, printed newsletters, and local public libraries.

Essential elements of the *Mariposa Grove Draft EIS* were presented by park staff at a webinar on April 9, 2013. A recording of the webinar is available at http://yose.webex.com.

In addition, park staff hosted two public meetings focused on the *Mariposa Grove Draft EIS*. These meetings consisted of an open house, presentation, and an opportunity to discuss the plan with park staff members and to provide comment. The public meeting schedule was as follows:

April 12, 2013: Public Meeting at Tenaya Lodge, Fish Camp, California

April 24, 2013: Yosemite Open House in the Visitor Center Auditorium, Yosemite Valley, California

Public comment letters were received through PEPC website at *http://parkplanning.nps.gov/mariposagrove*, by email at *yoseplanning@nps.gov*, and by U.S. mail. The full text of public comment letters received can be viewed on the project website at *http://www.nps.gov/yose/parkmgmt/mgrove_documents.htm*. Personal information included with the comments (e.g., names and contact information) is redacted in the correspondence posted online to protect authors' privacy.

During the 61-day public comment period, the park received 334 public comment letters. One comment letter was from a state agency, five were from organizations, one business, and the remainder originated from unaffiliated individuals. An analysis of these letters identified 356 discrete comments (excluding form letters), from which 68 general concern statements were generated. The results of the public comment analysis process and NPS responses to substantive public comments are provided in Appendix C. The changes to the alternatives under consideration in this *EIS* resulting from public comment are summarized in Chapter 2.

AGENCY CONSULTATION

U.S. ARMY CORPS OF ENGINEERS, REGULATORY BOARD

The Clean Water Act (Public Law 92-500) requires that federal land agencies consult with the U.S. Army Corps of Engineers (Army Corps) regarding wetlands located in or near proposed projects. The NPS is consulting with the Army Corps regarding the *Mariposa Grove FEIS* in accordance with Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 10 (33 U.S.C. 403) of the Rivers and Harbors Act.

Also under Section 404, permit approval is required for projects that may result in the discharge of dredged or fill material into waters of the United States. This includes all navigable waters, their tributaries, impoundments of these waters, and adjacent wetlands. Examples of Section 404 activities include infrastructure development, road fills, and riprap. Some actions proposed in the *Mariposa Grove FEIS* may require permits for the discharge of fill material. The NPS will work with the Army Corps to obtain required Section 404 permits prior to implementing any such actions.

Under Section 10, permit approval is required for the placement of structures in or over, or work in or over, navigable waters of the United States which affects their course, location, condition, or capacity. The NPS will ensure that all Army Corps permit approvals associated with the *Mariposa Grove FEIS* are in place prior to implementation.

The NPS provided a copy of the *Mariposa Grove Draft EIS* to the Army Corps as part of the consultation process, and received a comment letter on the plan in support of the alternative that restores and protects the most waters of the United States. The NPS is working with the Army Corps to ensure that wetland maps associated with the *Mariposa Grove FEIS* are verified per Army Corps standards, prior to submittal of permit applications.

U.S. Fish and Wildlife Service

The Endangered Species Act of 1973, as amended (16 USC 1531 et seq.) requires 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 critical habitat. The NPS originally obtained a list of federally listed endangered and threatened species that may be present in the South Entrance area and Mariposa Grove from the USFWS on November 14, 2011 and compared this list to park records. The list was updated regularly and used as the basis for the special status species analysis in this EIS. On March 15, 2012, the park contacted the USFWS regarding the candidate species Pacific fisher and Sierra Nevada Red Frog regarding timing of possible listing under the Endangered Species Act. On May 3, 2012 the park entered into informal consultation with the USFWS for this project to develop appropriate mitigation measures and proactive habitat improvements. The NPS provided the USFWS with a set of draft mitigation measures to protect the Pacific fisher on June 24, 2013. The USFWS concurred that the measures were adequate on June 25, 2013 (see Appendix E). Should the Pacific fisher be proposed for listing or listed under the Endangered Species Act during implementation of the Mariposa Grove project, the NPS will continue conferencing or consultation with the USFWS as appropriate.

California State Office of Historic Preservation

The cultural resources investigations and reports for the project were conducted in accordance with the Section 106 process under 36 CFR Part 800, "Protection of Historic Properties," the regulations that implement Section 106 of the National Historic Preservation Act (NHPA). A site visit in October 2011 was conducted with the staff of the California State Office of Historic Preservation during the scoping period for the project.

The NPS initiated consultation with the State Historic Preservation Officer (SHPO) in Sacramento regarding the proposed undertaking at the Mariposa Grove and South Entrance with a letter sent on September 30, 2011. On April 11, 2012, the park sent a letter requesting concurrence for a determination of ineligibility for four archeological sites in the study area. On June 26, 2012 the park sent a letter requesting concurrence on the amendment to the Mariposa Grove consensus determination of eligibility. On February 5, 2013, the NPS received a letter from SHPO that stated concurrence with the boundaries of the Area of Potential Effects, or APE; and the recommended eligibilities, as well as agreement that historic properties have been sufficiently identified. The NPS is developing a draft Memorandum of Agreement with the SHPO as part of consultation for this project. A draft version is included in Appendix G. The final Memorandum of Agreement will be included in the Record of Decision for the Mariposa Grove FEIS. The SHPO will be a signatory on the Memorandum of Agreement.

NPS is consulting with the SHPO under the four-step process outlined in 36 CFR Part 800 rather than an existing programmatic agreement. The NPS will continue to communicate with the SHPO through design and construction of the project as needed. The NPS will serve as the lead agency on behalf of the Army Corps, regarding future consultation with the SHPO regarding permits.

STATE WATER RESOURCES CONTROL BOARD AND CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

The NPS works with state and local government agencies to maintain the highest possible water quality standards and to take action to restore substandard waters, as directed by NPS Management Policies 2006 and Director's Order 84, Public Health (2004).

The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) are the regulatory boards within California's Environmental Protection Agency that derive their authority from Section 401 of the Clean Water Act and Section 13020 of the California Water Code. The SWRCB allocates rights to the use of surface water and, along with the regional boards, is charged with protecting surface, ground, and coastal waters throughout the state. The RWQCB issues permits that govern and restrict the amount of pollutants discharged into the ground or surface water, which includes regulating storm water during construction activities.

Under the Clean Water Act's Section 401, every applicant for a federal permit or license for any activity that may result in a discharge to a water body must obtain State Water Quality Certification that the proposed activity will comply with state water quality standards, if an activity would result in a discharge to a water body.

Yosemite National Park is under the jurisdiction of Regional Board 5, Central Valley, and obtains any necessary permits and/or certifications for construction activities from that board. If required, the NPS would file a Notice of Intent to discharge storm water and prepare and implement provisions of a Storm Water Pollution Prevention Plan to control run-off from construction activities. The NPS provided a copy of the *Mariposa Grove Draft EIS* to the RWQCB, who in turn notified the NPS that they will provide input as part of future permitting processes, as necessary.

AMERICAN INDIAN CONSULTATION

Yosemite National Park consults with seven traditionally associated American Indian tribes and groups that have ancestral connections to Yosemite National Park: the American Indian Council of Mariposa County, Inc. (aka Southern Sierra Miwuk Nation), Bishop Paiute Tribe, Bridgeport Indian Colony, Mono Lake Kutzadika'a Tribe, North Fork Rancheria of Mono Indians of California, Picayune Rancheria of the Chukchansi Indians, and the Tuolumne Band of Me-Wuk Indians. The NPS initiated consultation with these tribes and groups in a letter dated October 19, 2011 (with a subsequent correction letter dated November 28, 2011).

Tribal consultation for this project has included numerous meetings and tribal site visits. In addition to consultation meetings with individual tribal groups, all traditionally associated tribes and groups were invited to:

- an informational project scoping meeting on January 5, 2012. Representatives from the American Indian Council of Mariposa County, Inc. and the Tuolumne Band of Me-Wuk Indians attended.

- a site visit to the Mariposa Grove on January 11, 2012. Representatives from the American Indian Council of Mariposa County and the Tuolumne Band of Me-Wuk Indians attended.
- a site visit on May 22, 2012. Representatives from the American Indian Council of Mariposa County, the Tuolumne Band of Me-Wuk Indians, and the Picayune Rancheria of Chukchansi Indians attended.
- a site visit on April 2, 2013. Representatives from the American Indian Council of Mariposa County, the Tuolumne Band of Me-Wuk Indians, and the North Fork Rancheria of Mono Indians of California attended.
- a site visit on July 10, 2013. Representatives from the American Indian Council of Mariposa County, the Tuolumne Band of Me-Wuk Indians, the North Fork Rancheria of Mono Indians of California, and the Picayune Rancheria of the Chukchansi Indians attended.

The Mariposa Grove Restoration Plan was also discussed at the All Tribes meeting in Lee Vining on July 12, 2013.

Throughout the tribal consultation process, traditionally associated tribes and groups brought forward a range of issues, concerns, and proposed actions, including (but not limited to) the following:

- Protect traditionally significant archeological sites;
- Remove the gift shop from the Mariposa Grove and restore the area to protect archeological resources;
- Avoid removing black oaks;
- Avoid impacts to mature trees;
- Avoid shifting impacts to previously undisturbed areas;
- Consider elevated trails to minimize effects on the sequoia roots;
- Retain access to Wawona Point for tribal traditional cultural practices;
- Enhance picnicking opportunities;
- Minimize impacts of restrooms in the lower Grove area (consider keeping vault toilets);
- Provide opportunities for Native American youth to participate in project implementation;
- Reduce the scale of the parking lots to lessen impacts on resources by keeping shuttle operation in Wawona; and
- Include information about Native American connections to the Mariposa Grove in interpretive components.

The NPS has worked with the tribes and groups to integrate these proposed actions into the project, and strongly considered these issues and concerns throughout the development of the alternatives. Under all alternatives, the gift shop would be carefully removed from the archeological site that it was constructed on in the lower Grove area. Plans for developing a shuttle staging area in the lower Grove area were also modified between the *Draft* and *Final EIS* to ensure protection of archeological sites, black oaks and other mature trees, where feasible. Elevated trails (including boardwalks) are part of the design of all new proposed accessible trails. Access to Wawona Point for tribal gatherings

would continue. Trailside interpretive components to emphasize Native American connections to the Mariposa Grove would be focused within the sequoia grove. The NPS is actively pursuing opportunities to engage American Indian youth in project implementation, particularly in trail construction.

The NPS minimized the size of the South Entrance parking lot to the extent possible to meet the goals of the plan. Alternatives 2 through 4 in the EIS do not leave the large shuttle operation from Wawona to the Mariposa Grove, as proposed by some traditionally associated tribal groups. Rather, the shuttle operation from Wawona would be substantially reduced, as more parking would be available closer to the Grove at the South Entrance. This will reduce congestion and roadside parking in Wawona and eliminate backtracking (e.g., visitors who drive to the Grove from Yosemite Valley or the South Entrance often find the lot at the Grove or South Entrance full and then have to drive to Wawona to park and then take the shuttle to the Grove).

The NPS will continue to work with traditionally associated American Indian tribes and groups throughout project design, implementation, and development of a Memorandum of Agreement (MOA) with the SHPO. The MOA will include stipulations to avoid, minimize and mitigate adverse effects to historic properties with traditional cultural and religious significance to American Indian tribes. The Draft MOA is in Appendix G; the signed final MOA will be a part of the Record of Decision for the final Mariposa Grove EIS. Traditionally associated American Indian tribes and groups are invited to be a concurring party on the MOA.

FUTURE INFORMATION

The *Mariposa Grove FEIS* is available on the Planning, Environment, and Public Comment (PEPC) website at (http://www.parkplanning.nps.gov/mariposagrove). To request printed documents or CDs, please e-mail (yose_planning@nps.gov) or call (209) 379-1202. A minimum 30-day no-action period will follow the U.S. Environmental Protection Agency noticing of the availability of the *Mariposa Grove FEIS* in the Federal Register. The NPS will prepare a Record of Decision (ROD) no sooner than 30 days after release of the FEIS. After approval of the ROD by the Regional Director, the park will announce the selected plan through local and regional press and on the project website. The official responsible for project implementation is the Superintendent, Yosemite National Park.

For further information, visit the park website at *www.nps.gov/yose/parkmgmt/mgrove* or contact:

Superintendent
ATTN: Mariposa Grove FEIS
P.O. Box 577
Yosemite National Park, CA 95389

List of Agencies, Organizations, and Businesses Receiving The Restoration of the Mariposa Grove of Giant Sequoias Draft Environmental Impact Statement

The following pages list the agencies, organizations, and businesses who received a hard copy or CD of the *Final EIS*.

U.S. Government

Legislature

Members of Congress

Federal Agencies

Advisory Council on Historic Preservation
U.S. Department of Agriculture, Forest Service
Bass Lake Ranger District
Sierra National Forest
U.S. Department of Defense
Army Corps of Engineers, Regulatory Board
U. S. Department of the Interior
Fish and Wildlife Service, Sacramento Regional Office
National Park Service
Pacific West Regional Office
NPS Water Resources Division
U.S. Department of Justice
U.S. Environmental Protection Agency, San Francisco Regional Office

American Indian Tribes and Groups

American Indian Council, Mariposa County
Bishop Paiute Indian Council
Bridgeport Paiute Indian Colony
Picayune Rancheria of the Chukchansi Indians
Mono Lake Kutzadika'a Paiute Indian Community
North Fork Mono Indian Museum
North Fork Rancheria of Mono Indians of California
Tuolumne Band of Me-Wuk Indians
Tuolumne Mewuk Rancheria
Western Mono Tribal Government

County and Local Governments

Fish Camp

Advisory Council
Property Owners Association

Madera County

Board of Supervisors
Planning Department

Mariposa County

Board of Supervisors
Planning Department
El Portal Town Planning Advisory Committee
Wawona Town Planning Advisory Committee

Merced County

Board of Supervisors
Planning Department

Visitor Bureaus

Bass Lake Chamber of Commerce, Bass Lake
Coarsegold Chamber of Commerce, Coarsegold
Eastern Madera County Chamber of Commerce
Mariposa County Visitors Center (Chamber of Commerce), Mariposa
Merced Visitor Services / California Welcome Center, Merced
North Fork Chamber of Commerce, North Fork
Oakhurst Area Chamber of Commerce, Oakhurst
Yosemite Chamber of Commerce, Groveland
Yosemite / Mariposa County Tourism Bureau, Mariposa
Yosemite Sierra Visitors Bureau, Oakhurst

California State Government

State Agencies and Organizations

California Department of Fish and Wildlife Region #4
California Department of Transportation
California State Clearinghouse
California Office of Historic Preservation
California Regional Water Quality Control Board #5F (Central Valley)

Organizations and Businesses

Backcountry Horsemen of California
California Native Plant Society, Foothills Chapter
California Native Plant Society, Sequoia Chapter
Central Sierra Environmental Resource Center
Delaware North Corporation
Foothill Conservancy
Friends of Yosemite
High Sierra Hikers Association
Mariposans for the Environment and Responsible Government
National Audubon Society
National Parks and Conservation Association
National Trust for Historic Preservation
Native Habitats
Natural Resources Defense Council
NatureBridge Yosemite
Sierra Club
Sierra Mono Museum
The Redwoods in Yosemite
Yosemite Conservancy
Yosemite Restoration Trust

Libraries

Mariposa County Library, El Portal
Mariposa County Library, Wawona
Mariposa County Library, Mariposa
Madera County, Library, Oakhurst

Public Media

Newspapers

Associated Press
Fresno Bee
Mariposa Gazette
Merced Sun-Star
Modesto Bee
Mountain Democrat
Oakland Tribune
Sacramento Bee
San Francisco Chronicle
San Francisco Examiner

LIST OF PREPARERS AND REVIEWERS

Name	Responsibility	Education	Years of Experience
NPS			
Lisa Acree	Compliance Specialist	B.A. Environmental Studies	25 NPS
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Barbara Bane	Project Archeologist	Registered Professional Archeologist M.A. Anthropology B.A. Art History	3 NPS 5 Other
Sue Beatty	Restoration Ecologist	Graduate Work in Natural Resources Management B.S. Recreation	25 NPS
Tony Brochini	Facilities Management	2 years undergraduate studies	34 NPS
Monica Buhler	Former Restoration Ecologist	B.A. International Studies and Global Resources	14 NPS
Sue Clark	Former Compliance Specialist	M.S. Environmental Policy/ Natural Resources Management B.S. Plant and Soil Science	31 NPS 6 Other
Lindsay Cline	Wildlife Biologist	M.S. Wildlife Management B.S. Biology	4 NPS 3 Other
Rebecca Cremeen	Outdoor Recreation Planner	M. City and Regional Planning B.A. Geography	1 NPS 14 Other
Jim Donovan	Project Manager	M. Urban and Regional Planning B.A. Fine Arts	12 NPS 15 Other
Randy Fong	Chief, Division of Project Management	M. Architecture B.A. Architecture	35 NPS 1 Other
Jennifer Hardin	Cultural Anthropologist; American Indian Liaison	Ph.D. Candidate—Sociocultural Anthropology M.A. Sociocultural Anthropology M.A. Applied Cultural Anthropology B.S. Sociocultural Anthropology	3 NPS 14 Other
Dave Henderson	Traffic Management Supervisor	A.S. Administration of Justice RCJTC Graduate—Police Science	11 NPS 22 Other
Karen Hockett	Social Scientist	Ph.D. Natural Resources Recreation M.S. Zoology B.S. Biology	1 NPS 8 Other
Kevin Killian	Chief Ranger, Division of Visitor and Resource Protection	B.S. Zoology	20 NPS
Kris Kirby	Chief, Division of Business and Revenue Management	M.S. Public Administration B.A. Political Science	17 NPS 4 Other

Name	Responsibility	Education	Years of Experience
Laura Kirn	Branch Chief in Anthropology and Acting Branch Chief in History, Architecture and Landscapes Program, Division of Resources Management and Science	M.A. Historic Preservation B.S. Anthropology	29 NPS
Kimball Koch	Acting Park Historic Preservation Officer	M. Landscape Architecture	24 NPS
Bill Kuhn	Terrestrial Ecologist/ Biogeographer	Ph.D. Ecology/Biogeography M.S. Ecology B.A. Biology	9 NPS
Linda Mazzu	Chief, Division of Resources Management and Science	M.S. Natural Resources Management B.S. Park and Recreation Management	20 NPS 10 Other
Jana Friesen McCabe	Visual Information Specialist	M.A. Luso-Brazillian Literature B.A. Latin American Studies	13 NPS
Kevin McCardle	Historical Landscape Architect	M. Landscape Architecture B.S. Microbiology B.S. Science Education	3 NPS 12 Other
Kathleen Morse	Chief, Division of Planning	Graduate Work in Coastal Zone Management B.S. Natural Resources Economics	2 NPS 20 USFS
Thomas R. Medema	Chief, Division of Interpretation and Education	M.S. Parks and Recreation Management B.S. Outdoor Recreation and Education	20 NPS
Bret Meldrum	Former Branch Chief, Visitor Use and Social Sciences	Ph.D. (ongoing) Natural Resources Studies M.S. Conservation Social Sciences B.S. Recreation, Parks, and Tourism Services	5 NPS 4 Other
Don Neubacher	Superintendent	M.S. Natural Resource Management B.S. Planning and Management	29 NPS
Marty Nielson	Special Assistant to the Superintendent	B.S. Outdoor Recreation	21 NPS 8 Other
Charles Repath	Former Restoration Ecologist	M.S. Land Resources and Environmental Sciences B.A. History	3 NPS 15 Other
Ann Roberts	Former NEPA Compliance Specialist	M.S. Forestry/Ecological Restoration B.S. Wildlife Management	5 NPS 6 USFS 5 Other
Jim Roche	Park Hydrologist	M.S. Geology B.S. Chemistry	14 NPS 3 Other

Name	Responsibility	Education	Years of Experience
Madelyn Ruffner	Acting Branch Chief in Planning and Compliance, Division of Project Management	M.P.P. Public Policy B.A. Environmental Studies	8 NPS 5 Other
Daniel Schaible	Former Historical Landscape Architect	B.A. Landscape Architecture	6 NPS
Eric Scott	Wawona District Ranger	B.S. Resource Recreation Management	26 NPS
Dean Shenk	Supervisory Park Ranger, Division of Interpretation	A.A. Fine Arts	35 NPS
Woody Smeck	Former Deputy Superintendent	M. Landscape Architecture	23 NPS 6 Other
Sarah Stock	Wildlife Biologist	M.S. Zoology B.S. Ecology	6 NPS 10 Other
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Kim Tucker	Former Concessions Management Specialist; Division of Business and Revenue Management	Undergraduate studies (2 years)	36 NPS
Ed Walls	Chief, Division of Facilities Management	B.A. Microbiology	23 NPS
Mithun			
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Independent Consultant (subcontractor to Mithun)			
Robert A. York	Giant Sequoia Researcher	Ph.D. and M.S. Department of Environmental Science, Policy, and Management B.S. Forestry	2 Private 9 Public
Sherwood Design Engineers (subcontractor to Mithun)			
S. Bry Sarte	Principal Civil Engineer	B.S. Civil and Environmental Engineering B.A. Fine Arts	16 Private
Shauna Dunton	Civil Engineer	B.S. Civil and Environmental Engineering	12 Private
Nelson | Nygaard (subcontractor to Mithun)			
Michael Eiseman	Transportation Planner	B.A. Political Science	8 Private
Bonnie Nelson	Transportation Planner	B.S. Civil Engineering	30 Private
Cathleen Sullivan	Transportation Planner	M. City and Regional Planning	8 Private

Name	Responsibility	Education	Years of Experience
URS Corporation			
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Jennifer Pyne	EIS Project Manager, Visitor Use and Experience	M.E.P. Environmental Planning B.A. Politics	13 Private 2 Public
Kinzie Gordon	Principal-in-Charge, Independent Technical Review	B.A. Anthropology	38 Private
Janis Offermann	Archaeology, Traditional Cultural Resources	M.A. Anthropology B.A. Anthropology	2 Private 35 Public
Jeremy Hollins	Historic structures	M.A. Public History B.A. History	9 Private
Melanie Lytle	Historic structures	M.A. Historic Preservation B.A. History	6 Private
Bonnie DeBerry	Hydrology and Water Quality	M.F.S. Aquatic Chemistry B.S. Natural Resources	13 Private 4 Public
Tim Rimpo	Air Quality	M.S. Economics B.A. Economics	28 Private
Ron Reeves	Soundscapes	B.S. Information Systems	21 Private
JP Charpentier	Vegetation, Wetlands, Special Status Species, and Wildlife	M.S. Wildlife Ecology	13 Private
Philip Mineart	Hydrology and Water Quality	M.S. Civil Engineering B.S. Environmental Resources Engineering	28 Private
David Konopka	Visitor Use and Experience	Graduate Studies in Landscape Architecture & Outdoor Recreation Planning B.S. Natural Resource Conservation	2 Private 12 Public
Allison Getty	Park Operations	M.A. Natural Resources/ Environmental Management B.S. Natural Resources/ Environmental Management	5 Private
Ryan McMullan	Soundscapes	B.A. Political Science B.A. Audio Arts and Acoustics	4 Private
John Qoyawayma	Graphics	Business Computing Systems	28 Private
Kathy Hinkel	Project Administrator	Business Certificate	8 Private
Meg Quarrie	Senior Word Processor	B.A. English	30 Private
Climate Wise Solutions, LLC (subcontractor to URS)			
Dr. George Koch	Technical Expert, Vegetation, Wetlands, Special Status Species, and Wildlife	Ph.D. Biology B.S. Biology	30 Academia, Research, and Consulting
Independent Consultant (subcontractor to URS)			
Dr. Steve Lawson	Technical Expert, Visitor Use and Experience	Ph.D. Natural Resources M.S. Resource Economics and Policy B.A. Political Science	10 Academia 4 Consulting

Name	Responsibility	Education	Years of Experience
David Evans and Associates, Inc.			
Perry Palmer	Landscape Architect	B. Landscape Architecture	20 Private
Jim Smith	Civil Engineer	B.S. Civil Engineering	30 Private
Kayla Pirotte	Civil Engineer	B.S. Civil Engineering	5 Private
Victor Vaskelis	Civil Engineer	B.S. Civil Engineering	12 Private
Independent Consultant (subcontractor to DEA)			
Brenda Ostrom	Project Facilitator	B.S. Geography M.T. Aeronautical Technology	4 Public 12 Private
Independent Consultant (subcontractor to DEA)			
Karen Braitmayer, FAIA	Accessible Design	B.S. Behavioral Science M.S. Architecture	18 Private
Laugenour and Meikle (subcontractor to DEA)			
Tom Horgan	Waste Water Management	B.S. Civil Engineering	41 Private
Shannon & Wilson, Inc. (subcontractor to DEA)			
Michael Watari	Geotechnical	B.S. Civil Engineering M.S. Civil Engineering	13 Private 9 Public



Chapter 5: Bibliography

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Appendix A: Amendments to the General Management Plan

Appendix A
Specific Amendments to the 1980 General Management Plan Resulting from the *Restoration of the Mariposa Grove of Giant Sequoias EIS*

The 1980 *General Management Plan* for Yosemite National Park (GMP), as amended by the 1992 *Concession Services Plan*, is the overall management document for Yosemite National Park. The GMP directs the National Park Service (NPS) to "Retain [the Mariposa Grove] as the primary location within the park for visitor enjoyment and interpretation of the giant sequoia; Provide only visitor facilities consistent with preservation of the unique ecosystem; remove all other facilities not necessary for visitor enjoyment of the resource." While these management goals will be achieved with this project, minor changes to the Developed Area Plan from the GMP and other specific actions proposed in the *GMP* would occur.

Actions that are consistent with the GMP include: accommodate the physically disabled, repair and reconstruct trails, remove the 115-car parking lot, convert the existing bus parking area to shuttle turn-around and off-season parking for the Grove, remove the gift shop, and upgrade physical facilities (toilets). Actions that amend the GMP in the *Restoration of the Mariposa Grove of Giant Sequoias/Final Environmental Impact Statement* (*Mariposa Grove FEIS*) are as follows:

- The GMP directs the NPS to provide adequate wastewater treatment and dispose waste outside the Mariposa Grove. Under the *Mariposa Grove FEIS*, the NPS would continue to provide vault toilets in the lower Grove area and truck waste outside the Grove, or replace the existing vault toilets with flush toilets. Waste from flush toilets would be treated in the Mariposa Grove through a leach field system within the Grove, if feasible. Removing waste entirely from the Grove, as directed in the GMP, would require adding a sewage line from the Grove to the South Entrance, and likely construction of a sewage treatment facility at the South Entrance, at a high cost (see Chapter 1, Issues Considered but Dismissed). Although the funds required for a sewer line are not available at this time, it is still considered a possibility along with a septic system and the use of vault toilets in some locations where physical constraints to a septic system exist.
- The GMP directs the NPS to retain and rehabilitate the museum and comfort station. The museum building would remain, and its use as a primary interpretive facility would be moved to the new hub location under each action alternative. The museum building may be repurposed as a group hiker's shelter, meeting room, or other compatible use.
- The GMP directs the NPS to convert the Wawona Point Road to a trail. Under the Mariposa Grove FEIS, the road would be converted into a hardened trail that would allow for occasional maintenance traffic, as it is not feasible to move the communication network at Wawona Point at this time. The NPS would remove the Wawona Point Road if technology improves and the equipment can be removed (see Chapter 2, Alternatives Considered but Dismissed).
- The GMP directs the NPS to extend the tram system from the South Entrance through Mariposa Grove. The existing tram service through the Grove would be discontinued under Alternatives 2 and 3 to protect and enhance the ecological health of the giant sequoias and to improve the visitor experience of those walking in the Grove.

Therefore, the *General Management Plan: Visitor Use/Park Operations/Development Plan* would be amended as follows if the preferred alternative (Alternative 2) is selected:

1980 GMP Section and Page #	1980 GMP Text	2013 Amended GMP Text	2013 Restoration of Mariposa Grove FEIS Reference
Developed Area Plans-South Entrance Page 59	**Goals** **Visitor Use** Provide park orientation and information/reservation system for overnight accommodations and campgrounds Provide staging facilities for Mariposa Grove Provide adequate road to Mariposa Grove for bus access **Actions** **Visitor Use** Construct an information/reservation kiosk and 50-car parking area at south entrance Construct a parking area to accommodate 200 autos, 5 buses, tram terminal, and comfort station Provide bus service to Mariposa Grove	**Goals** **Visitor Use** ~~Provide park orientation and information/reservation system for overnight accommodations and campgrounds~~ Provide staging facilities for Mariposa Grove Provide adequate road to Mariposa Grove for ~~bus~~ shuttle access **Actions** **Visitor Use** ~~Construct an information/reservation kiosk and 50-car parking area at south entrance~~ Construct a parking area to accommodate ~~200~~ 295 vehicles, ~~5 3 commercial~~ buses, ~~tram~~ shuttle boarding and tour bus transfer area, ~~terminal,~~ and comfort station Provide ~~bus~~ shuttle service to Mariposa Grove	Chapter 2, Alternatives Alternative 2: South Entrance Hub (Preferred Alternative) Section
Developed Area Plans-Mariposa Grove Page 59	The awesome beauty and quiet of the grove are being protected by only allowing visitors to walk through the grove or ride a tram system with an interpreter.	The awesome beauty and quiet of the Grove are being protected by only allowing visitors to walk through the Grove, with special provisions made for visitors with physical disabilities ~~or ride a tram system with an interpreter.~~	Chapter 2, Alternatives Alternative 2: South Entrance Hub (Preferred Alternative) Section
Developed Area Plans-Mariposa Grove Page 60	**Actions** **Visitor Use** Extend the tram system from South Entrance through Mariposa Grove; prohibit commercial tour buses; accommodate the physically disabled	**Actions** **Visitor Use** ~~Extend the tram system~~ Provide shuttle service from South Entrance to the lower ~~through Mariposa~~ Grove; restrict commercial tour bus access to the lower Grove area; accommodate the physically disabled Convert Wawona Point Road to a trail Repair and reconstruct trails through tree grove Remove 115 car parking area Convert existing bus parking area to off-season parking (25-50 vehicles) Retain and rehabilitate museum building and comfort station Remove gift shop	Chapter 2, Alternatives Alternative 2: South Entrance Hub (Preferred Alternative) Section
Developed Area Plans-Mariposa Grove Page 61	South Entrance/Mariposa Grove Development Concept Map	Remove and replace with Figure 2-5 – Alternative 2: South Entrance Hub (Preferred Alternative)	Chapter 2, Alternatives Alternative 2: South Entrance Hub (Preferred Alternative) Section



Appendix B: Cumulative Actions

Appendix B
Cumulative Actions

This appendix presents a summary of the past, present, and reasonably foreseeable projects used in the analysis of cumulative effects in the *Mariposa Grove FEIS* (Chapter 3). The Council on Environmental Quality describes a cumulative impact as follows:

> *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 nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time* (Regulation 1508.7).

The cumulative projects listed below include past and present actions, as well as planning or development activity currently being implemented or planned for implementation in the reasonably foreseeable future. The *Mariposa Grove FEIS* evaluates these actions (Chapter 3) in conjunction with the impacts of an alternative as part of the cumulative analysis to determine if they have any additive impacts on a particular resource. For additional information regarding the plans and projects in Yosemite listed below, visit the National Park Service (NPS) Planning, Environment and Public Comment website at: http://parkplanning.nps.gov/.

Past Plans and Projects

- General Management Plan

  The GMP is the blueprint for improving and preserving the park for the next century. The purpose of this plan is to provide 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. It was finalized and signed in 1980. The plan describes actions to achieve five broad goals:

  - Reclaim Priceless Natural Beauty
  - Markedly Reduce Traffic Congestion
  - Allow Natural Processes to Prevail
  - Reduce Crowding
  - Promote Visitor Understanding and Enjoyment

- Mariposa Grove Comfort Station Log Replacement and Repair

  The Mariposa Grove Comfort Station was constructed in 1931. It is a sugar pine log building. The sill and spandrell logs were experiencing deterioration and were replaced with in-kind material and corner notching. In addition, some of the other logs needed "Dutchman" repairs. The log crowns, just past the notches, have some decay and some of them were replaced or repaired using preservation techniques. Any and all smaller cosmetic problems were corrected during this project.

- Mariposa Grove Interpretive Sign Installation

  The purpose of this project was to create a sense of arrival at the Mariposa Grove of Giant Sequoias and provide opportunities to visitors with information about the amazing resources of the giant sequoia Grove. The signage installation created a self-guiding trail through the

Grove and brings the Mariposa Grove exhibits and related components up to the same caliber of that at Tuolumne Grove, Olmsted Point, and Yosemite Falls.

Thirteen new wayside exhibits were created and installed along the trail through the Grove, to replace the damaged metal ones including:

- Two new peeled log orientation exhibits; one at the trailhead and one at the tram boarding area.
- A peeled log interpretation panel at the trailhead.
- Two new brochure boxes; one at the trailhead and one at the tram boarding area.
- Two new map/directional signs along the trail.
- Tactile components and custom illustrations will be added.

- Mariposa Grove Museum Lighting Installation

  The Mariposa Grove Museum houses excellent interpretive displays, yet the lack of lighting hindered the visitors' experience and also causes a safety hazard (visitors and employees have tripped and fallen in the space). This project installed rechargeable battery-powered lighting to help showcase the exhibits, provide visitor safety, and preserve the historic character of the building. The lights are only used during daytime museum visiting hours.

- Mariposa Grove Trails And Asphalt Removal

  This project removed asphalt from an abandoned road in the upper Mariposa Grove. The area was restored to its natural condition with a two-foot dirt trail running through it. Trail signs were replaced throughout the Grove, and fencing installed to further protect the giant sequoias.

- Replace Mariposa Grove Remote Access Weather Station with Standard Tower

  The purpose of this project was to replace the Remote Access Weather Station (RAWS) in the Mariposa Grove with a permanent 'Rohn-type' weather tower. The existing station was a 'tripod' structure typical of RAWS sites and the State of California Department of Water Resources (DWR) wanted to replace it with a standard 32.8 feet tall tower. The existing RAWS has a 20-foot tall mast. The new tower is painted black or fabricated with black anodized metal and is anchored by a concrete footer that was poured into a hole approximately 2 feet in diameter by 4 feet deep. The new tower hosts all the standard weather metrics currently collected by the RAWS (temperature, humidity, solar radiation, fuel moisture and temperature, rainfall, and wind speed and direction) as well as snow depth. The tower site is in a clearing not visible from roads or trails and not near any giant sequoia trees.

- South Entrance Boundary Marker Stabilization

  The South Entrance Boundary Marker was constructed by the Civilian Conservation Corps between 1938 and 1940. The marker is located at Yosemite's south boundary on Wawona Road. It is constructed of granite stone and serves as an entrance sign and boundary marker. The marker is an integral part of the carefully engineered road system that has been designed to be compatible with the natural landscape and mirrors the rustic style stonework found at the South Entrance Ranger Duplex, South Entrance Station Office and Comfort Station. The structure addressed with this project has a total surface area of approximately 244 square feet. Stabilization activities for this project focused on five tasks: (1) removing overgrown vegetation and eroded bank dirt to expose the masonry; (2) cleaning the entire surface utilizing a pressure washer and clean, clear water to expose deteriorated mortar joints; (3) selectively removing deteriorated, failed mortar joints and repoint with appropriate

mortar; (4) replacing missing stones and resetting loose, displaced stones; and (5) replacing the missing log and historic sign utilizing the original 1938 construction blueprints. All preservation treatments and project supervision were accomplished "in-house" by the Yosemite historic preservation team.

- South Entrance Leach Field Repair

  An additional (800) feet of leaching lines parallel to the existing South Entrance leach field were installed. Eight new inspection ports for monitoring and (3) distribution valves for effluent distribution were also installed. The existing dosing station was replaced. The leach field services the South Entrance Station, Ranger housing and entrance comfort station at Wawona.

- South Entrance Office Reroute Telephone Line

  This project involved a reroute of the telephone lines to the South Entrance office/residence (duplex) and the removal of an existing overhead line that was unsightly and difficult to maintain. The project included protection of the access point from snow plow damage with a standard green telephone access pedestal (the access point is currently protected by piles of rocks). NPS staff and equipment were used for all trenching activities.

- South Entrance Safety Improvements and Office Modernization

  This project addressed electrical, safety, and ergonomic concerns in the South Entrance Office. Wire molding was surface-mounted to the office walls. Twenty-four additional outlets were added to the office on at least 4 new circuits. A metal rod was driven into the ground near the breaker panel on the outside of the building. Two existing phone lines were re-routed. The office layout was changed to be more efficient and ergonomic, which included rearranging the furniture and adding additional storage cabinets.

- South Entrance Station Reestablish Exit Lane

  This road improvement project increased visitor and employee safety at the South Entrance Station. The project included re-establishing the old road alignment for exiting southbound traffic from Yosemite National Park and repairing the existing pavement surrounding the South Entrance kiosk.

  The project reduced congestion and the amount of large vehicle traffic entering the intersection.

  The project improved safety by allowing exiting vehicular traffic to make a gentle right-turn prior to entering the existing congested intersection. This entailed:

  - Completing an initial geotechnical investigation to determine the roads design profile. This would include two borings up to 10 feet deep (6 inches in diameter) and three borings up to 2 feet deep (6 inches in diameter).
  - Removing 12 trees between 12 to 36 inches in diameter.
  - Regrading and compacting the road subgrade. The compacted fill and base material would be used to create a structurally sound sub-base.
  - Installing final compacted asphalt pavement.
  - Adding curbing, pavement markings and signage.
  - Installing rumble strips and LED stop signs.
  - Relocating the existing barriers with new curb features.
  - Relocating telecommunication and power lines, a light pole, as well as abandonment of an existing ventilation shaft.

- South Entrance Traffic Safety Improvements

  This project entailed adding temporary traffic safety improvements to the South Entrance Station. Thirteen 10-foot sections of K-rail were installed within the road prism, for traffic entering and exiting the park, and were secured in place by using 3/4-inch rebar driven approximately 2 feet into the previously disturbed paved surface. New striping was painted onto paved road surfaces leading up to the middle kiosk, separating traffic into two lanes. Two new signs were installed, one directional sign and one sign indicating the narrow exit lane width. Removable channelizers were installed at the entrance lanes between the kiosks and the "T" intersection in an effort to prevent vehicles from crossing lanes.

- Tachyon Satellite Equipment Installation (Phase 4)

  This satellite equipment installation project provided a Local Area Network/Wide Area Network connection to various operational teams in areas where traditional high-speed data connectivity does not exist. There were two locations in Phase 4: South Entrance Station and Lake Eleanor Ranger Office. The approximately 47-inch dish antenna was mounted to a free-standing pole installed 3 to 5 feet above ground at each site. Antennas were placed in the least visible locations possible while still providing sufficient satellite communication to deliver high-speed data connectivity. Intrusion into the areas around the buildings and landscapes will be minimized with limited tree-trimming and removal. The Tachyon installer determined the locations for dish installation during initial site surveys. Each site was visited by the park's History, Architecture and Landscapes (HAL) staff. Tachyon engineers and park staff advised painting each dish Wosky Brown for best operational and visual results.

- Comprehensive Ecological Restoration Projects

  The NPS completed a suite of ecological restoration projects throughout Yosemite during the last several decades. The Merced River was a focus for many projects including the removal of the Cascades Diversion Dam and Happy Isles dam, and river-related ecological restoration at Eagle Creek, Lower River, former El Capitan Picnic Area and Dump, Devil's Elbow, Lower Yosemite Valley, Sentinel Bridge, North Pines, Housekeeping Camp. Other restoration projects in Yosemite Valley included ecological restoration at Cook's Meadow, Happy Isles Fen, Happy Isles Gauging Station Bridge Removal, and Fern Springs. Elsewhere in the park, ecological restoration projects took place in the Wilderness, Wawona Meadow, the Mariposa Grove of Giant Sequoias, and other areas. These projects improved aquatic, meadow, riparian, and upland habitats throughout the park.

- Wawona Meadow Restoration

  Phase I

  This project restored ecological processes in Wawona Meadow, which is habitat for two threatened bird species (great gray owl and willow flycatcher) and several sensitive plant species.

  Data gathering Phase 1 included the following,: meadow hydrology, wildlife habitat, invasive plant species, special status plant species, cultural landscape, historic features, archeological sites, American Indian use, visitor use, helicopter operations, stock use, fire, PG&E access, trailhead parking, and road and trail maintenance.

  Specifically, park staff:

  - Conducted vegetation, hydrologic and wildlife monitoring, assessments and surveys, including wetland delineation.
  - Assessed hydrologic diversions and identify solutions for ecological restoration.

- Conducted cultural resource and landscape assessments to identify cultural resources and provide recommendations for protection.
- Consulted with American Indian tribes to identify visitor groups and develop interpretive guidelines.
- Analyzed sediment/pollen cores to determine fire history and vegetation changes of Wawona Meadow.
- Eradicated Velvet grass (invasive species) eradication, through the use of herbicides in accordance with the Invasive Plant Management Plan.
- Removed small conifers no greater that six inches in diameter, breast height (dbh) adjacent to the historic fence, chutes and corral to improve protection from fire.
- Removed asphalt associated with the Wawona Meadow loop road that is eroding and affecting hydrology.
- Completed an Ecological Restoration Management plan for Wawona Meadow, incorporating all of the above information and issues.

Phase II

Ditches that were constructed in the Wawona Meadow in 1936 have altered its hydrology by disrupting both surface and subsurface flow, lowering groundwater levels, drying out adjacent areas, and altering plant communities. The ditch on the south side of the meadow extends for one mile and was reinforced with 22 buried concrete weirs. Fourteen of those weirs are more than 50 percent exposed. Most of them are located in the 982-feet length of the ditch that has eroded to 10 feet deep. Water flows through the ditch for most of the year, draining the groundwater from the meadow. This is evidenced by the dominance of upland (rather than wetland) and non-native plants adjacent to the gullied sections of the ditch. The rest of the ditch varies: Some parts have slow moving water (1 to 3 feet deep) and other parts are heavily vegetated with no water flow. The ditch on the north side of the meadow is mostly shallow and has less impact on hydrology. Monitoring of hydrology, plant communities, and wildlife would help direct restoration actions.

Under Phase II the project implemented the following actions:

- Removed concrete weirs above ground level and recycle out of the park.
- Filled sections of the ditch with 4,000 cubic yards of native fill.
- Placed “plugs” or grade-control structures to re-contour the area and discourage concentrated water flow.
- In shallower sections of the ditch, pulled back the remaining soil berm.
- Salvaged plants and topsoil prior to restoration disturbance.
- Collected native seeds from adjacent areas.
- Revegetated newly restored areas by replacing topsoil and salvaged plants, seeding, and planting willow.
- Placed five wayside exhibits around the meadow loop describing meadow ecology, historic events, and the restoration process.

- Vegetation Management Plan

  The Vegetation Management Plan is an addendum to the Yosemite National Park Resource Management Plan (RMP) (1993) and is guided by the 1980 General Management Plan. The purpose of the plan is to:

  - Delineate the legislative and administrative requirements that guide development of vegetation management objectives;

- Refine the goals and objectives for vegetation management that are established in the RMP;
- Describe the dynamic environment of vegetation within the park and the social, cultural and natural processes that influence the vegetation;
- Discuss the current vegetation management issues, define management objectives, management techniques and strategies for achieving objectives, and information needed; and
- Provide a summary of vegetation management planning needs to be addressed in the future, including the roles and responsibilities for planning and implementation.

The framework of the plan provides guidance for specific implementation plans to be developed for vegetation management in Yosemite. Vegetation management projects are ongoing.

- Wawona Tunnel Safety Improvements

  The purpose of this project was to improve safety within the Wawona tunnel. Work included the design and installation of new fire extinguishers and call boxes within the tunnel, and the design and installation of approximately 2,600-LF of new underground power line.

Present and Ongoing Plans and Projects

- Scenic Vista Management Plan

  The Scenic Vista Management Plan created a program to replace the park's current ad hoc approach to scenic vista management with a comprehensive strategy to prioritize viewpoints for management, identify which methods of vegetation clearing area appropriate at what times and in which places, and describe what trees and brush may need to be removed to restore the view at high priority vistas, including views at the Grizzly Giant and the Museum. Implementation began in 2012. Proposed vista management methods could include fire, mechanical thinning, and trimming.

- South Entrance Station Kiosks Replacement

  The goal of this project is to design and construct safe, secure, accessible, and high performance entrance station kiosks at the South Entrance of the park on Wawona Road. The project should be complete by the end of 2013.

  This project entails relocating the new kiosks along Wawona Road approximately 350 feet (315 feet straight line measurement) south of the existing kiosks location. Work includes approximately 43,000 square feet of fill and 7,500 square feet of cut along the east side of Wawona Road to allow for placement of the three new kiosks and the entrance and exit paved surface around the kiosks. This required the removal of approximately 135 trees between 4 inches and 48 inches diameter at breast height. Tree removal occurred in Fall 2012.

  Implementation will be complete in 2014. When completed, the work will include:

  - constructing three new, 8 feet x 14 feet permanent kiosks,
  - relocating new utility lines (gas, electric, and telecommunications),
  - installing curbing, signs, and landscaping around new-permanent kiosks,
  - installing security upgrades including video cameras,

  - conducting five geotechnical and pavement borings within the project area to determine the detailed soil conditions (8-inch diameter x 10 feet maximum depth), and
  - installing an upsized culvert and a wildlife crossing.

- Concession Services Plan

  This plan supplements the 1980 General Management Plan for Yosemite National Park. Revisions to certain concession services action items of the General Management Plan are described, and the environmental consequences of those items are evaluated. The final plan reduced overall lodging, replaced lodging at Yosemite Lodge with economy cabins and cottages rather than motel units, retained 150 tent cabins at Curry Village (rather than 100), and increased food service seats, among other actions.

- Comprehensive Interpretive Plan

  The purpose of this plan is to outline a comprehensive approach to interpreting park natural and cultural resources. The Comprehensive Interpretive Planning (CIP) process is established in Director's Order 6 and is the basic planning component for interpretation. The product is not the plan, but an effective and efficient interpretive program that achieves management goals, provides appropriate services for our visitors, and promotes visitor experiences.

  The heart of the CIP is the Long-Range Interpretive Plan (LRIP) that defines the overall vision and long-term (five to ten years) interpretive goals of the park. The process that defines the LRIP also encourages development of targeted, realistic strategies and actions that work toward achievement of its goals. Actions divided into annual, achievable steps are reproduced in the Annual Implementation Plan. Creating annual plans via this "stepping down" of the LRIP simplifies much of the annual planning process because specific goals already have been identified in the LRIP. The last section of the CIP is the Interpretive Database, which is a compilation of information needed to build the other two components. It includes media inventories, the park's strategic plan, enabling legislation, visitor surveys, reports, a bibliography, and other basic information.

- Yosemite Environmental Education Center

  The purpose of this project is address issues of deterioration and use at the Yosemite Institute environmental education campus at Crane Flat. The campus at Crane Flat has served as an educational facility since 1971, and the facilities are comprised of older buildings and structures that have been assembled over time and were not originally designed for educational purposes. Most of the Crane Flat campus structures and utilities are nearly 70 years old, are energy inefficient, and are increasingly difficult to retrofit to achieve modern standards for health, safety, and accessibility.

  The selected alternative presents a plan to construct a new campus at Henness Ridge and restore Crane Flat to natural conditions. These new facilities would accommodate 224 students and 20 staff. New utilities and a firehouse would be installed to accommodate the new campus, and the new facilities would be universally accessible and meet fire, health, and safety standards.

- Fire Management Plan/Operational Fire Management Plan

  Yosemite National Park's fire management program employs a variety of methods to accomplish and support fire and resource management objectives and to reduce the risk of wildfire in and adjacent to the park. Strategies in this plan are based on knowledge gained from fire and fuels research and monitoring, and from experience gained in Yosemite

National Park over the last 50 years. Over the last 30 years, federal fire policy has changed from suppression of all wildfires to a policy allowing a single fire to be used as a tool to meet multiple land management and public safety objectives. After decades more than 30 years of proactive response to wildland fire, the park is far from restoring natural fire regimes to the entire park landscape, though significant inroads have been made. While fuel reduction and prescribed burning have increased since the 1990 A-Rock Fire, developed areas are still at risk from uncontrolled wildland fires. The 2001 Federal Fire Policy specifically mandates public land agencies to reduce the amount of forest and shrubland fuels around areas with homes and buildings, and to restore ecosystems to a more natural, fire-tolerant balance. In response, the NPS has issued new fire management guidelines that require updated fire management plans. Yosemite National Park's 2008 Operational Fire Management Plan serves to utilize the new fire management guidelines in outlining procedures for managing fire in Yosemite National Park; for restoration and maintenance of ecosystems, for reduction of hazard fuels, for protection of natural and cultural resources, and for protection of wildland urban interface communities. Implementation of the fire management plan is ongoing.

- Fuels reductions/forest rehabilitation projects (US Forest Service)

  The purpose of these projects is to reduce the intensity and spread of wildfires across the landscape and near communities, and to reduce stand density within the lower and mid canopy layers of conifer stands to such that level provides for increased stand resiliency, growth, and vigor. The Sierra and Stanislaus national forests are both conducting a variety of projects aimed at reducing fuels and/or restoring more natural conditions in their west-slope Sierra forests. To accomplish these goals, workers in the forests thin conifer stands to reduce stand densities and ladder fuels; masticate ladder fuels and brush/shrub patches; utilize prescribed burning, understory and pile; manually treat and/or prescribed burn noxious weed infestations; and site prepare and plant failed conifer plantations.

  Scheduled/projected completion: Some form of fuel reduction/forest restoration is ongoing at all times in the west-slope Sierra national forests.

- Integrated Transportation Capacity Assessment

  This project develops traffic and visitor use computer simulation models to assist transportation planning, user capacity management, and operations.

- Yosemite Area Regional Transportation System

  The Yosemite Area Regional Transportation System (YARTS) is a multi-agency effort to provide public transportation options, reduce reliance on automobiles, and improve regional air quality. Since its start in May 2000, the YARTS has been providing visitors to the Yosemite region with a comfortable, economical, and convenient alternative to driving. YARTS provides regularly scheduled public transit service into Yosemite National Park and the gateway communities along its routes. In addition to year-around service from Merced to Yosemite Valley, during the summer months, YARTS also provides service along the Highway 120 corridor between Sonora and Yosemite as well as to/from Mammoth Lakes in Mono County on Highway 395 to the east of the park. The YARTS schedule makes connections with all intercity transportation providers in Merced: Amtrak, Greyhound, and Great Lakes Airlines at the Merced Airport. In Mono County, YARTS allows connections with "The Crest" bus that runs between Reno, NV and Lancaster, CA on Highway 395. Within the park, YARTS makes connections with all shuttle services including the free Valley Shuttle and the free Tuolumne Meadows Shuttle (summer only).Invasive Plant Management Plan Update (NPS)

The purpose of this plan is to provide park resource managers with the necessary planning tools and procedures for effectively and efficiently managing non-native invasive plants. The primary goal is to create a plan that is adaptive, that allows managers to adapt to changing conditions and needs. A methodology would also be created for assessing the efficacy and impacts of new herbicides, and assessing various management guidelines and tools.

An environmental assessment completed for this project and released for public review in 2010. A finding of no significant impact was approved by the Regional Director in August 2010. Project implementation is under way.

- Invasive Plant Control (California Department of Transportation)

  The California Department of Transportation (Caltrans) controls invasive plants along rights-of-way in several areas adjacent to Yosemite National Park. Yellow star-thistle is controlled along Highway 120 in Tuolumne County outside the park using the herbicide Transline (clopyralid). Caltrans does not currently use herbicides along Highway 140 within the Merced River corridor. Additionally, Caltrans works with individual county agricultural commissioners to respond to reports of invasive plants within the Caltrans rights-of-way.

- Invasive Plant Control (Mariposa County)

  Mariposa County actively controls several species of invasive plants in areas adjacent to the park. Mariposa County treats yellow star-thistle with a combination of mechanical, biological, and herbicide control techniques. Herbicides include Transline (clopyralid), Milestone® (aminopyralid), Roundup® (glyphosate), Rodeo® (glyphosate), and Accord (glyphosate). Yellow star-thistle control occurs in several locations throughout the county, and includes the Merced River Canyon up to the park boundary. Other priority species under county control are Iberian star-thistle and diffuse knapweed.

- Merced Wild and Scenic River Comprehensive Management Plan

  The NPS is currently preparing a comprehensive river management plan and environmental impact statement for the Merced Wild and Scenic River within Yosemite National Park (*Merced River Plan EIS*). The purpose of the *Merced River Plan EIS* is to guide management strategies and projects that protect, enhance, and restore the river's outstandingly remarkable values for the next 20 or more years. The *Merced River Plan EIS* will address a wide range of issues, including restoration, commercial development in the river corridor, user capacity, and facilities. As part of this planning effort, the NPS will address concerns related to parking in Wawona, where many visitors park and take the shuttle to the Mariposa Grove during periods of high visitation. The plan also considers expansion of regional transit options. Regional bus service, similar to that provided on the Highway 140 corridor, would be introduced that would serve communities to the south of the park, including Fresno. The draft *Merced River Plan EIS* was released for public review in January 2013.

- Motorized Travel Management Plans (US Forest Service)

  The U.S. Forest Service will be developing Travel Management Plans and Forest Plans for all national forests in California over the next few years. Travel Management Plans specify what forms of travel are allowed in what areas of the national forests. Forest Plans guide where and under what conditions an activity or project on national forest lands can generally proceed. Some of the forests have completed one or both of these tasks.

- Parkwide Communication Data Network

  Yosemite National Park plans to begin a Communications Data Network (CDN) infrastructure upgrade utilizing available, commercial off-the-shelf technology supporting a

single “hybrid communication backbone” employed throughout the park—to maximize existing equipment use, minimize current and planned costs, to fulfill the park’s future operational and security needs. This “backbone” would be a microwave and fiber optic pipeline used to transfer computer LAN data, radio communications, security and safety video systems, telephony, burglar/intrusion, fire alarm systems, traffic collection data, and telemetry throughout Yosemite. Upgrading the network also serves to enhance compliance and utilization of the narrowband and digital P25 compliant radio infrastructure as well as providing enhanced LAN connectivity for remote areas such as Wawona, Crane Flat, Hodgdon Meadows, and Tuolumne Meadows.

The CDN is designed to serve six geographic areas of the park as well as the five park entrance stations. The geographic areas include El Portal, Yosemite Valley, Wawona, Crane Flat, Hodgdon Meadows, Tuolumne Meadows, and Hetch Hetchy. The final installation would be a hybrid infrastructure, based around proven microwave technology that linking the geographic areas with multiple T-3 level bandwidth managed as necessary by park staff. There would be no need to rely on an independent service provider for maintenance of the system, as the backbone would be maintained by park staff.

An environmental assessment completed for this project and released for public review in 2010. A finding of no significant impact was approved by the Regional Director in April 2010. Project implementation is underway parkwide through 2015. The tower built in 2011 will receive additional equipment (microwave dishes and radio equipment within the existing shelter and replacing the existing generator with a small one).

- Parkwide Traffic Management and Information System

  This project designs and implements a real-time, information-based traffic management system to provide visitors and park staff information on traffic conditions throughout the park. This project would use the recently developed traffic model and updated traffic counter system to provide a web-based interface so that traffic and weather information can be accessed in real time.

- Parkwide Forestry Work Plan

  The purpose of the Yosemite National Park Forestry Program is to detect and mitigate or abate tree hazards before they fall and cause injury or damage to people, property, or facilities. Development zones, roads, and other facilities have been established in forested areas of the park. Fire exclusion and hydrological manipulation have changed the park’s forests and woodlands, and forest stands have not stabilized. Tree failures within Yosemite National Park developed areas have killed several people, seriously injured others, and cause over a million dollars in property damage. Public Law (16 USC 3, and 54) NPS Management Policies (8.8), NPS-77, Special Directive 82-6, and the Yosemite Resource Management Plan, Vegetation Management Plan, and Fire Management Plan provide a framework for hazardous tree management that would minimize threats to life and property from the failure of hazard trees within developed areas. The Forestry Worker Supervisors, Park Forester, and contractors, systematically inspect the trees for visible defects and prescribe mitigations or abatement, and accomplish the work as soon as practicable, oftentimes concurrent with inspections. Supervisors evaluate pruning, topping, and removal options that might preserve important habitat prior to prescribing tree takedown. Comprehensive tree hazard management involves warning visitors and residents that trees within the park may fall, and advisories are provided on the Yosemite National Park website, the Daily Report, and in other park publications.

- South Fork and Merced Wild and Scenic River Implementation Plan (USFS/BLM)

  The purpose of this plan is to provide long-term protection of natural and cultural resources and management of the South Fork of the Merced River for the use and enjoyment of visitors, such that the river would be unimpaired for future use and enjoyment as a natural setting. The U.S. Forest Service and the Bureau of Land Management developed a joint South Fork and Merced Wild and Scenic River Implementation Plan in 1991 for the segments of the main stem and South Fork of the Merced River that are under the jurisdiction of these agencies. The segments include a 15-mile portion of the main stem extending from the El Portal Administrative Site to a point 300 feet upstream of the confluence with Bear Creek; a 21-mile segment of the South Fork that flows from the park boundary to the confluence of the Merced River; and a 3-mile segment of the South Fork just upstream of Wawona, where the NPS has jurisdiction over the north side of the river and the U.S. Forest Service has jurisdiction over the south side.

- Yosemite Changeable Message Signs Installation in Southern Half of Park

  This project will enable improved communication to park visitors on the status of the park's shuttle buses through development of a visitor information system for all the shuttle bus systems in Yosemite Valley, Mariposa Grove/Wawona, Badger Pass, and Tioga Road.

- Wilderness Stewardship Plan

  The NPS will be updating the 1989 Yosemite National Park Wilderness Management Plan. The objective of updating the plan is to provide guidance to park operations for the successful management of Yosemite's designated wilderness, which comprises approximately 94 percent of the park. Scoping for the EIS is anticipated to occur in 2014.

- Wawona Road Wildlife Crossings

  This project takes proactive measures to reduce Pacific fisher mortalities from vehicle collisions (road-kill) along Wawona Road by building innovative wildlife crossing structures that facilitate safe animal movement. Pacific fishers are a candidate for listing under the federal Endangered Species Act, and recent camera research in the park indicates that a very small population exists in the southern portion of Yosemite, including the Mariposa Grove of Giant Sequoias, along Wawona Road near Chinquapin, and near Wawona. Fishers inhabiting this area of the southern Sierra Nevada are at the northernmost tip of their current range and must be able to safely cross the road on a regular basis if their population is to recover by expanding northward into historically occupied areas. Since 2007, six fisher road-kill mortalities have been recorded along Wawona Road, which bisects a narrow corridor of highly suitable fisher habitat. Within this same time period, three additional fishers have been killed by vehicles just south of the park on Highway 41 in Sierra National Forest. Wildlife crossing structures would provide a safer option for animals inhabiting this narrow corridor of suitable habitat to cross the road, and may help give this small fisher population its best chance at survival and potential recovery.

- Wilderness Sierra Nevada Yellow-legged Frog Reintroduction and Trout Eradication Project

  In Yosemite, there are as few as six populations of Sierra Nevada yellow-legged frogs with 50 or more individuals, 24 populations with 10 to 49 individuals, and 164 populations with one to nine individuals. The decline of the Sierra Nevada yellow-legged frog is being driven primarily by the introduction of non-native fish and the emerging infectious disease, chytridiomycosis. This project will increase the amount of high quality aquatic habitat for the Sierra Nevada yellow-legged frog and improve the success rate of Sierra Nevada yellow-legged frog reintroductions.

This project entails: 1) eradicating fish from 10 to 18 lakes, ponds, and marshes using gill nets, electrofishers, and fish traps; 2) transporting equipment and gear to restoration sites using pack stock; 3) temporarily installing bear boxes at restoration sites at the beginning of each season and packing them out at the end of the season; 4) conducting experimental translocations including augmenting 2 existing translocation sites and conducting one new translocation; 5) transporting translocated frogs by helicopter; 6) treating frogs prior to translocation with antifungal drug Itraconazole; 7) experimenting with bioaugmentation using the naturally occurring bacteria, Janthinobacterium lividum; 8) continuing long-term monitoring at approximately 130 sites annually and approximately 450 sites during summer 2012 using VES, continuing to PIT tag and swab individuals at 13 long-term mark-recapture sites, temporarily installing 1 digital recording device at each of two sites; and 9) salvaging egg masses and tadpoles from populations threatened by drought.

This project will occur over the course of five years, ending in December 2016.

- Wawona Road Rehabilitation

  The purpose of this project is to pulverize and repave approximately 25 miles of the Wawona Road between Southside Drive and South Entrance including the following elements:

  - Recycling (pulverizing) and overlaying the existing 24-foot wide paved road with spot reconstruction of subgrade and shoulders as required.
  - Minimal drainage work involving failed or severely undersized culverts. Slip-Lining was considered for any culverts that were relatively deep.
  - Minimal work at turnouts and intersections, which were within the existing paved footprint.
  - Pavement borings required to design the structural section for the roadway.
  - Areas disturbed by construction were revegetated under guidance of the park revegetation staff.

  The project includes resurface treatment to make the existing historic Wawona Road safe for visitors and employees as it is currently aligned. The project boundaries extend from Yosemite Valley at Southside Drive to the southern park boundary near Wawona. The specific work includes patching of potholes, crack sealing, shoulder and curb repair, and placement of an overlay, microseal, or chip seal, depending upon the best design for the specific location. The existing historic Wawona Road would also be widened in select locations. The project boundaries extend from Yosemite Valley at Southside Drive to the southern park boundary near Wawona.

  The last phase of this project is scheduled for completion in 2017. This phase would include the segment of the road between the park boundary and the South Entrance, and would be packaged for construction with the South Entrance intersection changes. This project would be subject to NEPA clearance through a separate compliance document.



Appendix C: Public Comments and Responses

Appendix C
Public Comments and Responses

Introduction

This report summarizes public comments submitted on the Restoration of the Mariposa Grove of Giant Sequoias Draft Environmental Impact Statement (*Mariposa Grove DEIS*). The National Park Service (NPS) released the *Mariposa Grove DEIS* for public review from March 8, 2013, through May 7, 2013.

Public Comment Analysis Methodology

The NPS analyzed all public comments received during the comment period. All letters, emails, faxes and public meeting comments were analyzed using a database developed by the NPS known as the Planning, Environment and Public Comment (PEPC) database. Letters were analyzed in stages, with review and assessment at each stage. First, staff read each letter to determine the discrete points expressed by the author, each of which is considered a "comment." Next, each discrete comment was assigned a code associated with a particular resource topic or element of the plan. The coding process captured discrete comments, assigned them to specific topic areas, and stored them in a database where they could be quickly accessed using a variety of query and reporting tools. Staff derived the code categories from an analysis of the range of topics covered in relevant present and past planning documents, NPS legal guidance, and the comment letters themselves. Comments that discussed multiple issues (e.g., commercial operations and transportation) were coded to multiple topics if necessary.

Comments were also reviewed as "in-scope" or "out-of-scope," as well as "substantive" and "non-substantive." In-scope comments were those that addressed the structure and findings of the *Mariposa Grove DEIS,* while out-of-scope comments included those comments addressing issues unrelated to the plan. Substantive comments are those that:

- Question, with reasonable basis, the accuracy of information in the EIS
- Question, with reasonable basis, the accuracy of environmental analysis
- Develop and evaluate reasonable alternatives other than those presented in the EIS
- Cause changes to the proposal or alternatives
- Suggest factual corrections

Comments in favor of or against the proposed action or alternatives, or comments that only agree or disagree with NPS policy, were not considered substantive, according to NPS Management Policy. All comments are part of the administrative record for this project.

After staff coded all individual substantive comments and grouped those of similar context together, they developed a unique "concern statement" to summarize the main points or common themes expressed. Concern statements were identified throughout the coding process and were derived from and supported by quotes from original letters. Concern statements are intended to help guide the reader to comments on the specific topics of interest and they do not replace the actual comments received from individuals. Rather, concern statements should be considered as one means of accessing information contained in original letters and the coded comment database.

The concern statements were screened to determine whether further clarification is needed in the EIS, or whether modification of the proposed action is necessary. In the latter case, concerns were brought forward to park management for further deliberation. As a result of this deliberation, substantive comments led to changes in the Restoration of the Mariposa Grove of Giant Sequoias Final Environmental Impact Statement (*Mariposa Grove FEIS)*. The NPS responses to the concern statements in this appendix detail these changes and/or points to sections of the FEIS for further information or clarification. Some responses provide background or relevant information that address the comment. Some responses explain why comments were considered but ultimately dismissed from further analysis.

RESULTS OF PUBLIC COMMENT ANALYSIS

During the 60-day public comment period, the park received 334 public comment correspondences concerning the Mariposa Grove plan. One comment letter was from a state agency, five were from organizations, one business, and the remainder originated from unaffiliated individuals, including form letters (see table below). The analysis of correspondence identified 356 discrete comments (excluding form letters), which generated 68 substantive concern statements.

Agencies and Organizations That Sent Correspondence

Federal and State Agencies	California State Clearinghouse and Planning Unit U.S. Army Corps of Engineers
Organizations	Extinction Witness National Parks and Conservation Association Yosemite/Mariposa County Tourism Bureau Central Sierra Environmental Resource Center (CSERC) Yosemite Sierra Visitors Bureau
Businesses	Delaware North Companies Parks & Resorts at Yosemite, Inc.

The majority of comments received during the public comment period were statements of support for Alternative 2 (Preferred Alternative) (271 correspondences), or statements of support for restoration efforts in Mariposa Grove (239 correspondences). Correspondence also reflected concern about access to the upper Grove area for specific users including people with disabilities, the elderly, or young children (24 correspondences). There were 17 correspondences that asked the NPS to consider alternatives to the current tram system in the upper Grove area.

Number of Comments Received by Code

Code	Description	Number of Correspondences That Include Specified Code
MG0100	Alt 2 Support	271
MG0106	General Support for Grove Restoration – No Alternative Specified	239
MG6350	Transportation – Tram Access to Upper Grove	26
MG10100	Commercial Operations – Tram	21
MG6100	Transportation – Circulation and Crowding	11
MG0104	Alt 4 Support	10
MG10200	Commercial Operations – Gift Shop	9
MG6000	Transportation	8

Code	Description	Number of Correspondences That Include Specified Code
MG0101	Alt 2 Oppose	8
MG4000	Visitor Facilities	7
MG8100	ADA – Parking/Access/Trails	7
MG1010	Policy and Other Planning	6
MG6600	Transportation – Parking – Other Options	6
MG0001	EIS Document/Participation	6
MG3000	Potential Impacts on Wetlands	5
MG4100	Visitor Facilities – Restrooms/Septic System	5
MG2100	Restoration/Stewardship – Giant Sequoia Habitat	5
MG4400	Visitor Facilities – Trails	4
MG7500	Socioeconomic or Cost Analysis	4
MG6300	Transportation – Shuttles	4
MG7000	Signage and Wayfinding	4
MG0103	Alt 3 Oppose	4
MG6500	Transportation – Parking Lot in the Lower Grove	3
MG6400	Transportation – Parking Lot at the South Entrance	3
MG2300	Restoration/Stewardship – Prescribed Burning	3
MG2000	Restoration/Stewardship	2
MG7010	Soundscape	2
MG2200	Restoration/Stewardship – Techniques	2
MG2400	Restoration/Stewardship – Cultural Resources	2
MG7700	Cumulative Impacts	2
MG3100	Potential Impacts on Wildlife/Habitat	2
MG1000	Purpose and Need	2
MG4500	Visitor Facilities – Communications	1
MG8000	ADA Compliance	1
MG4300	Visitor Facilities – Utility Lines	1
MG0105	Alt 4 Oppose	1
MG0102	Alt 3 Support	1
MG0010	Alt 1 Support	1

USING THIS REPORT

This report presents the public concerns organized by topic, along with "representative quotes," which are verbatim excerpts from individual public comment letters. These supporting quotes are followed by information as to whether the comment author was an individual, organization (with a general description of the organization type), agency, or American Indian tribe or group, and the assigned letter number.

Concerns that were considered substantive include a response from the project team. Substantive concerns and responses are listed first under each topic, followed by non-substantive concerns. Responses are not provided for non-substantive concerns (e.g., comments that oppose the proposed action but do not provide a substantive rationale, comments that do not meet the requirements listed above).

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RESPONSES TO COMMENTS

MG0001 – EIS Document/Participation

Concern ID: 46361

CONCERN STATEMENT: The National Park Service should improve the EIS by reconciling differences between the executive summary and Chapter 3, strengthening the analysis of beneficial impacts, and clarifying the meaning of the No Action alternative.

Representative Quote(s):

Corr. ID: 93 **Organization:** *Not Specified*

Comment ID: 321060 **Organization Type:** Unaffiliated Individual

Representative Quote: While comparing the impacts presented in the executive summary for each alternative with the impacts presented in Chapter 3, it seemed that the results didn't align perfectly. This may be due to the fact that the impacts were being summarized, and therefore couldn't capture the complexity of the results. If this is the case, please clarify in the ES [Executive Summary] of the FEIS.

Corr. ID: 93 **Organization:** *Not Specified*

Comment ID: 321061 **Organization Type:** Unaffiliated Individual

Representative Quote: The discussion of the significance of the impacts only discusses adverse impacts. There is no discussion, specifically, of "long-term major beneficial" impacts associated. Please clarify in FEIS.

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321330 **Organization Type:** Unaffiliated Individual

Representative Quote: The phrase "no action" is confusing as the NPS has taken and will take actions that affect access to the Mariposa Grove and facilities within the planning area to keep in compliance with various State and Federal laws (e.g. health and safety, historic preservation, etc.). So why not clarify what "no action" really means?

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321329 **Organization Type:** Unaffiliated Individual

Representative Quote: Why not clarify that the public does not have to choose between the alternatives but can propose a hybrid alternative?

Response: During the preparation of the FEIS, the document was edited and reviewed for clarity, readability, and consistency. Beneficial impacts are discussed by resource topic throughout Chapter 3, which includes assessment of the reduction of impermeable surfaces within the Grove as part of the restoration of giant sequoia habitat and improved hydrologic connectivity. Each resource area addressed in Chapter 3 includes a specific section on "Restoration-related Impacts."

Assessment of No Action alternative is a requirement under the National Environmental Policy Act. In this context, "no action" typically means no action related to the undertaking that comprises the proposed project. Under the No Action Alternative, or Alternative 1 in the EIS document, compliance with regulatory requirements, current management strategies, and strategies in current and future adopted plans would be implemented, as described in Chapter 2. Routine maintenance and repairs that are standard practice, or monitoring and reporting required under other federal

regulatory frameworks, are examples of activities that would continue under the No Action Alternative.

A Preferred Alternative is identified in Chapter 2 of the DEIS as Alternative 2, the South Entrance hub. However, the NPS would be able to select any one of the alternatives, or possibly a combination of alternatives based on the analysis of impacts, in order to select the course of action that best meets the purpose and need of the project while minimizing adverse impacts to the extent practicable.

Concern ID:	46362
CONCERN STATEMENT:	The National Park Service should clarify how funding sources influenced the planning process.
Representative Quote(s):	**Corr. ID:** 331
	Comment ID: 321340
	Representative Quote: What influence did the source for the funding of the proposed improvements in the Mariposa Grove have on the planning process?

Response: The planning process for the restoration of Mariposa Grove is driven by NPS objectives established through the General Management Plan (GMP) for Yosemite National Park and subsequent NPS decisions. Implementation of the proposed improvements to the Mariposa Grove would be funded by a variety of sources including the NPS, the Federal Highways Administration, private donors, and grants pursued by NPS and/or via park partners.

MG1000 – Purpose and Need

Concern ID:	46336
CONCERN STATEMENT:	The National Park Service should consider maximizing or enabling public recreational access to be the primary goal for its actions in Mariposa Grove.
Representative Quote(s):	**Corr. ID:** 92 **Organization:** *Not Specified*
	Comment ID: 321058 **Organization Type:** Unaffiliated Individual
	Representative Quote: Yes conservation is one of the goals of the NPS, but I believe the bigger goal / mission of the NPS is to enable and not limit access: this is why we call it a park versus a federally protected forest.

Response: The NPS developed the alternatives considered in the FEIS in accordance with public laws, treaties, proclamations, executive orders, regulations, and directives of the Secretary of the Interior and the Assistant Secretary for Fish and Wildlife and Parks. The NPS Organic Act, passed by the U.S. Congress in 1916, provides fundamental management direction for all units of the National Park System. The Organic Act requires that NPS "shall promote and regulate the use of. . .national parks. . .by such means and measures as conform to the fundamental purpose of the said parks. . .which purpose is to conserve the scenery and natural and historic objects and the wildlife 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." Fragile ecosystems such as that of the giant sequoia warrant special care if the groves are to survive and thrive.

Congress amended the Organic Act with the 1970 General Authorities Act, which affirms that all of the nation's parks—whether they include natural, cultural, or historic resources—are united under the mission, purpose, and protection of the Organic Act. The 1978 Redwood National Park Expansion Act also amended the Organic Act, re-affirming the mandate and directing the NPS to manage park lands in a manner that would not degrade park values. In addition, federal management decisions must be consistent with national laws, including the National Environmental Policy Act, National Historic Preservation Act, the Endangered Species Act, and the Clean Water Act.

MG1010 – Policy and Other Planning

Concern ID:	46273
CONCERN STATEMENT:	The National Park Service should clarify the relationship between the GMP, Yosemite Grant, and Mariposa Grove proposal concerning the retention of facilities, level of visitation, and reduction of private vehicles.
Representative Quote(s):	**Corr. ID:** 110 **Organization:** *Not Specified* **Comment ID:** 321193 **Organization Type:** Unaffiliated Individual **Representative Quote:** After nearly 150 years since the Grove and Yosemite Valley were removed from the public domain and reserved for "public use, resort and recreation, inalienable for all time", now the NPS is violating those express conditions of the Yosemite Grant and limiting the public's access to this unique grove of trees. **Corr. ID:** 331 **Organization:** *Not Specified* **Comment ID:** 321361 **Organization Type:** Unaffiliated Individual **Representative Quote:** I request that the NPS postpone a Record of Decision regarding the Mariposa Grove plan until the MRP has been adopted and the amendments to the GMP made public. When those actions have been accomplished, the NPS should release an addendum to the draft Mariposa Grove plan indicating how those actions will affect or not affect the various alternatives outlined in the draft Mariposa Grove DEIS.

Response: A new section was added to Chapter 1 of the FEIS to address Interrelationships with Other Plans and Policies. A new appendix (Appendix A) details the amendments that would be made to the GMP if the preferred alternative is selected.

MG10100 – Commercial Operations – Tram

Concern ID:	46277
CONCERN STATEMENT:	The National Park Service should consider alternatives to current tram operations that would still allow access, including: - Wheelchair/scooter rental - Reduced tram service (limited hours) - Aerial tram (like a gondola) - Compressed natural gas vehicles - Repaved road - Electric vehicles - Horse and wagons - Golf carts - Narrower vehicles (less likely to impact trees or pedestrians) - More than one operator(to promote competition)
Representative Quote(s):	**Corr. ID:** 44 **Organization:** Yosemite Conservancy **Comment ID:** 320534 **Organization Type:** Unaffiliated Individual **Representative Quote:** Throughout the park, transportation is converting to electronic vehicles, which are much quieter. Why cannot the trams to the same? This would still allow people to visit, while drastically reducing noise. Why can the trams not run less frequently? Again, less noise, since that seems to be your primary concern. I urge you to come up with a constructive solution that takes all variables into consideration, and does not basically close Mariposa Grove to all but hardy hikers. **Corr. ID:** 85 **Organization:** *Not specified* **Comment ID:** 321035 **Organization Type:** Unaffiliated Individual **Representative Quote:** Suggestion: To limit the noise and distraction of the tram, I would like to suggest this new invention..... electric vehicles. No noise, no pollution, no problems. There are porous surfaces than could help with water permeation. If the roadbed is the problem, then consider a raised roadbed across critical terrain.

Response: The NPS considered a range of access options to the upper Grove in the development of the alternatives. Prime considerations were the health and integrity of the trees and other ecological resources, site constraints such as the steepness of the grade, ways to maintain or improve the visitor experience, and safety. The NPS considered all of the suggestions identified in public comments. Access options not included in the final set of alternatives were not carried forward because of safety considerations due to the co-location of vehicles and pedestrians on the roadway (which would be narrowed as part of the restoration actions) or cost to purchase, operate, or maintain new vehicle types. Alternative 4 includes the option of less frequent tram service.

Concern ID: 46278

CONCERN STATEMENT: The National Park Service should consider the beneficial impacts of the tram tour, including the interpretive value of the audio tour and the safety net that trams provide for visitors who require assistance descending from the upper Grove area.

Representative Quote(s):

Corr. ID: 3 **Organization:** Private Citizen

Comment ID: 322033 **Organization Type:** Unaffiliated Individual

Representative Quote: The tram ride through the Mariposa Grove helped explain the Mariposa Grove to me in a way that otherwise, I would not have truly appreciated the Grove as much as I do now.

If at all possible, please keep the tram.

Corr. ID: 43 **Organization:** *Not Specified*

Comment ID: 320533 **Organization Type:** Unaffiliated Individual

Representative Quote: As a tram driver/tour guide in the Mariposa grove I think you're making a very big mistake by removing the tram tours. My passengers are always telling me how great they are, they can see so much more than if they were hiking, PLUS they get to learn about the history of the area. We take almost full loads every trip. What really needs to be done is to repave the tram road. That's what passengers hate about the ride. It's a giant pothole with a few smooth spots thrown in. Don't deprive tourists the chance to see and learn about the most beautiful place in the world.

Corr. ID: 98 **Organization:** *Not Specified*

Comment ID: 322034 **Organization Type:** Unaffiliated Individual

Representative Quote: In the Mariposa Grove, the current arrangement was put in place, which I have found to be a reasonable situation. One can ride the tram. To see the view from Wawona Point, you can get out when the tram stops at the site of the fallen tunnel tree, and walk out to the Point and back. Then there is the very nice foot trail down through the forset to the Museum, which is the part of the grove that I have enjoyed the most.

Response: The effect of the tram removal on the visitors who use it is acknowledged in Chapter 3 under Sociocultural Resources: Visitor Experience and Recreation. The analysis was revised to recognize the various contributions of the tram service to the visitor experience, including the interpretive features of the tram tour and the one-way option for hikers.

MG10200 – Commercial Operations – Gift Shop

Concern ID: 46376

CONCERN STATEMENT: The National Park Service should continue to provide all or some of the services of the gift shop.

Representative Quote(s):

Corr. ID: 88 **Organization:** *Not Specified*

Comment ID: 321045 **Organization Type:** Unaffiliated Individual

Representative Quote: Also, by removing the operations(Kiosk and Gift Shop)unprepared visitors are totally without necessay items and information. The concession staff is very knowledgable and is there from 7am to 7pm daily at the peak of the summer season. We not only sell water and tours, we also call 911(bee stings, broken legs, low sugar, heart attacks, lost person, etc) and also give directions on how to see the Grove, Park or how to get to the Bay Area.

Corr. ID: 103 **Organization:** Delaware North Companies Parks and Resorts

Comment ID: 321126 **Organization Type:** Business

Representative Quote: The gift shop supports visitor activities within the Grove by offering supplies that visitors may not have brought with them such as rain jackets for inclement weather or water and snacks. Given the heat, elevation and extensive trail system, it is appropriate for visitors to be able to purchase a drink or food before or after their trip to the Grove. Another benefit from the gift shop is that it provides a personal contact with visitors during the early and late weeks of the season before NPS staff is present.... The Grove and South Entrance are relatively isolated from other visitor services and it appears that retail and food/beverage offerings at a new visitor hub are an appropriate and necessary visitor service. All these factors should have been discussed in the analysis of the Plan and in the development of alternatives, yet they were not.

Corr. ID: 103 **Organization:** Delaware North Companies Parks and Resorts

Comment ID: 322036 **Organization Type:** Unaffiliated Individual

Representative Quote: In 2012 the gift shop sold over 29,000 beverages, 31,000 ice cream bars, 29,000 postcards, 4,400 apparel items 1,700 books and 297 maps in a 7-month period. These statistics suggest that basic beverage, snack and souvenir opportunities, as well as books and maps, are valued by many visitors to the Grove. The sales figures also suggest that a bookstore concept will not be sustainable as the retail volume will not support the staffing necessary to run the store.
We believe the gift shop was not adequately described and evaluated in Chapter 3...

Response: The EIS has been revised to affirm that visitor information, educational, and other sales items would be available at the South Entrance hub under Alternatives 2 and 4. Similar services would be provided at the Grizzly Giant hub under Alternative 3.

MG2000 – Restoration/Stewardship

Concern ID:	46286
CONCERN STATEMENT:	The National Park Service should completely restore the upper Grove area, including removal of all communications equipment and facilities except for a trail.
Representative Quote(s):	**Corr. ID:** 76 **Organization:** *Not Specified* **Comment ID:** 322027 **Organization Type:** Unaffiliated Individual **Representative Quote:** I propose moving the cabin from the Upper Grove to the Lower Grove or South Entrance to continue its use as a Museum or visitor contact station. The Museum site could be restored returning the site to meadow. I would recommend signing the area especially to point out the young and adolescent sequoias that grow near the cabin. **Corr. ID:** 76 **Organization:** *Not Specified* **Comment ID:** 322028 **Organization Type:** Unaffiliated Individual **Representative Quote:** I recommend dismantling the Station and moving it as well to the South Entrance or Lower Grove once the tours are discontinued.... I recommend moving the communications equipment. Thus the road between the Grizzly Giant to the Upper Grove can revert to a pedestrian trail only and the Upper Grove could returned to Wilderness status.

Response: Some administrative vehicular access must be provided to enable maintenance of the communication facilities at Wawona Point. The Wawona Point communications tower is a critical component of the park-wide communications network. The tower requires maintenance throughout the year, and must be accessible to service vehicles. The NPS reviewed alternative sites for tower relocation, but the only suitable locations were within Wilderness. Relocation costs would be prohibitive, possibly exceeding several million dollars. The NPS also considered alternative power supplies for the equipment and determined that new power transmission lines would cross designated wilderness, solar panels would be unreliable in the winter due to snow cover, and delivery of propane via other transportation modes (e.g., helicopter) during winter months would require extensive site preparation and would be expensive and unreliable during inclement weather. Because the communications tower and the current fueling system could not reasonably be relocated or replaced at this time, "full" restoration benefits at Wawona Point could not be realized. Should the telecommunications tower become obsolete due to technological advances, the NPS would consider removal of the equipment. The Museum is a historic building and will remain because of its association with the location of Galen Clark's first cabin in the Grove.

Concern ID:	46287
CONCERN STATEMENT:	When necessary to remove large trees, the National Park Service should leave them in the forest for trail closure, restoration, or habitat enhancement.
Representative Quote(s):	**Corr. ID:** 109 **Organization:** *Not Specified* **Comment ID:** 321189 **Organization Type:** Unaffiliated Individual

Representative Quote: I also think that removing large trees from the forest, as logs, as I saw happening at the upper grove in April is a mistake. The could be applied to the landscape as large woody debri for trail closure, riparian restoration, or general habitat enhancement. Also disturbing, are all the stumps along the outer loop trail, south of the upper grove. Perhaps managers could be less zealous about felling so-called hazard trees. If it is necessary to remove trees, they should be blasted or shaped to simulate natural mechanisms, and left tall enough (20'-50') to provide snag habitat.

Response: Under the Mariposa Grove EIS, trees would be removed as a part of construction activities, particularly out of the Mariposa Grove at the South Entrance where the parking lot would be expanded. The NPS will explore sustainable options for trees that would be removed, including re-use of trees as site furnishings, trail delineators, and stockpile for future use. Trees would also be removed as part of efforts to reduce fuel loading and fire hazards in the Grove, per the Fire Management Plan. Trees could be mechanically thinned in restoration areas as well to meet fire management goals.

MG2100 – Restoration/Stewardship – Giant Sequoia Habitat

Concern ID: 46288

CONCERN STATEMENT: The National Park Service should accelerate the realignment of the road at the entrance to the lower Grove area.

Representative Quote(s):

Corr. ID: 76 **Organization:** *Not Specified*

Comment ID: 320589 **Organization Type:** Unaffiliated Individual

Representative Quote: The proposal in the Preferred Alternative to realign the road at the entrance to the Lower Grove should be accelerated to reroute the road so that it does not cut through the ravine and does not pass close to the sequoias.

Response: The timing of the road realignment at the entrance to the lower Grove area is contingent upon funding availability and the completion of the design and regulatory compliance activities.

Concern ID: 46289

CONCERN STATEMENT: The National Park Service should consider other options to the realignment of the road at the entrance to the lower Grove area to avoid creating new impacts to the giant sequoias.

Representative Quote(s):

Corr. ID: 83 **Organization:** CSERC

Comment ID: 321016 **Organization Type:** Conservation/Preservation

Representative Quote: Realigning the road is not the only option for protecting the giant Sequoias from erosion in the drainage. Engineering an appropriate crossing and restoring the ravine would sufficiently protect the previously impacted Sequoias without introducing new impacts to Sequoias by realigning the road.

The minimal benefit of the road realignment should be carefully compared with having such an impact on the Giant Sequoias.

Response: A primary benefit of realigning the curve at the entrance to the Grove would be long-term protection of the giant sequoia growing along the ravine. Introduction of a straightened curve and a new engineered crossing would be intended to slow erosion in the ravine, where giant sequoia are rooted, and reduce soil compaction of the local root zone that is associated with vehicle traffic on the paved roadway.

Concern ID: 46290

CONCERN STATEMENT: The National Park Service should not overstate the benefits of the removal of paved roads to the giant sequoias.

Representative Quote(s):

Corr. ID: 83 **Organization:** CSERC

Comment ID: 321022 **Organization Type:** Conservation/Preservation

Representative Quote: While it is a step in the appropriate direction to convert a portion of the Upper Grove loop road to a trail, the Park should not overstate the benefit to the Giant Sequoia from this action. Having a hard packed trail, regardless of its width, is still going to impact the roots to some degree. Water will be better able to infiltrate the soil, but the structure and composition of a healthy forest soil will still be absent. It is certainly beneficial to remove the asphalt and allow the trees to continue to grow. However, only complete removal, decompaction and restoration of the road would fully relieve the roots of the Sequoia from the stress caused by having a hardened surface on top of them.

Corr. ID: 104 **Organization:** *Not Specified*

Comment ID: 321136 **Organization Type:** Unaffiliated Individual

Representative Quote: If the Mariposa redwoods are anything like my redwood was, by now the roots have thoroughly adapted. Be removing the paved surface and realigning water flows, you will most likely incur hardship on the trees by forcing them to readjust to your modifications.

Corr. ID: 110 **Organization:** *Not Specified*

Comment ID: 321195 **Organization Type:** Unaffiliated Individual

Representative Quote: The issue of removing paved roads in the grove to improve infiltration of rainfall and snowmelt is misleading. The majority of the water that the trees have access to is underground water. If it were only rainfall and snowmelt, the trees would not have survived all these years.

Response: Each alternative includes a mix of reduction of developed areas and new development, as described in Table 2-3. As discussed in Chapter 1 (page 1-7 of the DEIS), the primary purpose of the proposed actions in Mariposa Grove is to address the conditions that are contributing to stress on the giant sequoias, which includes the alteration of natural systems. The removal of pavement and narrowing of roads to be converted to pedestrian trails would support that aspect of the restoration. Limiting paved road and vehicle access also is compatible with the natural soundscape of the upper Grove area. The effects of pavement removal are described in Chapter 3 for many resource topics under the subheading for “Restoration-related Impacts.”

Concern ID: 46463

CONCERN STATEMENT: The National Park Service should consider the presence and assistance of Delaware North concessioner employees as part of the strategy to minimize damage to the Mariposa Grove.

Representative Quote(s):

Corr. ID: 336 **Organization:** *Not Specified*

Comment ID: 321699 **Organization Type:** Unaffiliated Individual

Representative Quote: The importance of Delaware Norths large number of employees in the grove has been ignored. Plans to increase parking and help get more pedestrians into the grove, without uniformed employees (NPS or DNC) will be damaging to the trees and natural beauty. There is not enough N.P.S. coverage in any of the plans to prevent damage to the grove. We are constantly radioing Wawona rangers. Its already a problem getting someone up there to give the guest guidance.

Response: It is acknowledged in Chapter 3 of the FEIS that concessioner employees support traffic management in Mariposa Grove and other visitor assistance. Under all the action alternatives, NPS will continue to provide for traffic management staffing as needed.

MG2200 – Restoration/Stewardship – Techniques

Concern ID: 46280

CONCERN STATEMENT: The National Park Service should consider alternatives to some machinery and materials use, such as using excavators instead of bulldozers and skid steers, and using sustainable pavement instead of asphalt.

Representative Quote(s):

Corr. ID: 57 **Organization:** *Not Specified*

Comment ID: 320556 **Organization Type:** Unaffiliated Individual

Representative Quote: Bulldozers and skid steers both have fixed ripping implements attached to them (Archuleta and Baxter 2008). This can create the potential for the equipment to re-compact the soil surface that they have just treated when positioning to treat part of the area that was not reached during the previous pass (Archuleta and Baxter 2008). This could limit the effectiveness of the mechanical treatment by destroying soil macropores and therefore decreasing water movement, decreasing soil aeration, and restricting root growth (Archuleta and Baxter 2008).

I would suggest that the NPS analyzes the potential of other heavy equipment types for this project. Excavators are now being used as multipurpose subsoiling machines. United States Forest Service personnel from the Umpqua National Forest have developed implements for excavators that allow these machines to accomplish multiple tasks (Archuleta and Baxter 2008). These implements allow excavators to subsoil while spreading organic matter over the project site (Archuleta and Baxter 2008). Subsoiling followed by the addition of organic matter has been shown to drastically increase water infiltration and reduce erosion potential (Luce 1997). An excavator could also be used to contour areas of the project that require it (Lloyd et al. 2013). The use of an excavator with a multipurpose implement could decrease the time involved with restoring these areas, lessening the potential for these treated

areas to experience runoff, and increase belowground productivity (Archuleta and Baxter 2008, Lloyd et al. 2013, Luce 1997).

Corr. ID: 105 **Organization:** *Not Specified*

Comment ID: 321144 **Organization Type:** Unaffiliated Individual

Representative Quote: I think it is important to consider the environmental damage that asphalt and petroleum products cause to the natural ecosystem. Research sustainable pavement alternatives currently available for road and trail repair and consider replacing all asphalt surfaces with context sensitive pavement materials that will limit the visual impacts of trails, paths and roads.

Response: The NPS welcomes suggestions for new and improved restoration techniques and methods, and will consider the recommendations in this comment letter as site-specific restoration is implemented. The NPS will use best management practices during construction and installation of new facilities. See Appendix E, Mitigation Measures, and Appendix D , Restoration Plan.

MG2300 – Restoration/Stewardship – Prescribed Burning

Concern ID: 46281

CONCERN STATEMENT: The National Park Service should discuss fire in more detail in the EIS, specifically – Future multi-year schedule for prescribed burns, cooperative efforts for fuel treatment coordinated with the Forest Service, gap dynamics and prescribed fire in relation to giant sequoia establishment and growth, the significance of the fire return interval departure rating of 4, and the benefits of fire smoke.

Representative Quote(s):

Corr. ID: 57 **Organization:** *Not Specified*

Comment ID: 320555 **Organization Type:** Unaffiliated Individual

Representative Quote: Though some restoration activities such as wetland restoration, soil preparation and removal of infrastructure are discussed at length, fire is not....Although fire has now been reintroduced, these prescribed fires are still not meeting the historic return interval of 3 to 15 years.... The multi-year prescribed fire schedule listed in appendix six of the Fire Management Plan only forecasts to 2009, more recent information on prescribed fire in the Mariposa Grove would be beneficial to the DEIS (NPS 2004).

In Appendix C: restoration plan, the NPS states that conducting prescribed fires and fuel treatments outside of the Mariposa Grove is a priority (NPS 2013). The appendix also mentions that some of the areas targeted for treatment include lands managed by the United States Forest Service (NPS 2013). None of the alternatives mention any cooperative efforts to coordinate with the United States Forest Service to accomplish this priority.

This DEIS seems to focus mainly on the restoration of wetland areas of the Mariposa Grove. Studies from Kings Canyon National Park, California have shown that tree height and continued growth after establishment is more dependent on light availability in burned areas than moisture (Shellhammer and Shellhammer 2006). Gap dynamics and prescribed fire use don't seem to be sufficiently discussed in relation to giant sequoia establishment and growth within the DEIS.

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321348 **Organization Type:** Unaffiliated Individual

Representative Quote: What is the significance of a fire return interval departure (FRID) rating of 4? What are the scale parameters? What benefits can be achieved from forest fire smoke emissions?

Response: The role of fire in ecological restoration is described in Chapter 1 as part of the goals and objectives for ecological restoration. Fire management activities are also discussed in Chapter 3, Natural Resources: Vegetation. The NPS concurs that gap dynamics and light availability are essential components of healthy ecosystems in the Mariposa Grove area. The FEIS defers to the 2004 "Final Yosemite Fire Management Plan" and the "Operational Fire Management Plan" for more detailed and up-to-date descriptions of the interaction of fire and the specific communities in the south end of Yosemite (Appendix B). Appendix B also summarizes the U.S. Forest Service fuels reduction and forests rehabilitation projects in adjacent lands to Yosemite.

MG2400 – Restoration/Stewardship – Cultural Resources

Concern ID: 46939

CONCERN STATEMENT: The National Park Service should carefully consider the use of the museum building as a historic structure to reduce deterioration and for visitors to ponder the setting that Galin Clark so much enjoyed.

Representative Quote(s):

Corr. ID: 76 **Organization:** *Not Specified*

Comment ID: 320584 **Organization Type:** Unaffiliated Individual

Representative Quote: 3. What to do with Clark's Cabin/Museum? The proposed usage to repurpose the building as a hiker's shelter doesn't make any sense. Left unsupervised it will be subject to vandalism or perhaps worse. The building itself is fragile (especially the roof) and if left unmaintained over time it will decay and become a nuisance eventually requiring its removal. I propose moving the cabin from the Upper Grove to the Lower Grove or South Entrance to continue its use as a Museum or visitor contact station. The Museum site could be restored returning the site to meadow. I would recommend signing the area especially to point out the young and adolescent sequoias that grow near the cabin.

Corr. ID: 99 **Organization:** *Not Specified*

Comment ID: 321081 **Organization Type:** Unaffiliated Individual

Representative Quote: The Mariposa Grove Museum is a great example of National Park Rustic Architecture. Also, the museum offers a historical connection with the grove that a contact center located at the entrance could not. Many photos have been taken of this historic structure along with fellow travelers that allows a more personal connection to the grove. If the building were repurposed, there is a great potential for delay which will likely lead to deterioration and eventual removal of the structure.

Response: Under Alternative 2, the museum structure is proposed to remain in place, although the function of the building would change. The Mariposa Grove museum building has been individually listed in the National Register since 1978, and it is described as a contributing feature of the Mariposa Grove Historic District in Chapter 3 of the EIS (see DEIS page 3-95 through 3-99.) The potential impacts related to a change in function of the museum building are addressed on DEIS

page 3-109. No physical alteration of the building is planned in order to preserve the integrity of the building. Any actions affecting the building would comply with the Secretary of the Interior's Standards for the Treatment of Historic Properties. The NPS would continue to maintain this structure to prevent deterioration, regardless of its use.

Concern ID:	46954
CONCERN STATEMENT:	The National Park Service should consider a balance between accessibility and historic considerations.
Representative Quote(s):	**Corr. ID:** 99
	Comment ID: 321077
	Representative Quote: Since there will be a new comfort station at the South Entrance Hub that would be ADA accessible, I would like to see any accessibility improvements to the current comfort station be abandoned. The current comfort station would then retain it's historical look and significance to the area.

Response: As discussed in the cultural resources section of Chapter 3 (beginning on page 3-93 of the DEIS), balancing cultural/historic resources, natural resources, and visitor use has long been the goal of management decisions in the Mariposa Grove. Future activities in Yosemite National Park must be in compliance with *Architectural Barriers Act Accessibility Standards for Federal Facilities* (GSA 2006), *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 1995), Director's Order 42: *Accessibility for Visitors with Disabilities in National Park Service Programs and Services* (NPS 2000a), and other applicable guidance.

MG3000 – Potential Impacts on Wetlands

Concern ID:	46284
CONCERN STATEMENT:	The National Park Service should move trails, converted roads, and new facilities outside of wetlands and stream corridors such as, the trail that cuts through the Rattlesnake Creek meadow and the facilities at the South Entrance.
Representative Quote(s):	**Corr. ID:** 109 **Organization:** *Not Specified*
	Comment ID: 321183 **Organization Type:** Unaffiliated Individual
	Representative Quote: Conversion of existing roads within a wetland and stream corridor to a raised accessible trail is counter productive to ecological restoration. Instead, a conventional accessible trail could be constructed outside of the wetland to the South or North at less cost and greater restorative effect.

Response: Wetlands within the Mariposa Grove, South Entrance area, and other areas that are potentially affected by the actions proposed under the alternatives were mapped and reviewed (see Chapter 3, beginning page 3-50 of the DEIS). Throughout the process of developing the alternatives evaluated in this EIS, the goal was to avoid disturbance of wetlands. However, some impacts were determined to be unavoidable in order to accommodate visitation to the Mariposa Grove. In those cases, NPS identified additional mitigation measures that are outlined in Appendices E and F of the EIS.

Concern ID: 46285

CONCERN STATEMENT: The National Park Service should include the removal of parking, climate change, the absence of fire, and the elimination of the water line leak in wetlands discussions in the EIS.

Representative Quote(s):

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321331 **Organization Type:** Unaffiliated Individual

Representative Quote: What percentage of wetland restoration would not be accomplished if the existing 115 space parking lot was not removed? What is this percentage related to? If climate change equates to a drying weather pattern, what is the likelihood that the wetlands are going to disappear anyway? What percentage of wetland loss is due to the absence of a frequent fire regime? What effect would the complete elimination of leaking water lines have on Grove health and on wetland areas?

Response: Under Alternative 2, about 1.0 acre of wetlands would be restored as a result of ecological restoration activities in the lower Grove area and removal of trails and road narrowing in the upper Grove area. Climate change may have an effect on the ecosystem that cannot be quantified at this time; however, ecological restoration of giant sequoia habitat is intended to reduce stresses on the ecosystem that may make it more resilient and adaptive to change.

As discussed in Chapter 3 (page 3-55 in the DEIS), there would be temporary minor adverse impacts in the lower Grove during removal of infrastructure and in the upper Grove during water line repair and/or replacement. The repair of leaking water pipes could have small local impacts on water tables, as it would eliminate unintended leakage. It is difficult to quantify or locate site-specific underground leaks in such a complex and large system, but overall, replacement of water lines could contribute to localized minor decreases in water levels, leading to restoration of natural water levels.

Concern ID: 46570

CONCERN STATEMENT: The National Park Service should modify the South Entrance parking to protect wetlands.

Representative Quote(s):

Corr. ID: 83 **Organization:** CSERC

Comment ID: 322030 **Organization Type:** Conservation/Preservation

Representative Quote: The configuration of the proposed parking area at the South Entrance Hub originally proposed a design that would have resulted in paved parking overlapping a 0.24- acre wetland. As Park planning staff has already agreed, this impact is entirely unnecessary as equivalent parking could be provided North of the wetland, closer to the Mariposa Grove Road, or other design modifications could avoid the wetland.

Response: NPS has worked extensively with the design team to modify the layout for parking at the South Entrance hub to accommodate visitors and services while also minimizing impacts on wetlands and other sensitive resources under Alternatives 2 and 4. This area is subject to many constraints due to topography and environmental resource considerations. The most recent version of the design drawings (Figure 2-6) shows that the parking lot would not be constructed directly over the existing wetlands. While an improvement, the NPS does not want to overstate the beneficial impact of this revision, as the water supply to the wetland would likely be substantially removed, and

there would not be a large buffer between the parking lot and the buffer. The impact analysis continues to acknowledge the loss of this wetland.

MG3100 – Potential Impacts on Wildlife/Habitat

Concern ID:	46292
CONCERN STATEMENT:	The National Park Service should relocate the "South Entrance to Grove Trail" to the shoulder of the Mariposa Grove Road to avoid impacts to fisher habitat.
Representative Quote(s):	**Corr. ID:** 83 **Organization:** CSERC
	Comment ID: 321013 **Organization Type:** Unaffiliated Individual
	Representative Quote: A reasonable alternative to constructing the trail in its proposed location would be to modify the main Mariposa Grove road to accommodate a walking and/or bike path along the shoulder to avoid a high degree of human disturbance into critical furbearer habitat.

Response: Potential impacts on fisher habitat are addressed in Chapter 3, Natural Resources: Special-status Species. The location of the new trail would not be immediately adjacent to any known fisher dens. Wildlife biologists will be consulted prior to finalizing the design of the trail to ensure protection of fisher habitat. The U.S. Fish and Wildlife Service and NPS wildlife biologists developed the mitigation measures in the EIS, as described in Appendix E These mitigation measures include direction that any new trail construction or re-alignment would occur during the non-denning season for fisher. The proposed trail between the South Entrance and the lower Grove would be located in a previously disturbed area since it follows an abandoned road alignment to the picnic area, and would parallel Mariposa Grove Road between the picnic area and the lower Grove area. Another reason to construct the trail is to avoid the inherit conflict between vehicles including shuttles and pedestrians walking along the road shoulder. In addition, walking along a trail that is separated from a road would enhance the hiker's natural experience, especially when entering the Grove.

Concern ID:	46293
CONCERN STATEMENT:	The National Park Service should provide a wildlife underpass at the wetlands near the South Entrance.
Representative Quote(s):	**Corr. ID:** 109 **Organization:** *Not Specified*
	Comment ID: 321192 **Organization Type:** Unaffiliated Individual
	Representative Quote: Provide wildlife underpass at wetlands south of Park entrance.

Response: It is assumed that the commenter is referring to the delineated wetland area in the vicinity of the South Entrance kiosks that are under construction in 2013. The design of the kiosks was developed and evaluated as part of a previous permitting/compliance effort, and was not reconsidered as part of this EIS analysis. A wildlife underpass is under construction as part of this adjacent project.

MG4000 – Visitor Facilities

Concern ID:	46339
CONCERN STATEMENT:	The National Park Service should consider a high line (not a zip line) so that visitors can experience the top of the tree canopy.
Representative Quote(s):	**Corr. ID:** 7 **Organization:** *Not Specified*
	Comment ID: 320128 **Organization Type:** Unaffiliated Individual
	Representative Quote: Has anyone ever consider setting up a high line (not a zip line) in a big tree grove so that visitors can safely experience the trees at the top of the canopy?

Response: A high line type of use was considered as one of many options through the planning phase during which the alternatives were developed. It was not included in the alternatives that were evaluated in the EIS since it does not meet the fundamental purpose of restoration of the giant sequoia habitat.

Concern ID:	46340
CONCERN STATEMENT:	The National Park Service should not eliminate stock use from the Grove.
Representative Quote(s):	**Corr. ID:** 50 **Organization:** *Not Specified*
	Comment ID: 320545 **Organization Type:** Unaffiliated Individual
	Representative Quote: Please do not eliminate stock use from the grove. Now that I'm older I enjoy so much riding from Fish Camp to Biledo through the grove. There are MANY other riders who feel the same way. We obey the rules and stay on the outer loop.

Response: Existing equestrian trails would not be impacted by the project.

Concern ID:	46341
CONCERN STATEMENT:	The National Park Service should have more logs or benches for people with mobility concerns and people who want to meditate among the giant trees.
Representative Quote(s):	**Corr. ID:** 85 **Organization:** Yosemite Conservancy
	Comment ID: 321034 **Organization Type:** Unaffiliated Individual
	Representative Quote: In the past, I have been able to take the tram to the top, and then, using canes, slowly walk down the trails among the grove. It renews the spirit to be able to stop and meditate amongst the old giants. (Can I suggest more logs or benches to sit upon and rest?)

Response: Under the action alternatives, the design includes additional accessible trails are proposed in the lower Grove and Grizzly Giant areas that would allow visitors of all abilities the opportunity to enjoy the beauty and tranquility of Yosemite's giant sequoia forest in a more peaceful setting than is available under current conditions. Final design will integrate benches or structures where people can rest.

Concern ID:	46346
CONCERN STATEMENT:	The National Park Service should retain non-historic trails to help disperse visitors and deter new trails from being created elsewhere, if impacts can be minimized.
Representative Quote(s):	**Corr. ID:** 109 **Organization:** *Not Specified* **Comment ID:** 321188 **Organization Type:** Unaffiliated Individual **Representative Quote:** Removing existing "non historic" trails from the grove may just lead to new trail forming elswhere. If their impacts can be minimized, those trails may help disperse visitors and provide better opportunites for solitude within the grove.

Response: In accordance with the goal of restoring the giant sequoia, the NPS intends to encourage and enforce (through signage and park staff) that visitors stay on established trails. As part of the action alternatives, new and extended trails are contemplated that would expand the range of trail experiences, including additional accessible trails for those with mobility limitations, and/or improved solitude and soundscapes.

Concern ID:	46347
CONCERN STATEMENT:	The National Park Service should explain the difference between visitor "typologies" and demographics.
Representative Quote(s):	**Corr. ID:** 331 **Organization:** *Not Specified* **Comment ID:** 321351 **Organization Type:** Unaffiliated Individual **Representative Quote:** How does visitor "typologies" differ from visitor demographics?

Response: Visitor typologies, such as those described in Table 3-11, represent different types of visitor experiences in terms of the amount of time to be spent, mobility considerations, and preferred setting. Demographics would include the socioeconomic profiles of visitors rather than a type of visitor experience or setting.

Concern ID:	46352
CONCERN STATEMENT:	The National Park Service should clarify the need for the shooting practice range.
Representative Quote(s):	**Corr. ID:** 331 **Organization:** *Not Specified* **Comment ID:** 321341 **Organization Type:** Unaffiliated Individual **Representative Quote:** Regarding the shooting range, why can't this facility be closed and rangers trained at nearby county facilities?

Response: Actions related to a shooting practice range are not included in any of the alternatives evaluated in this EIS.

Concern ID: 46368

CONCERN STATEMENT: If the museum function is moved, then the National Park Service should use the building as an overnight ski hut for cross-country skiers.

Representative Quote(s):

Corr. ID: 113

Comment ID: 321202

Representative Quote: If the museum function in the Upper Grove is moved to the lower Grove or South Gate, I suggest using the building as an overnight skihut for cross-country skiers.

Response: The action alternatives include relocating the museum function but do not specify new uses beyond the requirement that any future use must be compatible with maintaining the historic attributes of the structure in accordance with applicable statutes and policy or agency guidance.

Concern ID: 46369

CONCERN STATEMENT: The National Park Service should remove the water fountain at the museum so the treatment station can be moved to the lower Grove area.

Representative Quote(s):

Corr. ID: 76

Comment ID: 320586

Representative Quote: I also recommend removing the water fountain at the Museum. The proposal is silent on this; but it might be assumed since it discusses moving the water treatment unit and storage unit to the Lower Grove. The hikers can surely carry their own water. Signs can be posted at the trail head warning hikers that there is no water available in the Upper Grove. This assures that the treatment station can be moved downslope to the Lower Grove. If the water fountain stays, then the treatment facility must be maintained in the Upper Grove.

Response: The two drinking fountains in the upper Grove area are a historic feature of the Grove dating to 1931, and are contributing elements to the Mariposa Grove Historic District (see Chapter 3, Cultural Resources: Historic Structures). Removal of the fountain would adversely affect the cultural landscape. Under Alternative 2, the water supply treatment unit and storage tank currently located along the loop road would be relocated to eliminate the need for maintenance vehicle access along the southern segment of the loop road. The NPS plans to install new chlorination and water tank at the comfort station under all alternatives.

MG4100 – Visitor Facilities – Restrooms/Septic System

Concern ID: 46294

CONCERN STATEMENT: The National Park Service should move the comfort station in the upper Grove area to the lower Grove area or the South Entrance once the tram tours are discontinued.

Representative Quote(s):

Corr. ID: 76 **Organization:** *Not Specified*

Comment ID: 320585 **Organization Type:** Unaffiliated Individual

Representative Quote: 4. Maintaining the Comfort Station in the Upper Grove is a waste of resources once the tram tours are discontinued. Hikers to the Upper Grove number in the few hundreds per day currently and not everyone uses the Comfort Station. The Comfort Station has the capacity to handle thousands of visits per day. I recommend dismantling the Station and moving it as well to the South Entrance or Lower Grove once the tours are discontinued.

If a toilet is required in the Grove then keep the current vault toilet near the old hotel site and reroute trail to the current vault toilet. This allows for elimination of the trail that currently cuts through the Rattlesnake Creek meadow and facilitates complete restoration of the meadow. Rerouting the trail should be done regardless of the disposition of the Comfort Station and vault toilet. This can be accomplished by using the road/trail.

Response: Under all action alternatives, the comfort station is retained since hikers or other visitors would be present in the upper Grove and may benefit from those existing facilities. The upper Grove area comfort station is a contributing element of the Mariposa Grove Historic District, and therefore relocation would adversely affect the District.

Concern ID:	46295
CONCERN STATEMENT:	The National Park Service should locate the toilet facilities more centrally and conveniently as in Alternative 3, rather than concentrating them at one end of the Grove.
Representative Quote(s):	**Corr. ID:** 61 **Organization:** *Not Specified*
	Comment ID: 320564 **Organization Type:** Unaffiliated Individual
	Representative Quote: Alternative 3 locates most toilet facilities more centrally and conveniently, instead of concentrating them at one end of the Grove?

Response: Each action alternative considers improvements to toilet facilities that would improve the amenities for visitors within the concept of each alternative. For example, Alternative 3 places the hub for visitor services at Grizzly Giant whereas Alternatives 2 and 4 place the hub at the South Entrance. However, under all alternatives there would be toilet facilities at the South Entrance, lower Grove, Grizzly Giant, and upper Grove.

Concern ID:	46296
CONCERN STATEMENT:	The National Park Service should analyze the leach field at the lower Grove area to determine if it can accommodate restroom use by all the passengers from tour buses.
Representative Quote(s):	**Corr. ID:** 83 **Organization:** CSERC
	Comment ID: 321018 **Organization Type:** Conservation/Preservation

Representative Quote: Allowing tour buses under 40 feet to load and unload at the Lower Grove means that the restroom facilities at the Lower Grove will be the first opportunity for those passengers to have access to a restroom. Our Center is concerned that this may cause an unnecessary stress on the leach field in the Lower Grove.

The Park should include in its analysis whether the leach field is designed to support this kind of capacity. If the leach field is not going to be able to keep up with the influx of passengers from the shorter tour buses, the Park should request that the shorter tour buses allow their passengers a restroom break at a facility with a greater capacity.

Response: Since the DEIS was published, geotechnical and other investigations have been ongoing to continue to evaluate the feasibility of a leach field in the lower Grove and throughout the study area. The final selection of flush and/or vault fixtures would be contingent on the feasibility of the septic system and leach field based on the continuing investigation of site-specific conditions. The management of tour bus visitors would be contingent upon facility capacity and shuttle operations under Alternatives 2 and 4. This is clarified in Chapter 2 of the FEIS.

Concern ID: 46297

CONCERN STATEMENT: The National Park Service should consider the elimination of flush toilets, especially in the Grove where there would be new leach fields or sewer lines.

Representative Quote(s):

Corr. ID: 109 **Organization:** *Not Specified*

Comment ID: 321185 **Organization Type:** Unaffiliated Individual

Representative Quote: I am also disturbed by the prospect of new leach fields or sewer lines in the grove, and wonder if alternatives to conventional or vault toilets have been fully considered.

Corr. ID: 332 **Organization:** *Not Specified*

Comment ID: 321380 **Organization Type:** Unaffiliated Individual

Representative Quote: To alleviate water and sewage issues, why not eliminate flush toilets altogether in the entire project?

Response: It was clarified in Chapter 2 of the FEIS that the final determination of flush or vault fixtures would be contingent on the feasibility of the septic system and leach field based on the continuing investigation of site-specific conditions. The range of options still includes installation of flush toilets, vault toilets, a set of opportunities for leach field sites, and an option to install a sewer line from the lower Grove to the South Entrance. The final determination of which types of fixtures would be based on results of the continuing geotechnical investigations and soil surveys and to ability to avoid or minimize impacts on archeological or other sensitive resources.

MG4300 – Visitor Facilities – Utility lines

Concern ID:	46299
CONCERN STATEMENT:	The National Park Service should evaluate if enough water will be available if a 2 inch slip lining is installed in the current 4 inch water supply line.
Representative Quote(s):	**Corr. ID:** 32 **Organization:** Self
	Comment ID: 320520 **Organization Type:** Unaffiliated Individual
	Representative Quote: This is in reference to Appendix C of the "Draft Environmental Impact Statement", page C-24 & C-25 reference "Utilites". The plan of action calls for slip lining the entire length of the water supply line, a 4 inch Cast Iron pipe, with 2" HDPE (plastic pipe). The concern with the 2 inch pipe is it suffiently sized to carry the amount of flow, volumne, necessary to supply the grove and the entrance station? For example: The flow rate of 100ft length of 2 inch pipe is approx. 18 gallons. A 4 inch pipe of 100ft will carry 67 gallons. These rates are approximate and gathered from the Internet. Water usage, length of distribution lines, the affects of gravity, water storage, are other factors that determine pipe sizing.

Response: The EIS does not include this level of design detail in the alternatives, and this decision would be under the purview of Yosemite National Park facilities and maintenance staff. Park staff will take this comment under advisement.

MG4400 – Visitor Facilities – Trails

Concern ID:	46942
CONCERN STATEMENT:	The National Park Service should elevate pathways above hiking surfaces to minimize off-path hiking.
Representative Quote(s):	**Corr. ID:** 41 **Organization:** BergmannDesign
	Comment ID: 320531 **Organization Type:** Unaffiliated Individual
	Representative Quote: Pathways should all be elevated from the surface and off path hiking should be minimized.

Response: As discussed in Chapter 3, day use activities would continue to cause vegetation impacts in the Mariposa Grove because of the level of visitor interest in and use of Mariposa Grove. Pedestrian traffic would include direct impacts on the trails from soil compaction, erosion, and root exposure that could affect the health of giant sequoia; but much of this can be minimized through clear trail delineation. Vandalism, such as stripping off bark from giant sequoia, could continue in high-use areas, but the impact would be minimized with proper fencing, educational programs and signage, and regular management and patrols of these areas. The addition of way-finding signs and improving visitor orientation could reduce off-trail use, indirectly improving plant community composition and structure. Under Alternatives 2 and 4, accessible trails that cross wetland areas in the lower Grove would be elevated on boardwalks in sensitive locations.

Concern ID: 46946

CONCERN STATEMENT: The National Park Service should not develop a trail from the South Entrance to the lower Grove area because there is not enough demand, the trail has numerous elevation gains and losses, and it goes through old growth forest.

Representative Quote(s):

Corr. ID: 89 **Organization:** *Not Specified*

Comment ID: 321046 **Organization Type:** Unaffiliated Individual

Representative Quote: Hiking trail from South Entrance to picnic area and extenstion thereof to Lower Grove. I seriously doubt there is enough demand for this to warrant the expenditure of funds to do this and keep it maintained.... The existing trail from the South entrance is gnarly and has numerous elevation gains and losses.... It was also mentioned that this trail goes through old growth forest which should be protected instead of having a trail built through it.

Response: The proposed trail from the South Entrance to the lower Grove under Alternatives 2 and 4 would provide an alternative way to enter the Grove from the new hub besides the shuttle. Demand for such a trail would be expected to grow due to the relocation of the hub for transportation and visitor services to the South Entrance. New disturbance would be minimized due to locating the trail along an existing road alignment and adjacent to Mariposa Grove Road.

Concern ID: 46948

CONCERN STATEMENT: The National Park Service should convert the lower portion of the upper Grove area loop road to a hiking trail as long as all the other trails remain.

Representative Quote(s):

Corr. ID: 330 **Organization:** *Not Specified*

Comment ID: 321315 **Organization Type:** Unaffiliated Individual

Representative Quote: I am in favor of converting the south portion of the upper Grove loop road to a hiking trail; but I want all of the other trails in the Upper Grove to stay.

Response: Trail redundancy is being eliminated to restore sequoia habitat in Alternatives 2 and 4.

Concern ID: 46952

CONCERN STATEMENT: The National Park Service should publicize the hiking trail from Wawona to the Mariposa Grove.

Representative Quote(s):

Corr. ID: 51 **Organization:** *Not Specified*

Comment ID: 320627 **Organization Type:** Unaffiliated Individual

Representative Quote: Better information and path that is currently from the tunnel tree to Wawona. 6 miles is a lot for some, but there are a lot of people who don't even know about that option.

Response: Improved signage would be included under all action alternatives. The relocation of interpretive and visitor services to the main hub under all action alternatives would be expected to make information and park staff more accessible to visitors.

MG4500 – Visitor Facilities – Communications

Concern ID:	46950
CONCERN STATEMENT:	The National Park Service should clarify whether there are other uses at the communications facility at Wawona Point in addition to park administration, why it is considered a critical link when it was not available in previous years, and whether a larger fuel storage tank could reduce the number of fueling trips.
Representative Quote(s):	**Corr. ID:** 331 **Organization:** *Not Specified* **Comment ID:** 321335 **Organization Type:** Unaffiliated Individual **Representative Quote:** Regarding the communications facility at Wawona Point, is the facility only for Park administration or does it serve for other wireless uses? What did the NPS do for radio communications in the previous 50 years? Why is it now considered a critical link? Since the facility has been "recently" installed is this not an example of what can take place under the so-called "No Action Alternative?" Can a larger fuel storage tank be installed to reduce the number of fueling trips?

Response: The Wawona Point communications tower is a critical component of the park-wide communications network. The communications facility houses the radio networks, a repeater for concessioner use related to parkwide tours, and a cell tower. In addition to NPS functions, these facilities benefit park visitors by providing cellular phone service in the area. The tower requires maintenance throughout the year and must be accessible to service vehicles. The NPS reviewed alternative sites for tower relocation, and the potential locations would not be feasible, as they were located in Wilderness. Relocation costs would be prohibitive, possibly exceeding several million dollars. The NPS also considered alternative power supplies and determined that new power transmission lines would cross through Wilderness, solar panels would be unreliable in the winter due to snow cover, and delivery of propane via other transportation modes (e.g., helicopter) during winter months would require extensive site preparation and delivery would be expensive and unreliable during inclement weather. Should the telecommunications tower become obsolete due to technological advances, the NPS would consider removal of the equipment.

MG6000 – Transportation

Concern ID:	46302
CONCERN STATEMENT:	The National Park Service should eliminate all vehicles within one mile of the Grove.
Representative Quote(s):	**Corr. ID:** 41 **Organization:** BergmannDesign **Comment ID:** 320530 **Organization Type:** Unaffiliated Individual **Representative Quote:** Vehicles should not be allowed within at least a mile of any of the groves.

Response: In accordance with the Organic Act of 1916, NPS pursues a balance between restoration and protection of unique resources like Mariposa Grove and public access to experience these special areas. Alternatives 2 and 4 would limit private vehicular traffic into Mariposa Grove, by relocating the main transportation and visitor services hub to South Entrance and providing shuttle services and new trail connections between South Entrance and the Grove. NPS is not able to

eliminate all vehicles within the Grove because park staff vehicles must access the Grove for maintenance and access by placarded vehicles provides additional access for visitors with limited mobility. In addition, the shuttle would not be operating during the off-season and shoulder seasons, and limited vehicular access would be permitted to the Grove during those times.

Concern ID:	46305
CONCERN STATEMENT:	The National Park Service should evaluate whether a shift to more shuttle use and the road realignment would adversely affect the sense of arrival or a positive experience of the "first view" of the Grove.
Representative Quote(s):	**Corr. ID:** 99 **Organization:** *Not Specified* **Comment ID:** 321078 **Organization Type:** Unaffiliated Individual **Representative Quote:** There are two aspects related to a person's sense of arrival to the grove that I am concerned about. If you get on a shuttle at the South Entrance, how will you visually know you have arrived to the grove when you are in a crowded shuttle and not a private car? A visitor's first view of the sequoias is currently the Sentinels, which gives one a hint of what is to come. How will the realignment of the road impact this first view? **Corr. ID:** 99 **Organization:** *Not Specified* **Comment ID:** 321076 **Organization Type:** Unaffiliated Individual **Representative Quote:** I don't want my first view of the park, as I drive up to the South Entrance Kiosks, to be a large parking lot and associated structures. I don't want to feel like I am arriving at Disneyland. How well will the hub be screened from view along the 41?

Response: Under Alternatives 2 and 4, the sense of arrival would be the same for many people arriving to the Grove because over 40 percent currently arrive by shuttle bus. The NPS considered the change in the sense of arrival for those who currently arrive in private vehicles (see Chapter 3; Visitor Experience). Having only one parking lot option will reduce the stress of arriving, and the shuttle will allow visitors the time and opportunity to "shift gears." Upon arrival in the lower Grove area, the newly opened views of the lower Grove sequoias will enhance the visitors' sense of arrival into a much larger sequoia grove experience. Related to the arrival sequence at South Entrance, the design will ensure that there is sufficient vegetative screening to avoid looking into a parking lot, whether through natural vegetation or by new planting to screen the parking area.

Concern ID:	46307
CONCERN STATEMENT:	The National Park Service should consider the trade-offs between using shuttles or private vehicles to get to the Grove in terms of congestion patterns.
Representative Quote(s):	**Corr. ID:** 103 **Organization:** Delaware North Companies Parks and Resorts **Comment ID:** 321131 **Organization Type:** Business **Representative Quote:** There has been no determination of the number of people who bypass the Mariposa Grove and the addition of a parking area at the South Entrance is no guarantee of reduced crowds or traffic. The congestion may just occur at a single location and perhaps later in the day with the modest increase in parking places.

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321334 **Organization Type:** Unaffiliated Individual

Representative Quote: If the NPS consolidates all parking at a new parking lot near the South Entrance, what is to keep people from parking at Wawona or elsewhere and riding a bus to the Mariposa Grove location? How do you accommodate the additional visitors from other parking lots?

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321345 **Organization Type:** Unaffiliated Individual

Representative Quote: Where is the discussion about the weight impact on roadways of shuttle buses and tour buses versus private passenger vehicles?

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321346 **Organization Type:** Unaffiliated Individual

Representative Quote: Where is the discussion on the fact that buses can bring more people per hour to the Mariposa Grove than private passenger vehicles?

Where is the discussion on disbursed visitor arrival via private passenger vehicle versus concentrated visitor arrival via tour or shuttle bus? Bus passengers disgorge at one time at one location cars carry far fewer people and arrive and depart across a greater timeframe than buses.

Response: This topic is addressed in Chapter 3, Visitor Experience. The options for transportation into Mariposa Grove were evaluated in terms of the capacity each would accommodate relative to existing conditions (see for example, Table 3-12). It is possible that some visitors would be turned away on peak visitation days under all alternatives, given the high demand to visit the Grove and physical constraints on parking capacity. Pulsing currently occurs during the peak times of the day when the lower Grove lot is full and the vast majority of visitors arrive on shuttles. The addition of trails in the lower Grove, new interpretive signs, and the three-quarter mile hike to the Grizzly Giant will disperse visitors and moderate any pulsing from shuttle deliveries. A key consideration with the arrival of many people at one time (for example, on a tour bus) is the adequacy of visitor facilities such as toilets. These issues were addressed in the design of the alternatives, to make sure plumbing fixtures and septic system feasibility correspond to possible visitation levels based on bus, shuttle, and parking capacities. In the future, the NPS may need to institute a permit reservation system for commercial tour buses, if future demand exceeds the capacity of the septic system or commercial bus parking space.

Concern ID: 46310

CONCERN STATEMENT: The National Park Service should clarify how the design standard of 85% peak visitation capacity is applied in the analysis to assess parking and other topics.

Representative Quote(s):

Corr. ID: 103 **Organization:** Delaware North Companies Parks and Resorts

Comment ID: 321135 **Organization Type:** Business

Representative Quote: The Plan mentions a design standard at 85% of peak day visitation. It is unclear to us how this standard is being applied as it is necessary for certain plan elements (parking, for example), to be designed at 100% of peak day attendance to achieve the 85% standard elsewhere.

Response: The design of parking facilities and shuttle service is guided by factors including physical constraints, minimizing impacts on sensitive resources, and availability of funding. The NPS designs are intended to accommodate the 85th percentile of visitation. Table 3-12 was clarified to show estimates of how many visitors would be accommodated by mode of arrival on a day when visitation meets the 85th percentile under all alternatives.

Concern ID: 46311

CONCERN STATEMENT: The National Park Service should clarify the reasons for increased recreational vehicle parking, and the relationship between the size of the parking lot impact area.

Representative Quote(s):

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321324 **Organization Type:** Unaffiliated Individual

Representative Quote: Under the action alternatives it is proposed to increase RV parking to around 30 spaces. Please define what RV or oversized spaces are in relation to physical area impacted. Why the proposed increases?

Response: RV and oversized parking spaces are provided in response to visitor demand. The spaces would consolidate the vehicles that currently park in Wawona, the South Entrance, and the lower Grove whose passengers want to go to the Grove. Oversized spaces can also be managed as flexible parking areas and can be used in other capacities as needed.

Concern ID: 46314

CONCERN STATEMENT: The National Park Service should consider effects on air quality from shifting more visitors to shuttle buses from private vehicles.

Representative Quote(s):

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321355 **Organization Type:** Unaffiliated Individual

Representative Quote: Air quality and noise associated with bus traffic appear understated.

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321349 **Organization Type:** Unaffiliated Individual

Representative Quote: Where is the evidence to substantiate the claim that replacing private passenger vehicle traffic with shuttle bus traffic on the access road from the South Entrance to the lower Grove would "substantially reduce vehicle emissions?" One fully loaded shuttle bus may displace about 15 cars (theoretically) but how many vehicles add up to the same emission and carbon footprint of one bus? Who decided that cars are bad and buses are good? What is the evidence to support that position?

Response: This topic is addressed in Chapter 3, Air Quality and Climate Change. Under the preferred alternative, automobile and bus emissions would be moved to the South Entrance. Under

Alternative 2, privately owned vehicle use would be reduced substantially between the South Entrance Hub and the lower Grove as privately owned vehicle access to the grove during peak and shoulder seasons would be replaced by shuttle service from a new South Entrance Hub. Consequently, exhaust and dust emissions from visitor vehicles traveling on the South Entrance to lower Grove road segment would be replaced by shuttle bus emissions, which would substantially reduce vehicle emissions along this road segment. This would reduce the exposure of Grove visitors to exhaust and dust emissions. It is unknown which technology would be used for the shuttles so the amount of emissions reduced cannot yet be determined.

MG6100 – Transportation – Circulation and Crowding

Concern ID:	46319
CONCERN STATEMENT:	The National Park Service should not use roundabouts where pedestrians use intersections, to protect the safety of pedestrians.
Representative Quote(s):	**Corr. ID:** 56 **Organization:** *Not Specified* **Comment ID:** 320554 **Organization Type:** Unaffiliated Individual **Representative Quote:** I am not a big supporter of traffic circles where there is a potential for pedestrians. I have witnessed how impatient pedestrians attempt to cut across the center, rather than going around, resulting in hazardous situations. I like the intersection concept "F" better. The transitions appear to be cleaner, and take up less space. Pedestrians need only to watch for oncoming traffic from one direction source at a time.

Response: Pedestrian safety would be considered in the design if a roundabout is selected for implementation. Possible mitigation to enhance pedestrian safety at the roundabout may include proper signage, fencing, and design of sidewalks to minimize the potential for conflicts.

Concern ID:	46320
CONCERN STATEMENT:	The National Park Service should compare the crowding effects of Alternative 3, where visitors would distribute uphill and downhill, and Alternative 2, where visitors all begin from the lower Grove area.
Representative Quote(s):	**Corr. ID:** 61 **Comment ID:** 320561 **Representative Quote:** Alternative 3 delivers customers to the Grizzly Giant area. This allows customers to distribute themselves uphill and downhill in the Grove for less concentration and a lower impact. Alternative 2 concentrates everyone at the lower grove – which is contrary to both goals.

Response: Crowding potential is assessed in Chapter 3, Visitor Experience. Visitor concentration would be affected by the layout of visitor facilities as well as capacity like parking. It is not known how visitors would disperse in Alternative 3 because the Grizzly Giant is perceived by many visitors as the primary destination in the Grove. As a result of parking so close to their destination, some may choose to not hike at all. However, it is likely that more visitors would hike to the upper Grove than current levels. This would lead to greater impacts to the resources in the less-impacted part of the Grove and would result in reduced opportunities for solitude and increased crowding in the upper Grove.

Concern ID: 46321

CONCERN STATEMENT: The National Park Service should minimize impacts on giant sequoias when determining locations for transit facilities in the lower Grove area.

Representative Quote(s):

Corr. ID: 76 **Organization:** *Not Specified*

Comment ID: 320588 **Organization Type:** Unaffiliated Individual

Representative Quote: In the Preferred Alternative the current tram ticketing and turnaround area is to be repurposed to a small transit hub. I recommend that the turn around area be restored since it contains a number of sequoias; and that the transit hub be constructed in the area currently occupied by the snack shack/office and current shuttle bus parking area.

Response: The overall purpose of actions in Mariposa Grove is to restore and protect the giant sequoia habitat, and layouts for developed areas have been refined in order to minimize impacts on those habitats as well as archaeological resources, wetlands, and other sensitive resources.

Concern ID: 46323

CONCERN STATEMENT: The National Park Service should evaluate potential impacts on traffic congestion through analysis of parking capacity and traffic flow.

Representative Quote(s):

Corr. ID: 89

Comment ID: 321048

Representative Quote: With the centralization at the South Entrance of traffic to the Grove, expanded hours will also be necessary in order to avoid congestion in the mornings. Currently the public parking lot in the Grove fills up by 9:00 a.m. in summer. With the elimination of public parking in the Grove, the start time for the shuttles should be no later than 7:30 a.m. during the peak season to better manage the flow of visitors into the Grove.

Corr. ID: 103

Comment ID: 321130

Representative Quote: During a typical day, 15-20 tour busses stop to access the Wawona shuttle. Numerous concessioner traffic attendants are also situated at the South Entrance parking, at the Grove and sometimes at Wawona. Adding this traffic control staff creates capacity in the various lots beyond their static parking capacity, which is not factored into the analysis.

Corr. ID: 331

Comment ID: 321325

Representative Quote: It is stated that the current fragmented parking causes "backtracking." What is backtracking? How was this identified as a problem? Would this problem not also plague the proposed transit plans that the NPS wants to implement Park-wide, i.e. YARTS?

Corr. ID: 331

Comment ID: 321359

Representative Quote: The real issue is total capacity. If the current private vehicle access system is pushing crowding within the Mariposa Grove to unacceptable limits, the bus plan surely will make matters worse. Why was this not more fully analyzed in the Mariposa Grove DEIS?

Response: The goal of the project is to serve the same number of visitors that currently arrive at the Grove on a typical busy summer day. A thorough analysis was completed to determine the appropriate number of parking spaces and level of shuttle services to accommodate existing visitation. In addition to improvements to existing circulation and parking layout, potential congestion will be addressed through traffic management strategies such as the use of traffic control staff at the intersection and in the parking lot.

Congestion would also be alleviated by consolidating parking, which reduces backtracking. For clarification, an example of backtracking would include visitors coming from Yosemite Valley who arrived at the parking lot at the South Entrance, found the parking lots at the Grove and South Entrance were full, then had to travel back to Wawona to park and ride the shuttle to the Grove.

Concern ID:	46324
CONCERN STATEMENT:	The National Park Service should consider congestion pricing if the implemented plan does not reduce traffic congestion.
Representative Quote(s):	**Corr. ID:** 92 **Organization:** *Not Specified*
	Comment ID: 321057 **Organization Type:** Unaffiliated Individual
	Representative Quote: If it is too crowded, use congestion access pricing like they do on carpool lanes. This variable pricing can be adjusted seasonally as well as for holidays.

Response: NPS policies would not allow for determining ease of access to park resources based on the ability to pay additional fees.

Concern ID:	46729
CONCERN STATEMENT:	The National Park Service should consider the potential crowding issues that would result from consolidating parking into one parking lot, funneling people into shuttle buses, and closing the tram in the upper Grove area.
Representative Quote(s):	**Corr. ID:** 103 **Organization:** Delaware North Companies Parks and Resorts
	Comment ID: 321108 **Organization Type:** Unaffiliated Individual
	Representative Quote: Today, more than half of the visitation to the upper Grove comes from tram passengers. If that service is not available, we would expect far fewer people to actually observe the entire Grove. This could result in crowding and congestion at lower Grove areas such as Grizzly Giant, possibly adversely affecting natural resources and visitor experience at this popular destination
	Corr. ID: 331 **Organization:** *Not Specified*
	Comment ID: 321337 **Organization Type:** Unaffiliated Individual

Representative Quote: Considering the impacts on visitation to the Tuolumne Grove when the NPS cut-off private vehicle access should that experience not have been disclosed in the Mariposa Grove DEIS? The NPS is to tailor their plans around protecting visitor experience. How does funneling Mariposa Grove visitors to a single parking lot by the South Entrance and funneling people into a shuttle bus not degrade visitor experience?

Response: This topic is considered in Chapter 3, Visitor Experience. Potential congestion issues around hub locations may occur on high visitation days under all alternatives. Alternative 2 includes the possibility of a roundabout as needed to address persistent congestion issues. Currently, about 37 percent of visitors to the Grove spend at least some time in the upper Grove. Most Mariposa Grove visitors reach the upper Grove by hiking (27 percent), while about 10 percent arrive on the commercial tram service. We do not expect an overall decline in visitation to the Mariposa Grove as visitors will have a range of options for arriving at the Grove, including taking a shuttle into the Grove, or hiking in, making this a different experience than that at the Tuolumne and Merced Groves.

MG6300 – Transportation – Shuttles

Concern ID: 46328

CONCERN STATEMENT: The National Park Service should modify or enhance shuttle service with:
-Twice-daily shuttle from Yosemite Valley to the Grove during summer months
-Shuttles from Wawona at least once an hour that travel directly to the lower Grove area rather than stop for a transfer at South Entrance
-Shuttle connections to North park parking
-Longer shuttle service hours (sunrise to sunset).

Representative Quote(s):

Corr. ID: 330 **Organization:** *Not Specified*

Comment ID: 321319 **Organization Type:** Unaffiliated Individual

Representative Quote: I am concerned about the reduction of shuttle service from Wawona.... Whatever shuttles there are from Wawona, they should fill-up remaining spaces on the shuttle at the South Entrance and then continue to the Grove.... Shuttle bus service should start much earlier than in the past (sunrise) and continue later that in the past. (sunset)

Response: Final determination of the shuttle service operations would be determined at a later time based on available funding.

MG6350 – Transportation – Tram Access to Upper Grove

Concern ID: 46329

CONCERN STATEMENT: The National Park Service should provide additional access to the upper Grove area for certain visitor populations including the elderly, people with disabilities, or families with young children.

Representative Quote(s):

Corr. ID: 3 **Organization:** Private Citizen

Comment ID: 320124 **Organization Type:** Unaffiliated Individual

Representative Quote: If at all possible, please keep the tram.
For those of us who are older, and can't hike as much as we used to -- the tram is wonderful -- and for disabled people, the tram is probably the only way for them to enjoy the majesty and splendor of the Grove.

Corr. ID: 112 **Organization:** *Not Specified*

Comment ID: 321197 **Organization Type:** Unaffiliated Individual

Representative Quote: You are eliminating the opportunities of many peoples to experience this phenomenal grove. The fact that many in our society cannot walk to the top due to altitude, health, age or any other reason should not exclude them from this grove. Yes, the bottom part of the grove is outstandingly beautiful, but the upper portion should be seen also.

Response: The overall experience in Mariposa Grove for less mobile visitors has been a key consideration throughout the development of the alternatives. Under the preferred alternative, the tram would be discontinued. A wider range of experience would be provided at the lower Grove through the restoration of conditions in that area, the development of additional trails including accessible trails, and the modification of this area into a more natural setting with fewer mechanized noise and emissions.

MG6400 – Transportation – Parking lot at the South Entrance

Concern ID: 46342

CONCERN STATEMENT: The National Park Service should configure the parking to promote circulation and access for different types of vehicles and to minimize impacts on wetlands.

Representative Quote(s):

Corr. ID: 50 **Organization:** *Not Specified*

Comment ID: 320546 **Organization Type:** Unaffiliated Individual

Representative Quote: I have also heard that you are considering turning the snowplay area parking lot into parking for the Mariposa Grove. If you do that I hope you will consider providing good parking for horse trailers up the road then. It is a safe place where us riders can park and then enjoy the National Forest trails.

Corr. ID: 103 **Organization:** Delaware North Companies Parks and Resorts

Comment ID: 321132 **Organization Type:** Business

Representative Quote: The parking configuration shown in the Plan will be limiting as there is only space for four tour busses, the lot shows a single entry/exit location and the stalls for motor homes are head-in only, which could create traffic circulation issues.

Corr. ID: 109 **Organization:** *Not Specified*

Comment ID: 321179 **Organization Type:** Unaffiliated Individual

Representative Quote: The South Entrance Hub for visitor parking and orientation seems the most logical, but I wonder if its shape or configuration can be modified to elliminate construction impacts over an existing wetland. Also, can the paved area be broken up to maintain more forest canopy for habitat and shaded parking.

Response: Since the DEIS, further refinement to the layout of the South Entrance hub under Alternatives 2 and 4 occurred to optimize parking and avoid additional wetland areas. The revised layout is shown in the FEIS.

Approximately three spaces will be provided for tour buses to use throughout the day. The spaces are anticipated to be along the road and not be within the parking lot, thus avoiding conflicts with other vehicles. The snow play area is on U.S. Forest Service lands (see Chapter 2 for Alternatives Considered but Dismissed from Further Analysis).

Concern ID: 46345

CONCERN STATEMENT: The National Park Service should provide additional parking in the lower Grove area.

Representative Quote(s):

Corr. ID: 89 **Organization:** *Not Specified*

Comment ID: 321047 **Organization Type:** Unaffiliated Individual

Representative Quote: Public parking in the Grove. The preferred alternative only allows 50 “seasonal” public parking spaces for use when the shuttles stop running for the season, and eliminates public parking in the Lower Grove the rest of the time. In addition to these “seasonal” spaces, additional year-round public parking in the Lower Grove area on a first come first serve basis could be made availalbe on the unpaved leach field of the bathrooms. I would like to see the feasibility of this option explored by the NPS.

Corr. ID: 333 **Organization:** *Not Specified*

Comment ID: 321386 **Organization Type:** Unaffiliated Individual

Representative Quote: The bureau supports adding the parking area at South Entrance. However, this should be additional to the existing parking in the lower grove. Shuttles can ferry visitors from the south entrance to the lower grove as in the past without the obvious traffic congestion in Wawona and the necessity of vehicles going back and forth from South Entrance.

Response: Since the DEIS, the NPS has looked more closely at parking in the lower Grove under Alternatives 2 and 4. Although private vehicles that are not placarded would not be permitted to enter Mariposa Grove under those alternatives, entry would be allowed when the shuttle operation is not running. In the FEIS, the parking in the Grove when the shuttle is not operating was expanded under these alternatives to provide approximately 80 spaces in the lower Grove area and near the picnic area along Mariposa Grove Road. The final number of parking spaces would be determined during the final design stage. No changes were made to Alternative 3, since it would already provide year-round parking for private vehicles within the Grove unless the road is closed due to snow. During those times, visitors would need to walk from the South Entrance under any one of the action alternatives.

MG6600 – Transportation – Parking – Other Options

Concern ID:	46348
CONCERN STATEMENT:	The National Park Service should consider additional parking locations beyond what is proposed in the alternatives.
Representative Quote(s):	**Corr. ID:** 73 **Organization:** *Not Specified*
	Comment ID: 320578 **Organization Type:** Unaffiliated Individual
	Representative Quote: How about a big parking lot in Wawona there is lots of flat ground in Wawona and you don't have to clear out a lot of trees.
	Corr. ID: 90 **Organization:** *Not Specified*
	Comment ID: 321055 **Organization Type:** Unaffiliated Individual
	Representative Quote: Put a parking lot outside YNP up the Snow Play Area Road. It's a short walk to the Grizzley Giant.
	Corr. ID: 330 **Organization:** *Not Specified*
	Comment ID: 321317 **Organization Type:** Unaffiliated Individual
	Representative Quote: I am very much AGAINST the designated bus parking spaces at Wawona. If more bus parking is needed, put it elsewhere. Please consider putting them at the Snow Play area or Tenaya Hotel or the old Fish Camp Gas station area or ANYPLACE between the South Entrance and Fish Camp.
	Corr. ID: 331 **Organization:** *Not Specified*
	Comment ID: 321322 **Organization Type:** Unaffiliated Individual
	Representative Quote: Considering the diversity of the origination of visitors to the Mariposa Grove would not dispersed parking lots be a more effective approach to traffic management? Both the TRP and the MRP propose a network of large parking lots to intercept visitors

Response: Since the DEIS, the NPS has considered opportunities to optimize parking while protecting sensitive resources. Locations were only considered within the study area, since NPS does not have jurisdiction outside of the park and other planning efforts are addressing other areas of the park. Alternatives 2 and 4 in the FEIS were refined to include a reconfigured parking area and additional spaces in the South Entrance and for off-season use in the lower Grove area and near the picnic area along Mariposa Grove Road.

MG7000 – Signage and Wayfinding

Concern ID:	46306
CONCERN STATEMENT:	The National Park Service should improve signage in the Mariposa Grove.
Representative Quote(s):	**Corr. ID:** 41 **Organization:** BergmannDesign
	Comment ID: 320532 **Organization Type:** Unaffiliated Individual

Representative Quote: There should be no food or drink allowed that cannot be carried out. Sufficient warning at the trailhead about there being no drinking fountains, trash cans, etc and everything that enters the grove must leave the grove.

Corr. ID: 80 **Organization:** *Not Specified*

Comment ID: 321002 **Organization Type:** Unaffiliated Individual

Representative Quote: Please have your signs asking people to NOT walk near the Sequoia's base in more languages than English. We recently visited and the couple ahead of us seemed unaware of the signs as both went right up to the tree to take their picture touching the tree. They were not speaking English so probably did not understand the signage.

Corr. ID: 103 **Organization:** Delaware North Companies Parks and Resorts

Comment ID: 321112 **Organization Type:** Business

Representative Quote: We believe that improvements to trail way-finding, which were noted as a considerable visitor concern in public scoping, will help reduce incidents of tram-pedestrian conflicts as it will be easier for visitors to stay on the trails. Where trails cross the road, appropriate signage could help improve this situation and the reduction in tram service hours called for in Alternative 4 will further reduce the potential for adverse effects.

Response: Under all action alternatives, signage would be improved in the Mariposa Grove. This is noted under the "Actions Common to All Action Alternatives" section of Chapter 2.

Concern ID: 46313

CONCERN STATEMENT: The National Park Service should eliminate electronic signs.

Representative Quote(s):

Corr. ID: 109

Comment ID: 321181

Representative Quote: I also think that electronic signs should be elliminated, as they are ugly, unnecessary modern contrivance that do not add value to the visitor experience.

Response: Specific signage has not been identified for Mariposa Grove at this time, however changeable message signs may be considered. Final determinations on signage would be include as part of final design activities and would be identified based on physical constraints and the objectives for signage improvements.

Concern ID: 46934

CONCERN STATEMENT: The National Park Service should mention that the 2011 new audio equipment mitigates noise through use of headphones, and clarify the percent of noise impacts from the tram versus other noise generators in the Grove.

Representative Quote(s):

Corr. ID: 103 **Organization:** Delaware North Companies Parks and Resorts

Comment ID: 321110 **Organization Type:** Business

Representative Quote: The noise issues related to the trams' audio equipment have been addressed by the replacement of audio equipment in late summer 2011. This means that the audio is played over headsets to each visitor aboard the tram, so noise pollution from the audio equipment has been mitigated.

We believe noise issues related to the trams' diesel engines are successfully mitigated in Alternative 4 with limits on operating hours and route. The Environmental Consequences discussed in Chapter 3 concluded the soundscapes were exactly the same for all three action alternatives, suggesting that the retention of a limited tram service under Alternative 4 would have no measurable adverse impacts to the natural soundscape within the Grove as compared to the other alternatives.

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321328 **Organization Type:** Unaffiliated Individual

Representative Quote: What percentage of soundscape impacts are associated with the commercial tram versus the gift store generator versus the parking lot at the lower Grove?

Response: Revisions were made in the FEIS to acknowledge the impacts of vehicle type and use of headphones in mitigating noise potential from the tram. The other noise sources such as the generator and parking lot are currently concentrated in one location in the lower Grove area, unlike the commercial tram that traverses throughout the lower Grove and into the upper Grove.

MG7500 – Socioeconomic or Cost Analysis

Concern ID: 46330

CONCERN STATEMENT: The National Park Service should include the yearly maintenance costs of operating shuttles, including labor, vehicle repair, and vehicle replacement in cost estimates cited in the plan.

Representative Quote(s):

Corr. ID: 61 **Organization:** *Not Specified*

Comment ID: 320563 **Organization Type:** Unaffiliated Individual

Representative Quote: Alternative 3 significantly reduces the need for shuttle buses to the Grove. Shuttle busses would be a year-after year YNP expense in Alternative 2.

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321354 **Organization Type:** Unaffiliated Individual

Representative Quote: The operation and maintenance costs stated in the Mariposa Grove DEIS for the expanded shuttle bus system are grossly understated, and fail to adequately take into account labor costs, and increased infrastructure repair and replacement costs associated with the use of heavy vehicles.

Response: The preliminary cost estimate associated with planning level information that is evaluated in the EIS is presented in Table 2-1. More detailed cost estimates would be developed in concert with final design activities. For planning purposes, the current funding, contractual agreement, and

hourly rate were used as a basis for assumptions. For park owned 40-foot shuttles, current service hour rates were used as well as an amortization rate for park-owned vehicles ($600,000 per vehicle with a 10-year life span divided by annual hours of service).

Concern ID: 46331

CONCERN STATEMENT: The National Park Service should augment the EIS analysis to include consideration of socioeconomic impacts such as loss of jobs, impacts on small businesses that require vehicular access into the Grove, or park revenue lost due to the discontinuation of the tram, gift shop, or other concessioner activities.

Representative Quote(s):

Corr. ID: 58 **Organization:** Yosemite Trails Pack Station

Comment ID: 320557 **Organization Type:** Unaffiliated Individual

Representative Quote: For the last 48 years my family has been escorting small groups of the people to the Mariposa Grove. It's about a 2 hour ride from our Pack Station and we stop and take short break just to the south east of the Grizzly Giant. We cater to many segments of the general public, many of whom have physical limitations and would not be able to make the trip other then riding in a car.

I support the No Action Alternative. If on the other hand this option is taken off the table, I strongly request that our ability to access the Grizzly Giant not be diminished by the final plan. Our ability to provide access to the public would be severely curtailed and the financial consequences to our family run company would be catastrophic.

Corr. ID: 103 **Organization:** Delaware North Companies Parks and Resorts

Comment ID: 321129 **Organization Type:** Business

Representative Quote: The Plan fails to consider the loss of concessioner jobs and visitor spending that significantly affects concessioner revenues and Park fees.

The concessioner operated services at the Grove generate revenues that annually provide the National Park Service approximately $1 90,000 in direct fees. Ninety percent of this revenue is retained in Yosemite National Park. Not only was this revenue stream not considered in a socioeconomic analysis, it was not considered in the cost of the alternatives or in the analysis of Park Operations.... We know that there are more than twenty jobs in the Grove relating to tram and retail services and that the visitor spending for the trams will not be replaced as this is a unique service. It is also obvious that the removal of the gift shop (replaced by a book store) will have similar adverse economic impacts.

Corr. ID: 331 **Organization:** *Not Specified*

Comment ID: 321352 **Organization Type:** Unaffiliated Individual

Representative Quote: What is the socioeconomic impact of eliminating private vehicle access to the lower Grove parking area? How does this potentially impact the overall tourism market?

Response: A socioeconomic analysis for this purpose would evaluate potential impacts on the social environment, visitor populations, and the regional economy. The social and economic environments of the surrounding communities are primarily affected by changes in visitor levels, visitor spending, park and concessioner employment, and park and concessioner spending in the regional economy. Impacts on Yosemite National Park and the primary concessioner are addressed in the *Mariposa Grove FEIS* under Chapter 3, Park Operations.

There would be no measureable changes expected in park-wide annual visitation (estimated 3,951,393 people in 2011) as a result of the *Mariposa Grove FEIS*. The goal of the plan is to accommodate current visitor use levels. Concessioner employment associated with the tram, which is eliminated under Alternatives 2 and 4, is a nominal amount of employment and revenue generated within the park. The gift shop would be removed under all action alternatives. New visitor services at the South Entrance area (Alternative 2 or 4) or at Grizzly Giant (Alternative 3) would include visitor information, educational, and other sales items. Visitor convenience items would continue to be sold under a concession contract and it is anticipated that there would be little to no net employment change under the action alternatives.

Overall, the project is expected to result in negligible impacts on the socioeconomic environment, visitor populations, and the regional economy. Similarly, the project is not expected to result in growth-inducing impacts either regionally or in nearby communities; this is a consideration under the California Environmental Quality Act. Therefore, socioeconomics was dismissed from further analysis.

MG7700 – Cumulative Impacts

Concern ID:	46334
CONCERN STATEMENT:	The National Park Service should evaluate cumulative impacts that address parkwide planning decisions as well as actions outside of the park boundaries.
Representative Quote(s):	**Corr. ID:** 103 **Organization:** Delaware North Companies Parks and Resorts **Comment ID:** 321128 **Organization Type:** Business **Representative Quote:** The NPS has not adequately analyzed the cumulative effect on the visitor experience and recreation as a result of significant park wide reductions, removal and/or limitations on visitor services and recreational opportunities and that the removal of the gift shop and the tram tours only compounds this concern. We are concerned that these and the many other services discontinued for a large number of visitors who choose to partake in them will significantly adversely impact the visitor experience for the majority of visitors to Yosemite. We recommend that the NPS issue a supplemental document that describes the cumulative cost, how the plans will be funded, ADA impacts and the reduction in visitor services, experiences and recreation options. **Corr. ID:** 331 **Organization:** *Not Specified* **Comment ID:** 321347 **Organization Type:** Unaffiliated Individual

Representative Quote: To what extent (in percentages) has the Grove's health been compromised by the absence of fire versus impacted by people trammeling the area? To what degree has air quality and air emissions impacts from external to the Park affected the Grove's health?

Response: Additional discussion was added to the FEIS to address parkwide planning and the relationship of plans to pursue restoration efforts in Mariposa Grove with those efforts (see Chapter 1 and cumulative impacts discussions in Chapter 3). Concerns such as air quality and air emissions are a larger regional issue. This plan would have minimal impacts on the larger air quality issue. Concerning the Grove's health, quantification of impacts from the absence of fire versus impacts from trammeling is a complex issue. Both have affected the Grove to various degrees. The NPS will continue to monitor the effects of fire and trammeling on the sequoias into the future.

Concern ID:	46535
CONCERN STATEMENT:	The National Park Service should provide additional cumulative analysis, particularly in combination with the MRP and TRP.
Representative Quote(s):	**Corr. ID:** 103 **Organization:** Delaware North Companies Parks and Resorts
	Comment ID: 321133 **Organization Type:** Business
	Representative Quote: The Plan does not indicate how it ties to the MRP with respect to parking at Wawona or the continued use of shuttle service from inside the Merced River corridor. Further, there does not appear to be a comprehensive analysis of park-wide traffic circulation that would affect the Grove and South Entrance area.
	Corr. ID: 331 **Organization:** *Not Specified*
	Comment ID: 321356 **Organization Type:** Unaffiliated Individual
	Representative Quote: The projected increase in tour bus activity seems to contradict NPS projections for this visitor group as reported in the TRP and MRP. There is no adopted integrated Park-wide transportation plan.

Response: A discussion of the relationship between other planning efforts and the plan for restoration of the Mariposa Grove was added to Chapter 1 in the FEIS. The options proposed in the *Draft Merced Wild and Scenic River Comprehensive Management Plan* are integrated into planning for the *Mariposa Grove FEIS*. For example, facility and shuttle operations are being designed to accommodate anticipated public transit operations outlined in the MRP. The NPS is also preparing a comprehensive management plan for the Tuolumne Wild and Scenic River that flows through Yosemite National Park. This plan will concur with the same general approach of the in-progress *Draft Merced Wild and Scenic River Comprehensive Management Plan*.

MG8000 – ADA Compliance

Concern ID:	46355
CONCERN STATEMENT:	The National Park Service should clarify what is meant by the term "accessibility" and "placarded vehicle."
Representative Quote(s):	**Corr. ID:** 331 **Organization:** *Not Specified*
	Comment ID: 321332 **Organization Type:** Unaffiliated Individual

Representative Quote: What are "appropriately placarded" vehicles? Is there a difference between these and vehicles with accessibility placards? How is accessibility defined?

Response: The term accessibility is used in the EIS to refer to facilities that provide access to mobility-impaired visitors in compliance with the Americans with Disabilities Act (ADA). It is used to refer to trails, parking space, and other facilities that would be able to accommodate wheelchairs or other requirements by less mobile visitors. Placarded vehicles refers to the handicapped parking passes that are typically displayed on rearview mirrors that indicate that the car's passengers require accessible facilities.

MG8100 – ADA – Parking/Access/Trails

Concern ID: 46356

CONCERN STATEMENT: The National Park Service should consider visitors of all ability levels.

Representative Quote(s):

Corr. ID: 108 **Organization:** Yosemite Advocates

Comment ID: 321175 **Organization Type:** Unaffiliated Individual

Representative Quote: While we agree that the commercial tram operation should be discontinued, we nevertheless feel that there needs to be some provision for the continuation of handicapped access to the Upper Grove. Perhaps this could best be provided by permitting vehicles with a handicapped placard to travel on the service road, as is done on some of the restricted roads in Yosemite Valley.

Response: This has been an important consideration of the NPS throughout the planning process. The objective is to balance restoration efforts associated with the removal of pavement and other human disturbance with the ability to provide a high quality visitor experience to visitors of all ages and ability levels. Under the action alternatives, this has typically resulted in expansion of accessible trails and improving the quality of the setting and experience in those areas, while also slowing degradation in more primitive areas in the upper Grove.

Concern ID: 46357

CONCERN STATEMENT: The National Park Service should consider alternative means to provide access for people with disabilities that does not allow placarded private vehicles into the Grove.

Representative Quote(s):

Corr. ID: 83 **Organization:** CSERC

Comment ID: 321021 **Organization Type:** Conservation/Preservation

Representative Quote: Our Center supports providing access to those who have limited mobility. However, we do not feel that it is necessary to allow those with placards to utilize their private vehicles in the Grove.

Corr. ID: 99 **Organization:** *Not Specified*

Comment ID: 321079 **Organization Type:** Unaffiliated Individual

Representative Quote: The plan needs to provide some other alternative means for handicapped access. One possibility would be to allow private vehicles to drive on the service road. Another suggestion would be to have a small fleet of NEV's (Neighborhood Electric Vehicles) that the handicapped could use.

Corr. ID: 104 **Organization:** *Not Specified*

Comment ID: 321139 **Organization Type:** Unaffiliated Individual

Representative Quote: I understand that after removing the tram road, you plan on creating a hardened dirt road from the Lower Grove to an area near the Grizzly Giant, which will accept handicapped (placard) drivers. Do you really prefer these types of drivers over park personnel operating a tram? Some of the placard drivers will absolutely interfere with hikers and other cars. First-timers will stop and gawk at every opportunity. You can plan on addressing a few car accidents per season (hopefully none involving redwoods).

Corr. ID: 109 **Organization:** *Not Specified*

Comment ID: 321182 **Organization Type:** Unaffiliated Individual

Representative Quote: Alternative transportation for disabled visitors should be considered to Grizzly Giant, such as ADA compliant shuttles, instead of providing for placarded vehicles and parking.

Response: Some visitors with disabilities may be able to ride the shuttle into Mariposa Grove. To address a variety of potential situations, the NPS is committed to providing some accessible parking within the Grove itself to enable greater access. The accessible parking within the Grove is linked to accessible trail connections. The short section of new road alignment below the Grizzly Giant would be signed to encourage visitors to use the pedestrian trail instead of the road so hikers and placarded vehicles would not be sharing the same space. Placarded vehicles would be required to park in designated spaces or pullouts along the way to avoid impacts to trees.



Appendix D: Restoration Plan

ECOLOGICAL RESTORATION PLANNING FOR THE RESTORATION OF THE MARIPOSA GROVE OF GIANT SEQUOIAS

DIVISION OF RESOURCES MANAGEMENT AND SCIENCE

YOSEMITE NATIONAL PARK

Written by

Monica Buhler and Sue Beatty

Reviewed by

Judi Weaser

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INTRODUCTION

This report presents an ecological restoration plan to support the Restoration of the Mariposa Grove of Giant Sequoias Plan and Environmental Impact Statement (Mariposa Grove Plan). It provides a description of sites recommended for ecological restoration in the Mariposa Grove area, incorporating the most recent natural resource condition assessments and analyses of the Grove. This report also addresses cultural resources, American Indian consultations and park infrastructure and operations. We also present best management practices and general guidelines for ecological restoration and project implementation in the Mariposa Grove.

Several studies frequently cited in this document provide baseline information on hydrology, vegetation, wildlife, visitor use and cultural resources that direct ecological restoration efforts and priorities. Kuhn (2011) completed a landscape and population analysis of the giant sequoias in the Mariposa Grove, providing quantitative and qualitative information about the distribution and age class of all giant sequoias occurring in the grove. Kuhn and Roche (2011) assessed hydrologic conditions in the grove and identified point source and landscape level concerns, along with proposed mitigations. Buhler (2011) assessed current vegetation conditions and distribution in the grove, fire history and other vegetation management. Colwell (2010) completed a comprehensive plant survey that identified the occurrence and distribution of sensitive plant species and non-native plants, and compiled a plant list for the area. Repath (2011) completed a wetland delineation to identify the spatial distribution and condition of wetlands in the Mariposa Grove. Finally, Stock (2011) assessed wildlife populations occurring in the Mariposa Grove, focusing on special status species. A cultural resource summary completed by Bane (2011) provides information on cultural resources in the grove, both historic and prehistoric. These studies help managers propose resource based and informed recommendations on the most effective ecological restoration of the Mariposa Grove.

Many of the proposed ecological restoration guidelines and actions are based on the experience and success of the Giant Forest restoration in Sequoia and Kings Canyon National Parks. This provides us with confidence that recommended restoration tools and methods are likely to succeed.

ECOLOGICAL RESTORATION PLANNING FOR THE RESTORATION OF THE MARIPOSA GROVE OF GIANT SEQUOIAS

By Monica Buhler and Sue Beatty

THE MARIPOSA GROVE OF GIANT SEQUOIAS

The Mariposa Grove of Giant Sequoias is one of the most significant natural and cultural resources in Yosemite National Park. In 1864, Congress passed a bill granting the Yosemite Valley and the Mariposa Grove of Big Trees to the State of California. President Lincoln signed this innovative law, which required California to manage this new park for "public use, resort, and recreation." Protection of the grove was crucial in this time period as logging of other giant sequoia groves was ongoing. There are three groves of giant sequoias in Yosemite National Park: the Mariposa Grove, Merced Grove, and Tuolumne Grove. The Mariposa Grove is the largest, containing 86% of the park's mapped adult giant sequoias and estimated to receive more than one million visitors annually.

Over the years, policies and programs aimed at protecting giant sequoia in the national parks and forests of the Sierra Nevada, including Yosemite, have evolved from the protection of individual trees to the preservation of entire groves. Understanding of the giant sequoia life cycle and ecology is still evolving but several key points are important to consider for effective restoration and management. (York et al. in press).

- Giant sequoias are relatively rare and only occur in disjunct groves on the western slope of the Sierra Nevada, numbering 65 to 75 (depending on whether adjacent groves are lumped or split) covering approximately 14,600 ha.
- Despite the difficulty of using giant sequoia wood, loggers cut 34% of the original sequoia acreage between 1856 and the mid-1950s.
- Trees may live as long as 3,200 years
- Past shifts in the distribution of giant sequoia groves are thought to be driven by changes in climate. Today's distribution appears to be constrained by cold temperatures at upper elevations and insufficient water at lower elevations.

- Giant sequoias typically occur in mixed conifer forests and may be the dominant species in terms of basal area, but are relatively uncommon in terms of density of individuals.
- Trees have several adaptations to fire (e.g. thick and non-resinous bark, serotinous cones, scorch-resistant foliage, epicormic sprouting).
- Its life history strategy is a combination of pioneer (i.e. light seeds, rapid post-disturbance colonization, rapid growth) and late-seral species (longevity, large size) strategies. It is perhaps best classified as a "long-lived pioneer, "ideal for regenerating, recruiting, and persisting within the context of a low and moderate severity fire regime.

Giant sequoia germination, establishment and persistence are largely driven by fire and hydrology, and both of these processes are profoundly altered in the Mariposa Grove. Giant sequoias are extraordinary records of fire history because of their resistance to rot, ability to heal quickly from fire damage and extreme longevity. Swetnam et al. (1990) reconstructed a 1,438 year long fire history of the Mariposa Grove and found that frequency of fires ranged from annually (although very patchy), to the longest fire-free period of 15 years; with an average range of every 5-8 (6.5) years. Fire suppression policy beginning in the late 1800's led to an approximately 100 year fire-free period, until prescribed burning began in 1971. The absence of fire along with 40 years of prescribed burning has shaped current forest structure in and around the grove, as well as the current number and distribution of younger giant sequoias. Giant sequoia populations only occur where hydrologic conditions provide ample surface and subsurface water to maintain moist, but not saturated, soils (Rundel 1962). Recent assessments of hydrologic conditions in the Grove indicate that current infrastructure has altered surface flow, water storage and soil conditions in the Mariposa Grove, which is likely to affect the existing and future population of giant sequoias. The ecological restoration of fire and hydrology should be the central focus to ensure success.

THE NEED FOR ECOLOGICAL RESTORATION

Giant sequoia groves are sites of exceptional ecological importance and are therefore priorities for ecological restoration. While the area of the Mariposa Grove is small (less than 900 acres) over 20% of wildlife and plant species occurring in Yosemite National Park occur in or utilize the grove. This report describes potential ecological restoration actions for currently impacted areas in the Mariposa Grove area, including developed areas that require restoration if

infrastructure is moved or removed, as well as undeveloped areas that have directly or indirectly been altered by human activities.

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed and is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability (SER 2004). When preserving and restoring any ecosystem we often focus on reference conditions that describe a range of ecosystem conditions (i.e. structure, composition and function) occurring in a defined area for a particular time period prior to Euro-American settlement (Stephenson 1999). This is problematic when so many unknowns seem to overwhelm the knowledge we do have. However, we do have an extensive knowledge base that allows us to draw informed conclusions about conditions and trends and can make recommendations to improve conditions. The most successful ecological restoration focuses on key processes (particularly fire and hydrology), and how to restore their function and to maximize the resilience and resistance of an ecosystem (Stephenson 1999, Whisenant 1999).

Through ecological restoration in the Mariposa Grove, we strive to restore and maintain natural processes, primarily fire and hydrology, which sustain the giant sequoia ecosystem and provide conditions ideal for the perpetuation of native flora and fauna. Ecological restoration is also needed to restore natural conditions if infrastructure is removed, updated, or relocated.

Important cultural resources are numerous in the Mariposa Grove area, including the adult giant sequoias themselves and the following programmatic guidance and collaboration with cultural resource staff will ensure protection during ecological restoration implementation. Archeological sites are fragile, non-renewable resources and contain important information potential about past life ways and represent tangible heritage resources for park-associated American Indian peoples, as well as the visiting public. Where archeological sites are subject to ongoing impacts through social trails or visitor use, these areas will be carefully assessed for stabilization needs. Social trails will be removed and visitor use in these areas will be discouraged, using techniques that retain the data potential of the resource while encouraging native vegetation establishment and persistence. Where ecological restoration actions have the potential to affect cultural resources, the actions will be designed to avoid impacts wherever feasible. If avoidance is not possible, archeological site treatments such as controlled testing, and data recovery excavations where necessary, will be employed to reduce the level of impact and thereby avoid adverse effects. All treatments for pre-contact archeological sites will involve close consultation with park-associated American Indian tribes and groups to ensure these treatments incorporate native concerns, issues and perspectives.

This plan identifies both passive and active ecological restoration actions to restore natural structure and processes as well as protecting cultural resources. Passive restoration actions may include fencing and signing sensitive areas, which will halt human impacts and allow natural processes to repair damage. Active restoration actions include removing infrastructure (roads, asphalt, and underground utility lines), soil decompaction, revegetation, prescribed burning, removing hydrologic impediments and removal of formal and informal trails out of sensitive areas. These actions will accelerate ecosystem recovery and promote the health and longevity of the giant sequoia population.

ECOLOGICAL RESTORATION GOALS AND OBJECTIVES

The long-term preservation of giant sequoias is dependent on mitigating and minimizing the influences of human activities. In the past 40 years, managers across the Sierra Nevada have sought to remove infrastructure (such as the large restoration project in the Giant Forest of Sequoia National Park) and to restore the fire regime and hydrologic connectivity to giant sequoia groves. This ecosystem approach is centered on three key management goals (Piirto and Rogers 1999):

- Protect naturally occurring groves from human impacts (e.g. infrastructure, logging) and disturbances outside a natural range of variability (i.e. stand replacing fire).
- Preserve the groves by allowing and promoting natural ecosystem processes to prevail
- Actively restore impaired ecosystem functions, particularly fire and hydrology

The overarching goal of ecological restoration in the Mariposa Grove is to promote giant sequoia germination and establishment and ensure the persistence and longevity of the giant sequoia population. In order to achieve this goal, a combination of restoration actions will provide the best avenue for achieving the following ecological restoration objectives:

- Protect, maintain and enhance environmental conditions and ecosystem function required to sustain the population of giant sequoias
    - Ensure germination and recruitment through frequent surface fires
    - Create and maintain canopy gaps to facilitate giant sequoia germination and recruitment
    - Conduct prescribed burning outside of the Mariposa Grove to reduce the risk of a catastrophic fire originating outside of the grove

    - Protect individual trees and seedling habitat from structural damage sustained by roads, trails, utilities and visitor trampling
- Protect, maintain and restore natural hydrologic function in the Mariposa Grove of Giant Sequoias
    - Remove or modify infrastructure that impacts sheet flow hydrology
    - Where roads and trails remain, remove inside ditches, outslope cutbank areas and replace or install culverts to facilitate surface flow
    - Protect and restore wetlands
- Restore areas impacted by the removal, alteration or relocation of infrastructure to natural conditions
- Maintain and manage structure and composition of native vegetation within the range of natural variability and so that if functions dynamically in a long-term time frame (50-100 years)
    - Continue prescribed burning and modify as needed to reach target forest conditions
    - Minimize hazard tree removal to retain large snags for wildlife habitat
    - Continue invasive plant removal in and around the grove

By removing infrastructure from groves, protecting the roots of giant sequoias from the impacts of roads, trails, and foot traffic, removing impediments to natural surface and subsurface water flow, and restoring a natural fire regime (augmented by prescribed fire as necessary), we can effectively preserve, protect, and restore these unique ecosystems. Management must also focus on understanding and managing for the effects of anthropogenic factors such as air pollution and greenhouse gas driven climatic change.

Best Management Practices and Resource Protection Zones

Multiple actions will be taken across all alternatives to protect and restore ecological processes and the giant sequoia population. In order to minimize impacts to natural and cultural resources when implementing project actions, several mitigations and best management practices to ensure protection of resources in the grove during project implementation are listed below. Many of these guidelines are based on the successful ecological restoration project in Giant Forest, Sequoia National Park (USDI 1995).

General practices

- Limit future impacts in the natural and cultural resource protection zones: 300 feet from wetlands or streams, 50 feet from rare plant populations and 200 feet from adult giant sequoias, 100 feet from juvenile and 50 feet from seedlings and saplings and wildlife buffers. Current actions will occur in these zones to accomplish ecological restoration goals.
- All equipment used in the grove should have a low compaction factor and may include excavator, dozer, backhoe, loader, skid steer and dump truck.
- Ensure that local impact does not degrade the surrounding area, specifically giant sequoia, wetland, or riparian ecosystems or any primary ecological processes, by limiting size and development of staging and construction areas
- Minimize any impacts to giant sequoias including the bole, roots, root zone and seedling habitat
- Minimize impacts to hydrology and reduce erosion potential
- Minimize impacts to wetlands and processes (hydrology) that sustain them
- Minimize impacts to wildlife by monitoring and arranging (i.e. modify time of day, season etc.) construction or maintenance activities
- Ensure that any soil used from outside of the Grove is checked for pathogens (e.g. root rot) to limit the spread of tree diseases
- Ensure that all equipment and materials are weed seed free
- Protect rare or sensitive plant and animal species from direct and indirect impact
- Protect restoration areas from further impacts with fencing or appropriate deterrents
- Establish vegetation monitoring plots (both qualitative and quantitative) and photo-document project implementation and results

Wildlife

Based on all available anecdotal and scientific evidence, 78 amphibian, reptile, mammal, and bird species occur in the Mariposa Grove and South Entrance project areas. Of these 78 species, 13 are special status species, including 7 bird species (northern goshawk, golden eagle, peregrine falcon, bald eagle, great gray owl, California spotted owl, and olive-sided flycatcher) and 6 mammal species (pallid bat, spotted bat, western red bat, western mastiff bat, Sierra Nevada mountain beaver, and Pacific fisher).

Snags are an essential habitat element for the majority of special status species documented using the Mariposa Grove. Removal of snags may indirectly result in decreased rates of reproduction and increased rates of mortality for fisher (USDA Forest Service 2001) and spotted

owls use cavities in snags for nesting and raising young. The following management recommendations protect key habitat features for fisher, bats, and owls.

- Minimize hazard tree removal and protect and restore vegetation and wildlife habitat
    - Retain and recruit large diameter snags (Freel 1991, Buskirk and Powell 1994) and large diameter (greater than 24" dbh) live conifer and oak trees with decadence such as broken tops or cavities (Freel 1991).
    - Retain and recruit large woody debris, including large diameter (at least 15 in dbh by 15 ft long) down logs (Freel 1991, Buskirk and Powell 1994) and complex structure near the ground (e.g., down logs, large down branches, root masses, live branches) (Buskirk and Powell 1994).
- If hazard tree removal cannot be avoided
    - Remove snags only under consultation with the park biologist and park forester.
    - Prior to removal, a wildlife biologist will examine any trees and snags for nesting, denning, or roosting wildlife
- Avoid disturbing basal hollows (created by repeated fires), deep bark furrows, and cavities and crevices of tree crowns important for bats and other wildlife (Pierson et al. 2006).
- FISHER: Park biologists will continue to work closely with fisher researchers working in and around the park to establish whether fisher are actively foraging or denning near the project area, and may set additional protection measures as deemed necessary, to avoid disturbance during construction or restoration-related activities.
- OWLS: Conduct surveys in the spring (beginning March 15) to determine if spotted owls are nesting and foraging in the vicinity of the construction/restoration area. If owls are present, construction project manager should work with biologist to determine appropriate measures to avoid disturbance, such as no construction activities between 30 minutes before dusk and after dawn, and a 400 meter buffer of no disturbance (light or noise) around nest trees from March 15 through August 31.
- BATS: If a project targets any trees for removal during the winter, a biologist should survey for roosting bats in the preceding fall (September and October). If the biologist suspects hibernation in a tree, do not remove that tree until mid-April to mid-May. If a project targets any trees for removal during the summer, a biologist should survey for roosting bats within one-week prior to removal to determine if a bat maternal colony occurs in the tree.

- WILDLIFE USE: In construction zones, carnivore cameras, owl and bird surveys, and bat acoustic surveys will be installed as needed to inform proper mitigation actions that would reduce impacts to wildlife.

SOIL CONDITIONS

Where soils are heavily compacted and are covered with asphalt, soil conditions may be such that reestablishment of vegetation is unlikely without further treatment. Demetry (1997) found that soil impacts most frequently observed in Giant Forest were soil compaction, loss of organic matter, topsoil erosion and loss or alteration of natural soil structure. Soil compaction was highest under pavement (Demetry 1997).

Soil conditions in restoration areas of the Mariposa Grove will be tested for compaction, texture and chemical properties such as organic matter content and nitrogen, and amendments or treatment will be applied accordingly. Listed below is a range of soil treatments available to improve the potential for plant establishment, particularly giant sequoias.

- Measure depth of compaction with a penetrometer and decompact to that depth (typically 6-10 inches), (Demetry 1997)
- Decompact soils by hand or with heavy equipment (dozer or skid steer with rippers) under moderately moist conditions (may require 1 week of irrigation if work is completed in late summer or fall)
- Avoid large roots during decompaction; a rototiller or hand decompaction may be more appropriate in these areas
- Add locally gathered duff to provide seeds and organic matter
- If available, add local native soil and topsoil
- If determined that soil conditions are not conducive to plant reestablishment, amendments such as peat moss, kelp or other natural fertilizers may be used.
- To provide nutrients to the soil, open up cones on adult giant sequioas and prepare a seedbed, woody debris may be scattered and burned over the area. If woody debris is not available for burning, fuel may be burned at a single location and the ashes mixed into the topsoil of the restoraiton area

SURFACE TOPOGRAPHY

Depending on the degree of alteration in landform, a variety of recontouring and topography restoration actions may be implemented and are listed below:

- Regrade with existing soil: Where extensive recontouring to natural topography is required (e.g. road cuts) we will attempt to accomplish this through re-balancing cut and fill.
- Fill: Where additional material is needed, soils of the same type from the Mariposa Grove area is preferable but may need to be imported from South Entrance or other nearby locations
- Topsoil retention: Wherever removal or compaction to topsoil will occur, the top 12 inches of soil will be salvaged, stockpiled and replaced on the surface. To preserve microbial communities and limit erosion and the establishment of weeds, all soil piles will be mulched or covered with erosion blankets
- Final grade will be uneven to provide microhabitat for seed germination and establishment

Site preparation

After decompacting soils, particularly on sloped areas, potential for erosion can be high. Following is a list of available erosion control measures.

- Duff: Locally gathered litter and woody debris will be spread over disturbed areas for erosion control as well as provide a source of seeds and organic matter.
- Rice straw: If sufficient quantities of duff are not available, rice straw mulch (relatively inert and not a source of non-native seeds) may be used.
- Erosion control blankets and/or wattles: Erosion control blankets and/or wattles will only be used on steep slopes (3:1 or greater) and in unprotected drainages. Coconut fiber or rice straw will be used.
- Stones, boulders, limbs and logs: In conjunction with any other erosion control methods, these materials (gathered from adjacent areas) may be placed on the surface to provide microclimate for plants and slow water flow.

Revegetation

There is a range of actions available to revegetate an area with native plants and a combination will provide the most successful restoration. For any revegetation activities within the grove, only locally gathered plant material will be used to retain genetic integrity.

- Natural regeneration**:** Rely on natural regeneration from adjacent seed sources and duff
- Seed collection, seed increase and direct seeding: Plant the area with local native seed. It may not be practical to collect enough seed for direct seeding of the acreage

involved. Increasing seed can provide necessary quantities. This process requires three years.

- Seed or cutting collection and nursery propagation: Local native seeds and cuttings are gathered and planted in a nursery setting to provide established plants for planting in restoration areas. Plants are placed in a way to mimic natural distribution – not landscaping. This requires 1-3 years.
- Plant salvage and transplanting: In cases where plants may be damaged or destroyed when infrastructure is removed, repaired or relocated, plants can be salvaged and replanted when the area is recontoured to more natural conditions, or in an adjacent restoration site. Salvaged plants will be stored on site and protected with shade cloth and irrigated as necessary.
- Giant sequoias: nearly all restoration sites lie within the seed rain area of adult giant sequoias so the need for propagating giant sequoias in a nursery setting and planting these trees is not likely to be necessary for germination and recruitment. Rather, sites will be prepared to facilitate germination including burning woody debris to provide nutrients and a heat source to open cones on the trees. If seed dispersal does not occur (e.g. adequate heat is not created), some hand spreading of locally collected giant sequoia seeds may occur.

Canopy gaps

Canopy gaps are integral to successful giant sequoia recruitment. The Giant Forest Restoration Project focused on creating and maintaining gaps as part of the restoration because according to their assessments of existing recruitment and gaps, neither was adequate. However, based on our assessment of the giant sequoia population in the Mariposa Grove, we found that many gaps exist in the Mariposa Grove and recruitment is relatively high when compared to other groves (Kuhn 2011). Based on this assessment, we will continue to rely on fire to create and maintain these canopy gaps and capitalize on the gaps created by existing infrastructure (e.g. parking areas) as areas for giant sequoia recruitment.

Ecological Restoration Actions Common to All

Several restoration actions common to all action alternatives provide an avenue into restoring processes and some structural components to giant sequoia ecosystem. These actions are organized by topic below.

Prescribed burning and invasive plant removal are both on-going activities occurring in the grove and will continue. Invasive plant removal will follow the guidelines of the Invasive Plant Management Plan. Prescribed burning for resource benefits will follow the Fire Management Plan but prioritizing burning outside of the grove is key for effective restoration. Management of the scenic values of the grove will be managed following the 2010 Scenic Vista Management Plan.

FIRE

Frequent surface fires produce optimum conditions for giant sequoia reproduction and persistence by: 1. removing thick layers of dead and downed woody debris; 2. providing nutrients to the active seed by exposing bare mineral soil with a thin layer of ash; 3. maintaining an open canopy and creating canopy gaps that provide sunlight exposure and reduce competition; and, 4. heating the cones causing a release of large numbers of seeds (USDI 2004). Prior to fire suppression policy, frequent fires regularly consumed accumulated woody debris, a critical role in nutrient cycling, and burned smaller trees, maintaining a more open forest and often creating canopy gaps from pockets of higher intensity fire (Hartesveldt and Harvey 1967, Harvey et al. 1980). These canopy openings are required for successful regeneration of shade intolerant species such as giant sequoia (Hartesveldt and Harvey 1967, Harvey et al. 1980). In the absence of frequent fire, increased density of shade-tolerant conifers (primarily white fir and incense cedar) coupled with unprecedented levels of accumulated fuels leave these forests susceptible to stand replacing fires (Webster and Halpern 2010).

While summarized plot data for the Mariposa Grove are not statistically conclusive, trends indicate that prescribed fire is very effective at reducing density of trees less than 30 inches in diameter while causing limited mortality in trees larger than 30 inches in diameter. However, species composition data indicate a proportional increase in white fir, including larger trees, while pine (sugar and ponderosa) is decreasing. This decline in large trees is occurring at a landscape level in Yosemite National Park as well as across the Sierra Nevada range (Lutz et al. 2009).

Although we may be approaching target forest structural conditions (in terms of density) *within* the boundaries of the Mariposa Grove, all forests surrounding the grove have not burned in over 100 years and are far outside target conditions, leaving the grove vulnerable to high intensity fires originating outside of the grove. We are uncertain if current burning is sufficient to influence the resilience or likelihood that the giant sequoia grove will withstand a large, landscape wildfire. Burning and/or fuel treatments around the Mariposa Grove are essential to protect this important habitat and should be at the forefront of our objectives for restoration.

In continuing to manage fire in and around the Mariposa Grove, it is important to consider the dynamic nature of fire as well as vegetation response and to emphasize that variation in fire frequency, size and intensity, as well as looking at a landscape level, is key for restoring and maintaining the giant sequoias in the Mariposa Grove.

Following is a list of proposed actions to restore and maintain fire as a primary disturbance process.

- Conduct prescribed fire (adjusting season, intensity and frequency) to reach target conditions outlined in the Yosemite Fire Management Plan focusing on heterogeneity
    - Increase size of burn units to minimize hazard tree cutting and impacts from line construction
    - Create and maintain canopy gaps to facilitate giant sequoia and pine recruitment
    - Continue to monitor forest structure and modify fire prescription to promote pine and giant sequoia germination and establishment
    - Maintain a mosaic forest structure that provides some dense canopy in the vicinity of large trees for Pacific fisher habitat (Buskirk and Powell 1994) but also opens up forest canopy and reduces the chance of large scale stand replacing fire.
    - Retain forest structure with multi-layered vegetation (vertical within-stand diversity), (Freel 1991).
- Conduct prescribed fires or fuel treatments outside of grove and around the South Entrance (requires collaboration with USFS) within five years of implementation of the Mariposa Grove Restoration Plan to reduce the risk of catastrophic fire originating outside of the grove. This is a priority for Yosemite's Prescribed Fire Program. Rather than restrict treatment to a particular area buffer, focus on the landscape level is essential to protect the Mariposa Grove and any investment into restoration.

HYDROLOGY

As with most giant sequoia groves, in-depth hydrologic studies in the Mariposa Grove are lacking. Thus, we are unable to quantify changes to hydrologic conditions in the Grove and are limited to the assessment of current conditions in relation to inferences on likely conditions in the past and from hydrologic studies in other giant sequoia groves.

Existing studies in giant sequoia ecosystems suggest that optimal hydrologic conditions include adequate soil-moisture for recruitment of successive giant sequoia cohorts (Rundel 1972), seed

germination (Weatherspoon 1986), and seedling survival and growth (Hartesveldt and Harvey 1967). Anderson (1995) qualified that available water was topographically driven, and giant sequoias positioned in topographic lows would be less likely to experience drought stress due to surface and shallow soil water inputs from catchment hillslopes. York et al. (in press) described that changes in climatic water deficit—water balance and drought stress—may be as important as altered fire regimes on giant sequoia ecosystems.

Hydrologic alterations in the Mariposa Grove include surface flow impacts, channelization, soil compaction, and hardened surfaces. Channelization of surface runoff within the Grove accelerates drainage and reduces the volume and timing of water available for infiltration, soil moisture, and subsequent uptake by giant sequoias. In addition, the channelized flow can transport chemical pollutants directly to aquatic ecosystems. Soil compaction affects hydrologic conditions of the unsaturated zone by altering soil structure, at both the surface and within the soil profile. Similar to the presence of hardscape features within the Grove, compaction of the soil surface reduces infiltration rates and thereby augments surface runoff. Surface compaction inhibits successful seed germination of giant sequoia seedlings (Hartesveldt et al. 1975, Demetry 1997), and can alter soil structure and associated porosity. Thus, soil compaction may affect the sustainability of the Grove by limiting water infiltration, seed germination, and root development of giant sequoia.

The lower portion of the main Rattlesnake Creek channel (roughly 0.5 miles upstream from the bridge crossing at the lower Grove parking area to the watershed outlet) is notably entrenched. As there is not a defined headcut, the source of this anomaly remains undetermined. However, both the outer loop trail and the water supply pipeline do cross this channel roughly 200 feet downstream from the upper extent of the entrenched channel. Signs of recovery (streambank and floodplain formation) were observed but rates of sediment accretion are likely low and reconnections with the floodplain will likely take decades.

- Facilitate surface water infiltration into soil subsurface horizons
    - Reduce soil compaction within the grove watershed, and especially within the rooting zone of all existing giant sequoia trees and in areas of likely recruitment (i.e., forest canopy gaps)
    - Remove or redesign roadways and trail systems such that they are out-sloped eliminating the need for culverts and drainage ditches.
    - Mulch denuded areas to reduce erosion potential and increase water holding capacity
    - Investigate Rattlesnake Creek channel entrenchment and replace or repair trail crossing or other impediments to flow (may include a bridge)

WETLANDS

The Mariposa Grove and its wetlands are not only unique because of the presence of giant sequoias but also because of the great diversity of habitats, plants and wildlife. Wetlands in the Grove form an almost continuous, dendritic network and make up a significant portion (12.3%) of the watershed. These wetlands provide important hydrologic support for the Merced Watershed. Hydrologic functions provided by such wetlands include aquifer recharge, storm runoff abatement, sediment retention, prevention of erosion through streambank stabilization, and stream/river temperature moderation.

Mariposa Grove wetlands have very high biotic functions and values. This area contains a rich mosaic of old growth forest (with trees of all age classes, standing snags and large downed trees), streams and wetlands. These habitats support a great variety of plant and wildlife species, including a number of special status species. Area wetlands have high native plant productivity, cover, and diversity. In addition, several fens, which have a limited distribution in the Sierra Nevada, are present.

Overlaying the position of giant sequoias in the Grove with delineated wetlands, roughly 82% of giant sequoias are located within 200 feet of delineated wetlands (Kuhn 2011). This supports conclusions by Halpin (1995) on the importance of topographic flow accumulation, and further signifies the importance of soil water availability within the rooting zone for giant sequoia.

Roughly 0.42 miles of paved road surfaces are located within wetlands, as determined by spatial overlay the of wetland extent on the road network within the Grove area. In these locations, the compacted road prisms may influence wetland function within the Grove; Forman and Alexander (1998) reported the hydroperiod (i.e., the timing and extent of inundated and saturated conditions) of wetland habitats is amplified on upslope side of the road and depressed downslope side. In other locations along the Grove Road, emergent wetland communities have formed in drainage ditches at the base of road cut-slopes. Wetland formation in these areas is most likely due to the interception of shallow percolating soil water by the compacted road prism and associated cut-slopes (Wemple 1998).

In cases where roads, infrastructure or trails are removed and opportunities for wetland restoration exist the following restoration action are proposed:

- Recontour to facilitate sheet flow, high groundwater levels and wetland plant establishment
- Seed or plant with local native wetland plant species

- Ensure that natural hydrologic conditions are present to sustain wetland hydrology
- Reduce erosion potential
- Refer to adjacent wetlands for plant species, functions and values
- Prevent and remove invasive plant species (specifically velvet grass)
- Install fencing or other deterrents to decrease human impacts

INFRASTRUCTURE

Although infrastructure in the Mariposa Grove today is significantly different from the past, it still has profound impacts to ecosystem functions. Currently, there are just over ten miles (16.1 km) of trail and 5.21 miles (8.4km) of paved roads (includes grove road, road to Wawona Point and the old road from Grizzly Giant toward Goat Meadow) that provide many access points in the Mariposa Grove. In addition, the parking area and shuttle/tram transfer areas cover approximately three acres in the lower portion of the grove. Buildings in the grove include the museum, restrooms with flush toilets and a pit toilet in the upper grove; a cell tower, repeater, and generators at Wawona Point; a vault toilet at the Grizzly Giant; and a bathroom, gift shop and fueling station in the lower grove. Utilities to support this infrastructure include a water line, sewer lines from the upper grove restrooms, a water tank in the middle grove and a generator near the gift shop. It is also likely that many abandoned utility lines that once supported the hotel and tent cabins in the upper grove remain. The impacts from construction and use of roads, parking lots, trails, buildings, sewer systems, and water lines can have small to large impacts on trees and may take years, decades, or centuries to potentially lead to tree mortality. These impacts may weaken trees and contribute to tree death and failure by introducing root rot, compacting soil, depleting organic matter, and increasing soil erosion (Hartesveldt 1962, Demetry 1997). The Mariposa Grove Plan outlines several common to all actions that will allow for some ecological restoration and are described below.

The grove road and parking area has the most profound impact on giant sequoias and other natural resources in the Mariposa Grove. Sixty eight percent of adult giant sequoias are within an estimated adult rooting zone distance (200 feet or 61meters) of the grove road (Kuhn 2011). Direct observations such as cut roots, disturbed and compacted soils, bole damage, and altered hydrology adjacent to the road lead to the conclusion that roads are likely having a negative impact on giant sequoias. In addition, inadequate culverts, road cuts, and the impervious road surface alter surface water flow and connectively to subsurface water (Entrix 2007). The road causes fragmentation of wetlands and many plant communities (including giant sequoia forest) in numerous places and eliminates potential giant sequoia seedling habitat.

The Grove Road and Culverts

Entrix (2007) delineated and assessed the existing road drainage network and reported conditions for sixty-three culverts within the drainage area of the Grove. The function of the majority of these culverts (41 of 63 observed culverts; or 65%) was either diminished or compromised entirely due to inadequate capacity, incorrect orientation, or by the accumulation of sediment and debris (Entrix 2007). In addition, runoff from an area totaling 88.5 acres, roughly 12 percent of the Grove drainage area, is intercepted and rerouted out of the of the Grove drainage area, and is no longer available for uptake by giant sequoia trees.

In order to improve the hydrologic conditions, additional, larger and better-placed culverts could mitigate many of the observed impacts. Once culverts are enhanced and replaced, work to restore the contours adjacent to existing culverts would help reduce the impacts and likelihood of further downcutting, channeling and ponding. The surface, width and other components of the road will vary between alternatives but culvert replacement and improvements are common to all. To mitigate the road and culvert impacts on hydrology the following restoration actions are proposed:

- Install larger (wider), at grade, better placed, additional culverts to facilitate sheet flow rather than channelized flow
- Remove inside ditches and out-slope hillside above the road to facilitate sheet flow
- Narrow road
- Fill in ditches associated with culverts with native soil
- Apply woody debris, native mulch, and plant material (willows using hydrodrilling techniques) to divert and disperse runoff, reduce erosion, promote deposition and limit scour
- If appropriate, place rocks to disperse outflow energy and prevent downcutting
- Recontour slope and landform to natural conditions where possible to encourage sheet flow
- Revegetate with native species (plant or seed) to slow water velocity, reduce erosion and encourage sheet flow and sediment deposition
- Protect and document cultural resources

Removal/Reduction of Upper Loop Road

The removal or reduction of the north and west sections the upper Grove Loop road will reduce the extent of impervious surfaces, allow for recontouring topography to more natural conditions and provide potential giant sequoia seedling habitat. This work would occur when soils are moist and water table is lower, in mid-summer to fall over a period of 12 weeks.

Planting will occur in the fall and plants will be watered as needed. The following restoration actions are recommended:

- Salvage any soil or vegetation impacted by asphalt or infrastructure removal
- Remove all asphalt and other non-native material
- Decompact soils with equipment (skid steer or dozer with rippers)
- Recontour to natural slope topography and establish narrow trail where impacts to hydrology are minimal (excavator, dozer, ski steer, loader)
- Amend soils based on soil assessments
- Mulch, seed and revegetate impacted area
    - Plant any salvaged plants
    - Collect and broadcast local native herbaceous seed
    - Grow out native plants sparsely planted to mimic natural vegetation (not like a landscaped park)
    - water plants as necessary
- Protect and document cultural resources
- Protect restoration areas from further impacts with fencing or appropriate deterrents
- Establish vegetation monitoring plots and photo-points (qualitative and quantitative)
- Install groundwater monitoring wells to assess subsurface water levels

Removal of Gift Shop and Parking areas

The removal and/or reduction of the extent of the parking area and the removal of the gift shop and parking area will reduce the acreage of impervious surfaces, allow for recontouring topography to more natural conditions and provide potential giant sequoia seedling habitat. This work would occur when soils are moist but when water table is lower, in summer to fall over a period of up to 12 weeks. Planting will occur in the fall and plants will be watered as needed. The following restoration actions are recommended:

- Salvage any soil or vegetation impacted by infrastructure removal
- Remove all asphalt and other non-native material
- Recontour to natural slope topography
- Decompact soils with equipment
- Amend soils based on soil assessments

- Mulch, seed and re-vegetate impacted area
    - Collect, increase and broadcast local native herbaceous seed
    - Grow out native plants and sparsely plant to mimic natural vegetation (not like a landscaped park)
    - Water plants as necessary
- Protect and document cultural resources
- Protect restoration areas from further impacts with fencing or appropriate deterrents
- Establish vegetation monitoring plots and photo-points (qualitative and quantitative)

TRAILS

Trails typically have less impact than roads although many trails in the grove are wide (up to 8 feet) and do impact hydrology, wetlands and giant sequoias. In addition, the high concentration of trails in the grove requires maintenance and hazard tree management (for safety as well as prescribed fire), thus impacting a large portion of the grove area. The current trail system and lack of barriers around most adult trees allows for extensive direct human disturbances (includes social trails) to many giant sequoias that can have a number of negative ecological impacts. To mitigate trail impacts or remove sections of trail and restore to natural conditions, the following actions are proposed:

- Replace two sections of trail with boardwalk to reduce impacts to wetlands
- Out-slope the uphill side of trails and remove any inside ditches or impediments to hydrology
- Install fence, plants or other barriers where necessary to maintain minimal trail width
- Remove remnant asphalt on the western portion of the Outer Loop Trail (in wilderness)
- Remove trail segments (nature trail, southern trail in upper loop road area and redundant trail linking the grove road and outer loop trail west of the museum) and restore to natural conditions. In wilderness areas, this work will be completed with hand tools and in non-wilderness areas, a skid steer or mini excavator may be used. This work would occur in late summer or fall when conditions are dryer over 8 weeks.
    - Remove the linear feature by recontouring natural slope topography
    - Mulch and seed with local native plant species.

UTILITIES

A pipeline from Biledo Spring, located in the adjacent Rainier watershed, provides domestic drinking water for the Grove and South Entrance. Long-term evaluation of the reliability of this water supply is needed if augmented water demands are required to support additional infrastructure (i.e., conversion from vault to flush restroom facilities) for the Grove or the South Entrance Station.

Yosemite Utilities staff pressure tested these lines in January 2012 to determine the location and volumes of water leaked from the aged infrastructure. From this assessment, the total pipeline loss was estimated at 39,504 gallons per day (or 44.28 acre-feet per year); all of this loss occurs within the upper Grove area between the uppermost water tank and the Mariposa Tree, and likely percolates into the upper Grove wetland. An additional 500-1500 gallons per day (0.6-1.7 acre-feet per year), depending upon level of use, leak into the wetland from water percolation through the upper Grove leach field. Leaks reported by Hartesveldt (1962) centered on the uppermost water tank, and were repaired by previous maintenance efforts. Although this large amount of water likely augments groundwater levels and available water for giant sequoias in the area, these long-lived trees are unlikely to be adversely affected in the long term by the repair of these leaks. Some young sapling giant sequoias established on the water line may be adversely affected with the repair but we do not want to create or maintain unsustainable (artificial) conditions for giant sequoias for long-term management.

- Slipline the entire length of the pipe (4" Cast Iron) with a 2" HDPE (plastic) pipe to repair the leak and minimize surface impacts. Where access to the line is necessary, use currently impacted areas (e.g. roadbed) and avoid giant sequoia roots or rare plant populations.
- Crush, fill (slurry), or remove all abandoned underground utilities
- Salvage any soil or vegetation impacted by repair or removal
- Recontour area to natural landform
- Decompact, mulch, seed and revegetate impacted area
- Monitor giant sequoias and wetland vegetation affected by the current leak

HISTORIC DUMPS

There are a number of historic dumpsites throughout the Mariposa Grove. In some cases, evidence of the dump is apparent on the surface, which is characterized by compacted soils, absence of vegetation and scattered metal and other debris. Depending on archeological significance of these sites, some surface or subsurface debris will be removed and the area restored to more natural conditions. To accomplish this, extensive documentation may be required and we must ensure that no hazardous materials, such as asbestos, are present. Cultural resource staff will recommend mitigations to ensure proper documentation of the site prior to any removal.

- Document cultural resources
- Ensure that materials are not hazardous

- Depending on cultural resource documentation, remove surface (possibly subsurface) debris and any non-native material
- Recontour area to natural topography
- Decompact soils
- Mulch, seed and/or plant the area to facilitate plant recovery

VISITOR USE

Trampling by foot traffic and the resulting soil compaction negatively affect the shallow roots of giant sequoias (Hartesveldt 1962, Hartesveldt et al. 1975). Soil compaction decreases soil porosity (which affects root respiration), decreases water storage, increases erosion of topsoil (loss of organic matter and nutrients) and affects continued root growth (Hartesveldt 1962, Demetry and Manly 2001). A decrease in root growth as well as actual physical damage to roots decreases the trees ability to obtain nutrients and water, exacerbated by decreases in mycorrhizal fungi and beneficial soil microbial populations unable to survive in compacted soils (Demetry and Manly 2001). Damage to the shallow root system and associated reductions in nutrient and water uptake can weaken both the structure and health of the tree, making it more susceptible to other pathogens or physical damage. Fences, removing infrastructure and rerouting trails and roads away from giant sequoia roots, has mitigated many of these impacts but often can divert attention to a previously undisturbed giant sequoia.

- Protect easily accessible giant sequoias. Some trees may require fencing. In addition, rather than fence every tree, well-placed trails and improved education delivering a consistent message is necessary for effective protection of the entire grove population.

MONITORING AND LONG-TERM MAINTENANCE AND MANAGEMENT

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed and is typically very successful. However, successful ecological restoration should include continued protection and management of the project site into the indefinite future (Clewell et al. 2005). Frequently, ecological restoration projects are not funded for subsequent management that may be required to prevent recurrent degradation of restored ecosystems. To ensure success and to facilitate learning (sometimes

from mistakes), it is critical to include monitoring and utilize adaptive management in ecological restoration planning.

Monitoring can help to determine the efficacy of the restoration efforts and provide guidance for future restoration projects in similar environments. Monitoring methods may include vegetation transects, quadrats or ocular estimations, groundwater monitoring wells, and photo point establishment.

The Mariposa Grove of Giant Sequoias comprises the largest grove of giant sequoias in Yosemite National park and is a complex and dynamic ecosystem. Any alterations can effect cascading changes to the complex physical, chemical and biological interactions and conditions. Monitoring the efficacy of restoration efforts and the conditions stemming from those actions can feed into adaptive management and help avoid unwanted results. Ecological restoration is a long-term process of initiating autogenic repair but when the degree of degradation is high, further intervention may be necessary. Future ecological restoration actions and monitoring will also be guided by ongoing and future research as understanding of the causal factors for ecosystem damage increases.

Long-term monitoring coupled with investigative research studies could facilitate an in-depth understanding of past and present hydrologic conditions in the Grove and inform management of potential approaches to enhance the sustainability of the Grove over time. Such efforts are especially important considering potential environmental changes associated with climate change. Research needs to enhance our understanding and management of giant sequoia sustainability in the Grove, include:

Future monitoring of restoration actions will be dependent on Park staff to secure funding through proposal processes.

Maintenance of restoration sites is also required to ensure plant recovery and successful giant sequoia recruitment. General management and maintenance recommendations should follow an ecosystem approach centered on the following.

- Minimize anthropogenic disturbance and infrastructure near all giant sequoias and wetlands
- Maintain natural resource protection buffers for wetlands and streams, rare plant populations, giant sequoias and wildlife

- Facilitate surface water infiltration into soil subsurface horizons
  - Minimize hardscaping within the grove watershed
  - Minimize soil compaction within the grove watershed, and especially within the rooting zone of all existing giant sequoia trees and in areas of likely recruitment (i.e., forest canopy gaps)
  - Minimize induced channelization of runoff.
- Minimize vehicular traffic in the Grove
- Continue an active prescribed fire program
- Maintain, protect and enhance wetland extent and condition
- Minimize the need for hazard tree removal to protect and restore vegetation and wildlife habitat
- Continue non-native plant survey and treatment to control infestations and limit spread
- Protect easily accessible giant sequoias. Rather than fence every tree, well-placed trails and improved education delivering a consistent message is necessary for effective protection of the entire grove population.

DATA GAPS

Future studies needed to fill information gaps

- Complete giant sequoia survey to map and measure all trees in the grove.
- Use data collected in (1) to construct a population model that can be compared to expected population structure
- Conduct an analysis of fire history and giant sequoia mortality, survival, and recruitment to more fully understand the relationships
- Measure gap size and distribution to determine if current fire intensity and patterns are congruent with giant sequoia regeneration and wildlife habitat requirements
- Long-term monitoring and research to increase understanding of the water regime in the grove and to facilitate management actions to sustain the grove over time in light of changing snow line due to climate change.

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Appendix E: Mitigation Measures

Appendix E
Mitigation Measures Applicable to All Action Alternatives

The National Park Service places a strong emphasis on avoidance, minimization, and mitigation of impacts. To help ensure that field activities protect natural, cultural, and social resources and the quality of the visitor experience, mitigation measures have been developed. Project-specific mitigation measures and management practices were developed for the Mariposa Grove of Giant Sequoias during project implementation. Many of these measures and practices are based on the successful giant sequoia ecological restoration project in Giant Forest, Sequoia National Park (USDI 1995). Additional mitigation measures are identified as part of the draft Statement of Findings for Protection of Wetlands; these measures are described in Appendix F.

The following section discusses mitigation measures that would occur prior to, during, and after construction of specific management actions.

Topic	Mitigation Measure	Responsibility
Common to All Resources		
Federal and State Permit Requirements	The NPS will apply for and comply with all federal and state permits required for construction-related activities, including Clean Water Act Section 401 and 404.	Yosemite National Park, Project Manager
Emergency Notification	Develop an emergency notification plan that complies with park, federal, and state requirements and allows contractors to properly notify park, federal, and/or state personnel in the event of an emergency during construction activities. This plan will address notification requirements related to fire, personnel, and/or visitor injury, releases of spilled material, evacuation processes, etc. The emergency notification plan will be submitted to the park for review/approval prior to commencement of construction activities.	Yosemite National Park, Project Manager
	Notify utilities prior to construction activities. Identify locations of existing utilities prior to removal activity to prevent damage to utilities. The Underground Services Alert and NPS maintenance staff will be informed 72 hours prior to any ground disturbance. Construction-related activities will not proceed until the process of locating existing utilities is completed (water, wastewater, electric, communications, and telephone lines). An emergency response plan will be required of the contractor.	Yosemite National Park, Project Manager
New Construction and Modification Design	Guidance for the design of new construction and modifications will be provided by *A Sense of Place: Design Guidelines for Yosemite National Park* (NPS 2012).	
Equipment and Construction	All equipment used in the Grove should have a low compaction factor and may include excavator, dozer, backhoe, loader, skid steer, and/or dump truck.	
	Prior to entry into the park, steam-clean heavy equipment to prevent importation of non-native plant species, tighten hydraulic fittings, ensure hydraulic hoses are in good condition and replace if damaged, and repair all petroleum leaks.	Yosemite National Park, Project Manager; Contractor

Topic	Mitigation Measure	Responsibility
	Ensure that construction or restoration actions do not impact the surrounding area, specifically giant sequoia, wetland, or riparian ecosystems or any primary ecological processes, by limiting size and development of staging and construction areas, and confining them to developed or disturbed areas to the extent practicable. Confine work areas within creek channels to the smallest area necessary. Store all construction equipment within the delineated work limits.	
	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 with all applicable permits or project conditions.	Yosemite National Park, Project Manager; Contractor
	Implement compliance monitoring to ensure that the project remains within the parameters of National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA) compliance documents.	Yosemite National Park, Project Manager; Contractor
	Provide a project orientation for all construction workers to increase their understanding and sensitivity to the challenges of the special environment in which they will be working.	Yosemite National Park, Project Manager
	If deemed necessary, demolition/construction work on weekends or federal government holidays may be authorized, with prior written approval of the Superintendent.	Yosemite National Park, Project Manager
	Remove all tools, equipment, barricades, signs, surplus materials, and rubbish from the project work limits upon project completion. Repair any asphalt surfaces that are damaged due to work on the project to original condition. Remove all debris from the project site, including all visible concrete, timber, and metal pieces.	Yosemite National Park, Project Manager; Contractor
	The park shall develop a Communications Strategy Plan to alert necessary park and Concessioner employees, residents, and visitors to pertinent elements of the construction work schedule.	Yosemite National Park, Project Manager
	Verify utility locations by contacting the Underground Services Alert prior to the start of construction.	Yosemite National Park, Project Manager, Contractor
Hazardous Materials	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 be submitted for park review and approval prior to construction.	Contractor
	Store and use all hazardous materials in compliance with federal regulations. All applicable Materials Safety Data Sheets will be kept on site for inspection.	Contractor
	Hazardous or flammable chemicals shall be prohibited from storage in the staging area, 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.	Contractor
	Comply with all applicable regulations and policies during the removal and remediation of asbestos, lead paint, and polychlorinated biphenyls.	Contractor

Topic	Mitigation Measure	Responsibility
Spill Prevention/ Response	Develop and implement a comprehensive spill prevention/ response plan that complies with federal and state regulations and addresses all aspects of spill prevention, notification, emergency spill response strategies for spills occurring on land and water, reporting requirements, monitoring requirements, personnel responsibilities, response equipment type and location, and drills and training requirements. The spill prevention/response plan will be submitted to the park for review/approval prior to commencement of construction activities.	Contractor
	To minimize the possibility of hazardous materials seeping into Contractor soil or water, check equipment frequently to identify and repair any leaks. Standard measures include hazardous materials storage and handling procedures; spill containment, cleanup, and reporting procedures; and limitation of refueling and other hazardous activities to upland/nonsensitive sites. Provide an adequate hydrocarbon spill containment system (e.g., absorption materials, etc.) on site, in case of unexpected spills in the project area. Ensure equipment is equipped with a hazardous spill containment kit at all times. Ensure that personnel are trained in the use of hazardous spill containment kits.	Contractor
Waste Management	Require construction personnel to adhere to park regulations concerning food storage and refuse management.	Yosemite National Park, Project Manager, Contractor
	Properly secure trash during the workday and remove all trash from site at the end of each workday.	Yosemite National Park, Project Manager, Contractor
Specific to Natural Resources		
Air Quality and Dust Abatement	The Yosemite National Park and/or a contractor (as appropriate) shall implement and comply with a dust abatement program during construction. Measures include, but are not limited to, the following: • Water or apply soil stabilizers to disturbed areas; • Cover and/or seal truck beds and stockpiles to minimize blowing dust or loss of debris; • Limit truck and related construction equipment speeds in active construction areas to a maximum of 15 miles per hour and strictly adhering to park regulations and posted speed limits in other areas while inside park boundaries; • Minimize vegetation clearing; • Re-vegetate post construction.	Yosemite National Park, Contractor
	The Yosemite National Park and/or a contractor (as appropriate) shall implement equipment exhaust controls during construction. Measures include, but are not limited to, the following: • Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to two minutes. Clear signage shall be provided for construction workers at all access points; • Require that all construction equipment, diesel trucks, and generators be equipped with Best Available Control Technology for emission reductions of NOx and PM;	Yosemite National Park, Contractor

Topic	Mitigation Measure	Responsibility
	• Require all contractors use equipment that meets CARB's most recent certification standard for off-road heavy duty diesel engines; • Require all equipment operations to occur during daytime hours to minimize effects of local inversions.	
	Maintain adequate dust suppression equipment and using clean water to control excess airborne particulates at staging areas, active construction zones, and unpaved roads leading to/from active construction areas.	Contractor
Hydrology, Water Quality, and Wetlands	An erosion control plan would be prepared specifying measures to prevent erosion/ sedimentation problems during project construction. The plan would include a map of the project site delineating where erosion control measures will be applied. The following minimum criteria, adapted from the Guidelines for Protection of Water Quality During Construction and Operation of Small Hydro Projects (CVRWQCB 1983), would be met: • Where working areas are adjacent to or encroach on live streams, barriers shall be constructed that are adequate to prevent the discharge of turbid water in excess of specified limits. • Material from construction work shall not be deposited where it could be eroded and carried to the stream by surface runoff or high stream flows. • All disturbed soil and fill slopes shall be stabilized in an appropriate manner. • Surface drainage facilities shall be designed to transport runoff in a non-erosive manner. • Wastewater contaminated with by-products from construction activities shall be contained in a holding or settling tank to prevent contaminated material from entering watercourses or wetlands. • Waters shall be free of changes in turbidity that cause a nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits, as described in The Water Quality Control Plan for the Central Valley Regional Water Quality Control Board (CVRWQCB 1998). In determining compliance with the limits below, appropriate averaging periods may be applied, provided that beneficial uses will be fully protected: o Where natural turbidity is between 0 and 5 nephelometric turbidity units (NTUs), increases shall not exceed 1 NTU. o Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20% of the natural turbidity. o Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs. o Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10%. • Implement stormwater management measures to reduce nonpoint-source pollution discharge. This could include measures such as oil/sediment containment or street sweeping.	

Topic	Mitigation Measure	Responsibility
	• Remove hazardous waste materials generated during implementation of the project from the project site immediately. • Dispose of volatile wastes and oils in approved containers for removal from the project site to avoid contamination of soils, drainages, and watercourses. Keep absorbent pads, booms, and other materials onsite during projects that use heavy equipment to contain oil, hydraulic fluid, solvents, and hazardous materials spills. • Final design and installation of site drainage improvements will be closely coordinated with the park's Resources Management and Science Division. • Salvage hydric soils and use them as fill in wetland excavations to the maximum extent possible. Minimize use of fill materials with high permeability in wetland areas to prevent development of unnatural groundwater conduits. • Incorporate trench plugs into new and abandoned utility corridors through wetland areas where required to prevent formation or continuation of groundwater conduits.	
	Develop and implement a comprehensive stormwater pollution prevention plan for construction activities that complies with federal and state regulations and addresses all aspects of stormwater pollution prevention. The plan will be submitted to the park for approval prior to construction activities. The plan will include measures such as: • Take measures to control erosion, sedimentation, and compaction, and thereby reduce water pollution and adverse water quality effects. Use silt fences, sedimentation basins, etc., in construction areas to reduce erosion, surface scouring, and discharge to water bodies. • To the extent possible, schedule the use of mechanical equipment during periods of low precipitation to reduce risk of accidental hydrocarbon leaks or spills. When mechanical equipment is necessary outside of low precipitation periods, use NPS-approved methods to protect soil and water from contaminants. • Dispose of volatile wastes and oils in approved containers for removal from construction sites to avoid contamination of soils, and drainages. Inspect equipment for hydraulic and oil leaks prior to use on construction sites, and implement inspection schedules to prevent contamination of soil and water. Keep absorbent pads, booms, and other materials on site during projects that use heavy equipment to contain oil, hydraulic fluid, solvents, and hazardous material spills.	Contractor
	If special-status plant species are identified within the construction disturbance zone, in particular within restoration and revegetation areas, avoid special-status plant populations to the extent feasible during construction activities.	Yosemite National Park, Project Manager; Contractor

Topic	Mitigation Measure	Responsibility
	If it is not feasible for construction activities to avoid special status plant species, species conservation measures will be developed in coordination with Yosemite National Park natural resources staff. Measures may include salvage of special-status plants for use in revegetating disturbed areas and trans-plantation of special-status plants wherever possible using methods and monitoring identified in the revegetation plan, monitoring to ensure successful revegetation, protection of plantings, and replacement of unsuccessful plant materials if practicable.	Yosemite National Park, Project Manager; Contractor
	Provide proper and timely maintenance for vehicles and equipment used during construction to reduce the potential for mechanical breakdowns.	Yosemite National Park, Project Manager; Contractor
	Use silt fencing at drainages to prevent construction materials from escaping work areas.	Contractor
	Delineate wetlands and apply protection measures during construction. Wetlands shall be delineated by qualified NPS staff or certified wetland specialists and clearly marked prior to work. Perform activities in a cautious manner to prevent damage caused by equipment, erosion, siltation, etc.	Yosemite National Park, Project Manager; Contractor
	During heavy equipment use, spill kits are on site to prevent water contamination in the case of a spill. To minimize soil compaction when accessing riparian or riverine habitat unhardened by imported rock, track mats are placed on the ground, onto which the equipment will be driven. In areas impacted with imported fill and rock revetment, soils are decompacted as a final egress with equipment.	Contractor
Soils, Erosion Control, and Site Preparation	Ensure that any soil or amendment imported from outside the Grove for use in the Grove is checked for pathogens (e.g., root rot) to limit the spread of tree diseases.	
	Use approved siltation and sediment control devices in construction areas to reduce erosion and surface scouring.	Contractor
	Use approved siltation and sediment control devices appropriate to the situation in grading areas to capture eroding soil before discharge to riparian channels.	Contractor
	Where soils are heavily compacted and are covered with asphalt, soil conditions may be such that reestablishment of vegetation is unlikely without further treatment. Demetry (1997) found that soil impacts most frequently observed in Giant Forest were soil compaction, loss of organic matter, topsoil erosion, and loss or alteration of natural soil structure. Soil compaction was greatest under pavement (Demetry 1997). Soil conditions in restoration areas of the Mariposa Grove will be tested for compaction, texture, and chemical properties such as organic matter content and nitrogen, and amendments or treatment will be applied accordingly. Listed below is a range of soil treatments available to improve the potential for plant establishment, particularly giant sequoias. • Measure depth of compaction with a penetrometer and decompact to that depth (typically 6 to 10 inches) (Demetry 1997).	

Topic	Mitigation Measure	Responsibility
	• Decompact soils by hand or with heavy equipment (dozer or skid steer with rippers) under moderately moist conditions (may require 1 week of irrigation if work is completed in late summer or fall). • Avoid large roots during decompaction; a rototiller or hand decompaction may be more appropriate in these areas. • Add locally gathered duff to provide seeds and organic matter. • If available, add local native soil and topsoil. • If determined that soil conditions are not conducive to plant reestablishment, amendments such as peat moss, kelp, or other natural fertilizers may be used. • To provide nutrients to the soil, open cones on adult giant sequoias, and prepare a seedbed, woody debris may be scattered over the area and burned. If woody debris is not available for burning, fuel may be burned at a single location and the ashes mixed into the topsoil of the restoration area.	
	Depending on the degree of alteration in landform, a variety of recontouring and topography restoration actions may be implemented and are listed below: • Regrade with existing soil: Where extensive recontouring to natural topography is required (e.g., road cuts), attempt to accomplish this through re-balancing cut and fill. • Fill: Where additional material is needed, soils of the same type from the Mariposa Grove area is preferable, but soil may need to be imported from South Entrance or other nearby locations. • Topsoil retention: Wherever removal or compaction of topsoil will occur, salvage and stockpile the top 12 inches of soil, and replace it on the surface. To preserve microbial communities and limit erosion and the establishment of weeds, mulch all soil piles or cover with erosion blankets. • Leave final grades uneven to provide microhabitat for seed germination and establishment.	
	After decompacting soils, particularly on sloped areas, erosion potential can be high. Following is a list of available erosion-control measures: • Duff: Spread locally gathered litter and woody debris over disturbed areas for erosion control and to provide a source of seeds and organic matter. • Rice straw: If insufficient quantities of duff are available, use rice straw mulch (which is relatively inert and not a source of non-native seeds). • Erosion-control blankets and/or wattles: Use coconut fiber or rice straw erosion-control blankets and/or wattles only on steep slopes (3:1 or greater) and in unprotected drainages. • Stones, boulders, limbs, and logs: In conjunction with any other erosion control methods, place these materials (gathered from adjacent areas) on the surface to provide microclimate for plants and to slow water flow.	

Topic	Mitigation Measure	Responsibility
Soundscapes	Ensure that all construction equipment has functional exhaust/ muffler systems.	Contractor
	Submit a construction work plan/schedule that minimizes construction-related noise in noise-sensitive areas to the park for review/approval prior to commencement of construction activities.	Contractor
	Use hydraulically or electrically powered construction equipment, when feasible.	Contractor
	Locate stationary noise sources as far from sensitive receptors as possible.	Contractor
	Limit the idling of motors except as necessary (e.g., concrete mixing trucks).	Contractor
	To the extent possible, perform all on-site noisy work above 76 A-weighted decibels (dBA) (such as the operation of heavy equipment) between the hours of 8:30 a.m and 5:00 p.m. to minimize disruption to nearby park users.	Contractor
Vegetation and Revegetation	Park policy requires that all machinery brought in to the park is clean prior to entry and inspected by park staff to avoid introductions of invasive species, including seeds. Restoration work frequently involves ground disturbance, which has the potential to introduce and spread non-native plant species. For ground disturbing projects, park staff will survey for and treat invasive plants before and after restoration activities following the guidance of Yosemite's 2011 Invasive Plant Management Plan.	Yosemite National Park, Project Manager
	Minimize any impacts on giant sequoias including damage to boles, roots, root zone, and seedling habitat.	
	Protect rare or sensitive plant species from direct and indirect impact.	•
	Protect restoration areas from further impacts with fencing or appropriate deterrents.	
	Establish vegetation monitoring plots (both qualitative and quantitative) and photo-document project implementation and results.	
	There is a range of actions available to revegetate an area with native plants, and a combination of actions will provide the most successful restoration. For any revegetation activities within Mariposa Grove, only locally gathered plant material will be used to retain genetic integrity. • Natural regeneration: Rely on natural regeneration from adjacent seed sources and duff. • Seed collection, seed increase, and direct seeding: Plant the area with local native seed. It may not be practical to collect enough seed for direct seeding of the acreage involved. Increasing seed can provide necessary quantities. This process requires 3 years. • Seed or cutting collection and nursery propagation: Gather local native seeds and cuttings and plant in a nursery setting to provide established plants for planting in restoration areas. Place plants in a manner that mimics natural distribution – not landscaping. This requires 1 to 3 years.	

Topic	Mitigation Measure	Responsibility
	• Plant salvage and transplanting: In cases where plants may be damaged or destroyed when infrastructure is removed, repaired, or relocated, salvage plants and replant them when the area is recontoured to more natural conditions, or in an adjacent restoration site. Store salvaged plants on site, and protect with shade cloth and irrigate as necessary. • Giant sequoias: Nearly all restoration sites lie within the seed-rain area of adult giant sequoias, so the need for propagating giant sequoias in a nursery setting and planting these trees is not likely to be necessary for germination and recruitment. Rather, prepare sites to facilitate germination, including burning woody debris to provide nutrients and a heat source to open cones on the trees. If seed dispersal does not occur (e.g., adequate heat is not created), hand spread locally collected giant sequoia seeds.	
	Canopy gaps are integral to successful giant sequoia recruitment. The Giant Forest Restoration Project focused on creating and maintaining gaps as part of the restoration program because according to assessments of existing recruitment and gaps, neither was adequate. However, based on NPS assessment of the giant sequoia population in the Mariposa Grove, many canopy gaps exist in the Grove, and recruitment is relatively high when compared to other giant sequoia groves (Kuhn 2011). Based on this assessment, the park will continue to rely on fire to create and maintain these canopy gaps in Mariposa Grove, and to capitalize on the gaps created by removing existing infrastructure (e.g., parking areas) as areas for giant sequoia recruitment.	
Wildlife and Special Status Species	Limit the effects of light and noise on adjacent habitat through controls on construction equipment.	Yosemite National Park, Project Manager; Contractor
	Provide adequate education and enforcement to limit construction worker activities that are destructive to wildlife and habitats.	Yosemite National Park, Project Manager
	Regulate speeds on the Mariposa Grove Road to reduce the potential for wildlife vehicle collisions.	
	Alternative-specific mitigation measures: • Alternative 3: Grizzly Giant Hub. Close the road to the Grizzly Giant transit hub from dusk until dawn. • Alternative 4: South Entrance Hub with Modified Commercial Tram Service. Limit hours of commercial tram operation to reduce noise impacts on wildlife.	
	Based on available anecdotal and scientific evidence, 78 amphibian, reptile, mammal, and bird species occur in the Mariposa Grove and South Entrance project area. Of these 78 species, 13 special status species occur or have the potential to occur in the project area including 6 bird species (northern goshawk, long-eared owl, California spotted owl, Vaux's swift, olive-sided flycatcher, and yellow warbler) and 7 mammal species (pallid bat, Townsend's big-eared bat, spotted bat, western red bat, western mastiff bat, Sierra Nevada mountain beaver, and Pacific fisher). In order to mitigate impacts to special status species during construction and maintenence activities, we recommend (1) timing construction activities to avoid the most sensitive time	Yosemite National Park, Project Manager

Topic	Mitigation Measure	Responsibility
	periods for special-status animals; (2) retaining key habitat features for denning, roosting, nesting, and hibernating; and (3) adaptively managing for special-status species through continued targeted surveys during key time periods during the construction and post-construction phases.	
	Mitigation to protect key habitat features for fishers, bats, and owls: • Limit the effects of light and noise on adjacent habitat through controls on construction equipment. • In construction zones, conduct visual/auditory surveys targeting owls and other birds, visual and acoustic surveys targeting bats, and remote camera surveys targeting fishers to inform proper mitigation actions that would reduce impacts on wildlife. • Avoid disturbing basal hollows (created by repeated fires), deep bark furrows, and cavities and crevices of tree crowns important for bats and other wildlife (Pierson et al. 2006). Snags are an essential habitat element for the majority of special status species documented using the Mariposa Grove. Removal of snags may indirectly result in decreased rates of reproduction and increased rates of mortality for fishers (USDA Forest Service 2001), and spotted owls use cavities in snags for nesting and raising young. If hazard tree (snag) removal cannot be avoided: • Remove snags only under consultation with the park biologist and park forester. Tree removal should occur outside of sensitive time periods for special status species. • A wildlife biologist should examine any trees and snags for nesting, denning, or roosting wildlife, or the potential for such use, prior to removal.	
	Mitigation to protect fisher dens: • Protect all known fisher natal (birthing) and maternal (kit rearing) den structures within Yosemite, and any den structures located in the future. This measure is particularly compelling because female fishers have been known to reuse past dens (i.e. same fisher returning to the same den the next season or another female using a den occupied by a different fisher from a previous season) (R. Sweitzer, pers. comm.). • Protect verified fisher birthing and kit rearing dens during fisher denning season (March 1 through June 30) with 700-acre buffers consisting of the highest quality habitat (CWHR size 4 or greater and canopy closure greater than 60%) in a compact arrangement surrounding the den site in the largest, most contiguous blocks available. • For active dens, within this buffer, (1) enforce a night closure of any paved roads and (2) halt construction, restoration, fire management, or other disturbing activities until the cessation of denning season (June 30).	
	Mitigation specific to the Pacific fisher: • Continue monitoring fishers in the park (in conjunction with fisher researchers working in and around Yosemite National Park) to establish whether fishers are actively foraging or denning near the project area. Establish buffers to prevent disturbance around any active dens.	

Topic	Mitigation Measure	Responsibility
	• Add wildlife crossing structures at riparian crossings near South Entrance and Mariposa Grove along Wawona and Mariposa Grove roads as construction work is being conducted to reduce barriers to animal movement and habitat fragmentation. • Conduct fuels reduction activities outside of fisher denning season. • Time construction and restoration activities to avoid the most sensitive time periods for fishers (i.e. during denning season [March 1 - June 30] and during juvenile dispersal [from early February onward]). • Adaptively manage for fishers through continued targeted surveys during key time periods during construction/ restoration/fire management activities. • Retain habitat features important to fishers including: large diameter black oaks, large diameter conifers, large diameter snags, large decayed logs, high canopy closure/multiple layer canopy, and coarse woody debris on the ground, in areas with moderate to steep slopes and drainages with running and/or pooled water (Zielinski et al. 2004). • Retain and recruit large-diameter (>11 inches diameter at breast height [DBH]) snags (Freel 1991; Buskirk and Powell 1994) and large-diameter (>24 inches DBH) live conifer and oak trees with decadence such as broken tops or cavities (Freel 1991). • Maintain dense canopy cover (>60%) in the vicinity of large trees (Buskirk and Powell 1994). • Retain and recruit large woody debris, including large-diameter (at least 15 inches DBH by 15 feet long) downed logs (Freel 1991, Buskirk and Powell 1994) and complex structure near the ground (e.g., downed logs, large downed branches, root masses, live branches) (Buskirk and Powell 1994). • Retain a mosaic of late-successional coniferous or mixed forests and perform fuel treatments in patches, allowing adequate dispersal habitat for fishers and avoiding creation of large, open areas that have no overstory or shrub cover. • Identify additional protection measures as deemed necessary to avoid disturbance during construction or restoration-related activities.	
	OWLS: Conduct surveys in the spring (beginning March 15) to determine if spotted owls are nesting or foraging in the vicinity of the construction/restoration area. If owls are present, the park construction project manager will work with park biologists to determine appropriate measures to avoid disturbance, such as no construction activities between 30 minutes before dusk and 30 minutes after dawn, and an approximate 1,250-foot buffer of no disturbance (light or noise) around nest trees from March 15 through August 31.	

Topic	Mitigation Measure	Responsibility
	BATS: If a project targets any trees for removal during the winter, a biologist will survey for roosting bats the preceding fall (September and October). If the biologist suspects hibernation in a tree, do not remove that tree until mid-April to mid-May. If a project targets any trees for removal during the summer, a biologist should survey for roosting bats within one week prior to removal to determine if a bat maternal colony occurs in the tree. If bats are determined to be roosting in the tree, delay removal until fall (mid-August through October).	
Specific to Cultural Resources and Historic Properties		
Archeological Resources	Train all members of the restoration/construction teams in proper handling of inadvertent discovery of archaeological resources. Training would involve information regarding the types of archeological materials that are likely present in the specific project area, how to identify archeological materials, and the procedures for contacting the appropriate parties in the event that archeological materials are encountered during restoration/construction activities. All restoration/construction personnel would be required to participate in the training, and written guidelines would be prepared and distributed to aid in identification of archeological materials and to inform workers of the procedures to follow in case of a discovery or potential discovery. If buried archeological resources such as flaked stone or groundstone, historic debris, building foundations, midden soils or human bone are inadvertently discovered during ground-disturbing activities, work shall stop in that area and within a 100-foot radius of the find until a qualified archeologist can assess the significance of the find. Inadvertent discoveries would be treated in accordance with 36 CFR 800.13 (Protection of Historic Properties: Post-review discoveries). The archeological resource would be assessed for its eligibility for listing on the National Register in consultation with the SHPO and representatives of traditionally associated American Indian tribes and groups (if it is an American Indian archeological site), and a determination of the project effects on the site would be made. If the site would be adversely affected, a treatment plan would also be prepared as needed during the assessment of the site's significance. Assessment of inadvertent discoveries may require archeological excavations and/or archival research to determine resource significance. Treatment plans would fully evaluate avoidance, project redesign, and data recovery alternatives before outlining actions proposed to resolve adverse effects. If human skeletal remains are encountered, protocols under federal and state law would apply. All work shall stop in the vicinity of the discovery, and the find would be secured and protected in place. The appropriate county coroner (Mariposa or Merced) and Park Archeologist would both be immediately notified. If a analyses determine that the remains are American Indian, and that no further coroner investigation of the cause of death is required, the coroner would then be required to contact the NAHC (pursuant to Section 7050.5[c] of the California Health and Safety Code) and the County Coordinator of Indian Affairs. The remains would also be treated in accordance with the Native American Graves Protection and Repatriation Regulations at 43 CFR 10.4 (Inadvertent discoveries).	Yosemite National Park, Project Manager

Topic	Mitigation Measure	Responsibility
	Management actions involving moderate to severe ground disturbance (trail reroutes; formalization of social trails; excavations for subsurface utilities; development of campgrounds; removal of abandoned infrastructure and/or facilities, construction of buildings, structures, parking lots, and roads; topographic recontouring; decompaction and plant salvage; and actions that may focus visitor use at areas with sensitive surface resources) within or adjacent to the boundaries of known archeological sites shall be preceded by intensive surface survey and/or controlled subsurface testing as well as archeological and American Indian resource monitoring, as determined appropriate given past studies and findings. Gift shop demolition and removal should avoid ground disturbance. If mechanical demolition cannot avoid effects, alternative methods such as manual demolition and /or sling lift should be used to remove the piered structure. Within or adjacent to site boundaries, topographic recontouring should be achieved through fill and compaction rather than grading/cutting wherever possible in order to avoid ground disturbance. Initial limited testing shall be conducted in the area(s) proposed for ground disturbance, to first determine if the presence of site components can be verified. If so, the methods of achieving the proposed action may be modified and/or relocated, if possible. If effects could not be avoided, archeological treatment measures would be site-specific and contingent on previous studies' results and the level of work proposed.	Yosemite National Park, Project Manager
	Management actions involving minor ground disturbance within or adjacent to the boundaries of known archeological sites shall be conducted with an archeological monitor present to ensure that activities (restoration, revegetation of denuded areas, removal of hazard fuels or unwanted vegetation, etc.) do not adversely affect the integrity of site stratigraphy or horizontal artifact context. Monitoring may also be included as part of a treatment plan for individual resources following initial testing as per AR-MM-2. The archeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis. If the monitor determines that any portion of the proposed action could have an adverse effect on the site, alternative methods of accomplishing the action shall be discussed with the restoration personnel.	Yosemite National Park, Project Manager

Topic	Mitigation Measure	Responsibility
Historic Properties	Avoidance, mimimization, and mitigation of actions affecting historic properties will be addressed through a project specific memorandum of agreement (MOA) between NPS and the California State Historic Preservation Officer consistent with guidance in 36CFR 800.6(b). These efforts could include screening and/or sensitive design that would be compatible with cultural landscape resources. Should avoidance of adverse impacts not be possible, documentation and treatment would be identified to reduce the intensity of the impact. A draft MOA is included in Appendix G.	
	As per Section 106 of the NHPA, prior to construction or demolition activities, the park shall conduct a review of impacts to historic buildings, structures, and districts within the project area of potential effect (APE). This will include a review of existing known historic resources for their continued integrity and eligibility for listing in the National Register, identification of currently unknown historic properties within the APE, and determination of potential adverse effects in compliance with 36 CFR Part 800 – Protection of Historic Properties.	Yosemite National Park, Project Manager
	Actions will be consistent with the Secretary of Interior's Standards for the Treatment of Historic Properties. The park would seek to first avoid, then minimize, and lastly mitigate any actions adversely affecting historic properties.	
	To minimize the effect of new culvert construction on historic road character, new headwalls would be considered where the culverts are visible from the roads. The new walls should be stone (not veneer), constructed using compatible stone in a form and masonry pattern that is compatible with the nearby historic period masonry.	Yosemite National Park, Project Manager
	Prior to any ground disturbing activities associated with revetment, further analysis and possible documentation at each site would be required in order to assess potential adverse effects to historic resources.	Yosemite National Park, Project Manager
American Indian Traditional Cultural Resources	Memorandum of Agreement is under development and may stipulate additional mitigation measures (see Appendix G).	
	NPS American Indian Liaison should be contacted immediately upon discovery of human remains.	
Specific to Sociocultural Resources		
Park Operations	Install appropriate traffic signs.	Yosemite National Park, Project Manager
	Conduct a Minimum Requirement Analysis for all actions that would take place in Wilderness (e.g., repairs to the water line in Biledo Meadow).	

Topic	Mitigation Measure	Responsibility
	Ongoing monitoring undertaken by Yosemite's interdisciplinary Visitor Use and Impacts Monitoring Program regularly assesses conditions in meadows and along riverbanks, providing important information on the success of restoration efforts. In addition, the park performs regular monitoring for invasive plants, stock use impacts, wildlife abundance and diversity, and visitor experience. To evaluate the success of particular restoration actions, monitoring plans will be implemented specific to each restoration project. Geophysical and biological parameters will be monitored over time to determine restoration success and recovery rates. Pre- and post-restoration vegetation and soil sampling and photo points are examples of monitoring to measure project success.	Yosemite National Park, Project Manager
Visitor Experience and Recreation	Fence construction staging areas and construction activity areas to visually screen construction activity and materials.	Contractor
	Consolidate construction equipment and materials to the staging areas at the end of each work day to limit the visual intrusion of construction equipment during nonwork hours.	Contractor
	Provide protective fencing enclosures around construction areas, including utility trenches to protect public health and safety.	Contractor
	Limit construction activities to the off-season to allow for continued visitor access to the ski area during the winter.	Yosemite National Park, Project Manager, Contractor
	All new sources of lighting, or substantial modifications to structures with existing sources of exterior lighting, shall conform to the standards set forth in the Yosemite Lighting Guidelines.	Contractor
	Restoration work provides many opportunities to teach other park employees and visitors about natural processes in Yosemite. Each restoration project incorporates an element of outreach or interpretation such as informative signs or self-guided nature trails. Biologists work closely with interpretive staff to disseminate messages to visitors regarding trails and areas that are currently closed due to ongoing restoration efforts.	Yosemite National Park, Project Manager



Appendix F: Draft Statement of Findings for Protection of Wetlands

Appendix F
Draft Statement of Findings for Protection of Wetlands
(Executive Order 11990)

Restoration of the Mariposa Grove of Giant Sequoias

Recommended

Don L. Neubacher, Superintendent, Yosemite National Park Date

Certified for Technical Accuracy and Servicewide Consistency

Forrest Harvey, Chief, National Park Service Water Resources Division Date

Approved

Christine S. Lehnertz, Pacific West Regional Director Date

INTRODUCTION

The National Park Service (NPS) prepared the Restoration of the Mariposa Grove of Giant Sequoias Final Environmental Impact Statement (*Final Mariposa Grove/ EIS*) to restore habitat and natural processes critical to the long-term health of the Mariposa Grove ecosystem, including the giant sequoia trees, wetlands, and associated plant and wildlife communities. Additional goals of the project are to conserve and protect cultural resources and improve the overall experience for visitors to Mariposa Grove. This Wetland Statement of Findings is a required component of the Record of Decision for an environmental impact statement, per NPS Director's Order #77-1: Wetland Protection, which establishes the policies, requirements, and standards for implementing Executive Order 11990 (Protection of Wetlands). A separately identifiable Wetland Statement of Finding is required when an alternative selected for implementation would result in adverse impacts on wetlands. This Statement of Findings:

- Presents the rational for implementation of the proposed project with regard to wetlands, and documents the anticipated effects on wetland resources
- Describes the effects on wetland values associated with the proposed action
- Provides a thorough description of mitigation measures
- Ensures "no net loss" of wetland functions or values

THE PURPOSE AND NEED FOR ACTION

The Mariposa Grove of Giant Sequoias (figure F-1) is one of the most significant natural and cultural resources in Yosemite National Park. The primary purpose of the proposed project is to restore degraded habitat and natural processes critical to the long-term health of the giant sequoias, wetlands, and associated plant and wildlife communities in the Mariposa Grove; conserve and protect cultural resources; and improve the overall experience for visitors to Mariposa Grove. The following existing conditions have a negative effect on the ecological health and historic context of the Mariposa Grove:

- Road, trails, and other infrastructure are disrupting the natural hydrologic functioning of the Mariposa Grove
- Buildings and infrastructure are encroaching on individual giant sequoias and their roots, and reduce habitat for giant sequoia propagation
- Ongoing foot and vehicle traffic throughout the Mariposa Grove is damaging giant sequoia trunks, compacting soils, and exposing shallow giant sequoia roots, potentially making the trees less resilient and more susceptible to external stressors
- The risk of catastrophic fire remains high due to heavy fuel loading

In addition, current conditions diminish the quality of the visitor experience including:

- The road configuration at the South entrance to Yosemite is confusing and highly congested during periods of high use, creating safety concerns
- Frequent closures of the parking lot and road to the Mariposa Grove contribute to visitor frustration
- Shuttles from Wawona are often full, limiting boarding and increasing wait times for visitors

- Way-finding is in need of improvement
- Trails and other infrastructure do not meet accessibility requirements
- Vault toilets are inadequate and not fully accessible, and are the source of nuisance odors
- Operation of the commercial tram throughout the Mariposa Grove creates vehicle/pedestrian conflicts and affects natural soundscapes throughout the Grove
- Historic features at Wawona Point are in disrepair

WETLANDS IN THE MARIPOSA GROVE AREA

Though the Mariposa Grove of Giant Sequoias occupies a small part of Yosemite National Park (less than 900 acres), the Mariposa Grove has exceptional ecological importance. Wetlands in the Grove form an almost continuous, dendritic network making up a significant portion (12.3%) of the Grove's watershed (figure F-2). Wetlands in the Grove provide important hydrologic support for the Merced River watershed and provide hydrologic functions including aquifer recharge, storm runoff abatement, sediment retention, prevention of erosion through streambank stabilization, and stream/river temperature moderation.

The Mariposa Grove encompasses a great diversity of habitats, plants, and wildlife. The area includes a rich mosaic of old growth mixed conifer forest (with trees of all age classes, standing snags, and large downed trees), streams, wetlands, and a number of special status plant and wildlife species including the pacific fisher. The pacific fisher is a candidate for listing under the Federal Endangered Species Act and has a high likelihood of listing prior to project completion. Several fens, which have a limited distribution in the Sierra Nevada, are present. The location of the giant sequoias is strongly linked to the presence of wetlands. About 82% of giant sequoias are located within 200 feet of delineated wetlands (Kuhn 2011). This supports conclusions by Halpin (1995) on the importance of topographic flow accumulation, and further signifies the importance of soil water availability within the rooting zone for giant sequoia.

Wetland Extent

The NPS investigated and delineated wetlands in two areas: the Mariposa Grove (figure F-2), and near the park's South Entrance (figure F-3)[1]. Specific wetland classes identified within the project area consist of riverine wetlands (rivers, creeks, and streams) and palustrine wetlands (shallow ponds, marshes, swamps, and sloughs). The Mariposa Grove encompasses 90.3 acres of palustrine forested wetland, 1.6 acres of palustrine scrub shrub wetland, 8.8 acres of palustrine emergent wetland, and 2.0 acres of riverine (NPS 2011a). The surrounding mountain slopes are gentle and incised by approximately 6.1 miles of perennial and 2.8 miles of seasonal streams. Wetlands are continuous along the dendritic network of perennial (6.1 miles) and seasonal (2.8 miles) streams that drain the project area. In and near the South Entrance, 1.4 acres of palustrine forested wetland were delineated (NPS 2011a).

[1] A qualified wetland specialist with nine years' experience as a wetland ecologist, nine additional years of experience as a botanist and restoration ecologist, a M.S. in restoration ecology, a professional certificate in wetland ecology, and U.S. Army Corps of Engineers wetland delineator training conducted the wetland delineation.

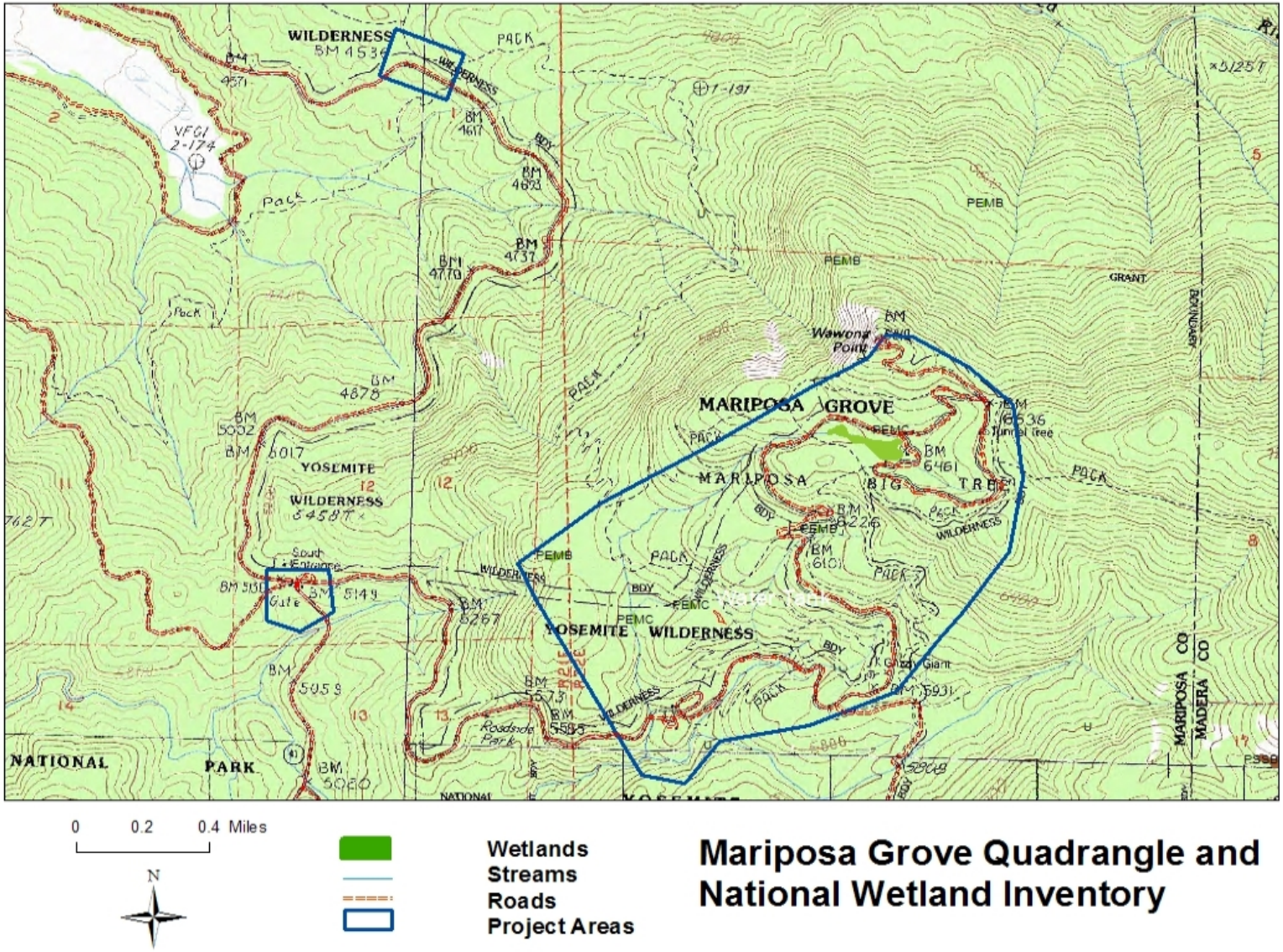


Figure F-1 – Mariposa Grove and South Entrance Vicinity Map (NPS 2011a)

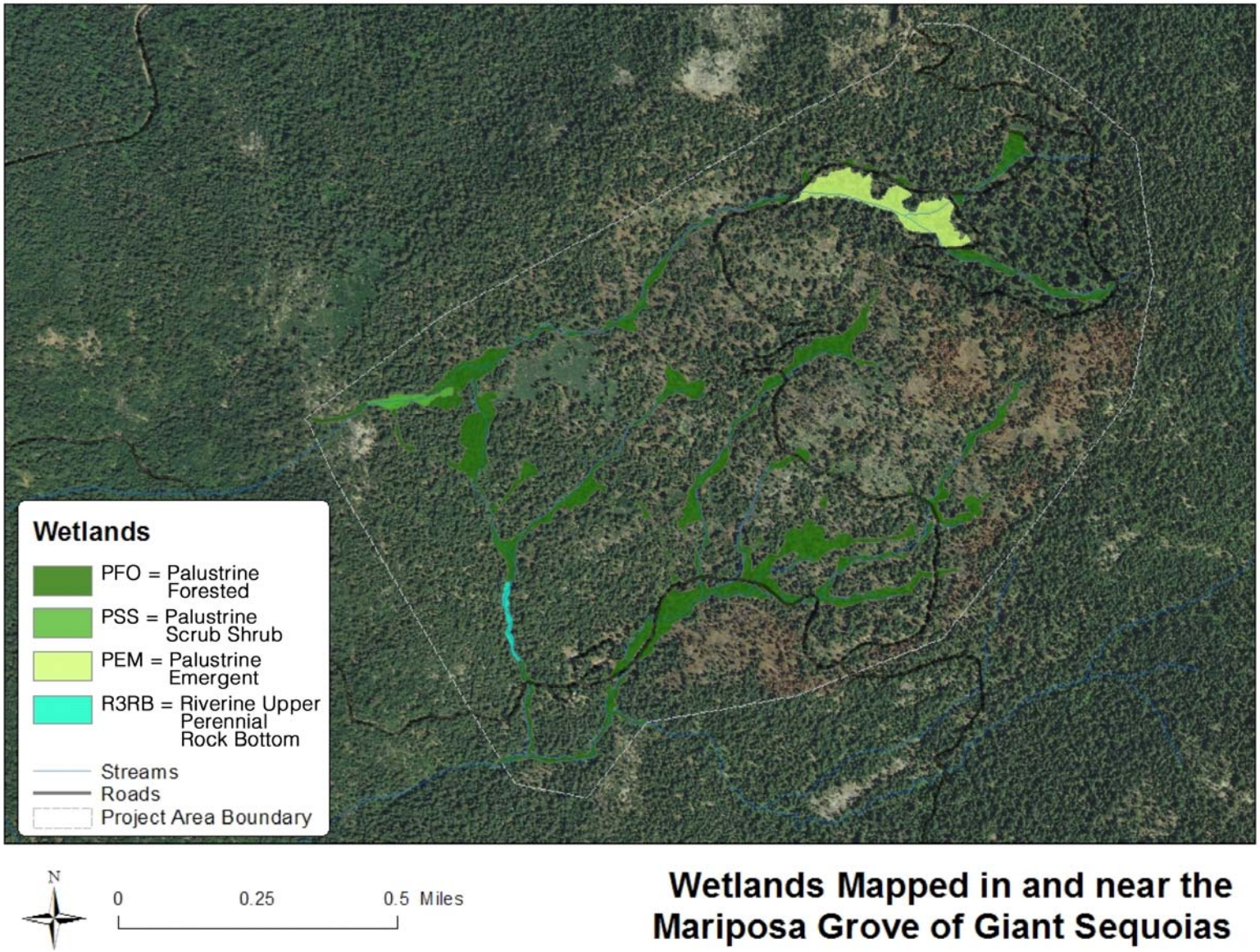


Figure F-2 – Wetlands in and near the Mariposa Grove of Giant Sequoias (NPS 2011a)

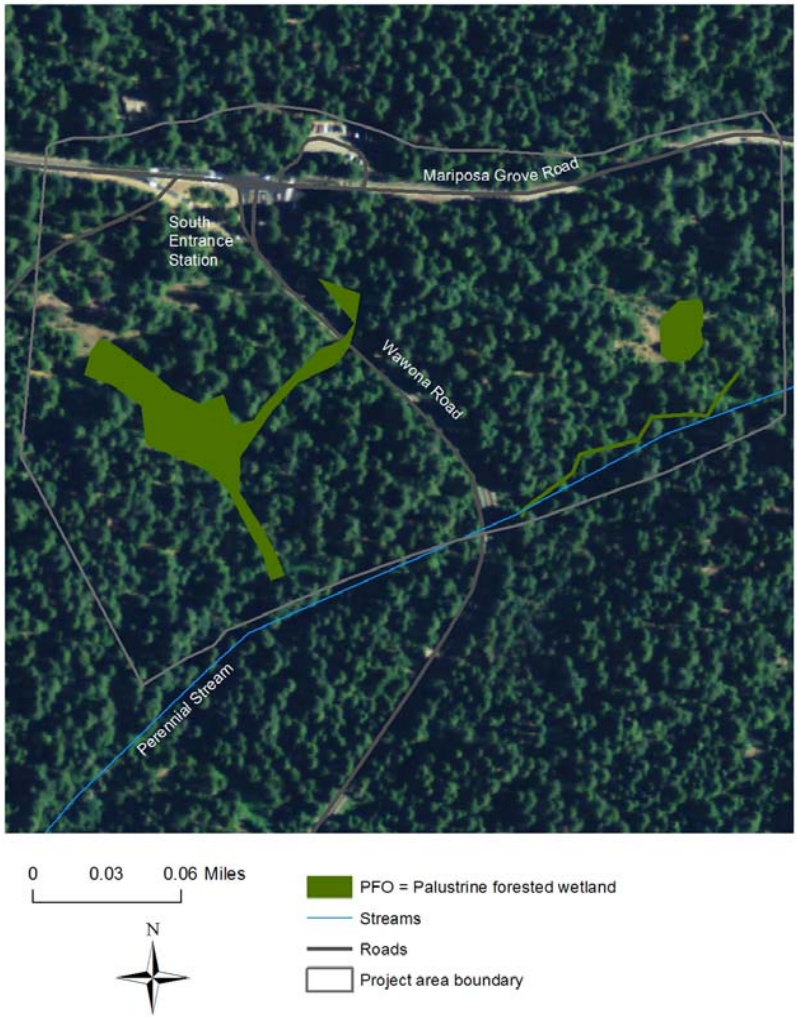


Figure F-3 – Wetlands at the South Entrance to Yosemite National Park (NPS 2011a)

Existing Structures in Wetlands

The Mariposa Grove Road crosses through delineated wetland in the lower Grove, at several areas as the road climbs toward the upper Grove, and in the upper Grove largely along the upper Grove loop. Roads, parking areas, trails, and visitor facilities are located near giant sequoias and within wetland and rare plant habitat throughout the project area. Infrastructure and visitor use may negatively affect wetland and stream hydrology and function, wetland and rare plant communities, and giant sequoias.

ALTERNATIVES CONSIDERED

To address the issues facing the Mariposa Grove and its visitors, and consistent with goals outlined in the 1980 *General Management Plan* for Yosemite National Park, the NPS developed a No Action Alternative and three action alternatives that include major actions to ecologically restore the Grove and improve visitor experience.

A number of proposed actions are common to the action alternatives including ecological restoration, infrastructure removal or improvement, and actions to improve the visitor experience. These common actions include road and trail and culvert repair to improve hydrologic flows; project-specific prescribed fire and hazardous fuel reduction treatments; removal of pavement and soil decompaction; repair/replacement of the leaking water distribution system; relocation of the water tank; and improvement of visitor orientation and accessibility. Rehabilitation, stabilization, protection, and/or enhanced interpretation of cultural resources at Mariposa Grove, Wawona Point, and South Entrance are also common to the action alternatives. Other components vary among the three action alternatives.

Alternative 1

Alternative 1, No Action, serves as a baseline from which to compare the other alternatives. Alternative 1 would continue the current level of maintenance and operations at the Mariposa Grove of Giant Sequoias. Infrastructure would remain concentrated in the lower part of the Grove and commercial operation of the tram and the gift shop would continue. Access to Mariposa Grove would remain challenging for visitors during peak use periods. Renovation, rehabilitation, or upgrading of existing facilities to improve functionality and accessibility would occur as emergency actions in response to system failures, rather than as planned and coordinated actions. The current level of interpretation and orientation would stay the same, and utilities and comfort stations would not be upgraded. Stressors on the giant sequoias, wildlife, special status species, and other natural and cultural resources in the Grove and at South Entrance would remain in place, and the visitor experience likely would continue to deteriorate as demand to access and experience the Grove increasingly exceeds the capacity of the current infrastructure to accommodate the number of day-use visitors.

Alternative 2

Alternative 2, South Entrance Hub (NPS Preferred Alternative), would remove the majority of visitor parking, commercial tram staging and operations, and the concessioner-operated gift shop from the Mariposa Grove to allow for comprehensive restoration of wetlands, soundscape, and giant sequoia habitat. Parking, shuttle facilities, and visitor services would be relocated to a South Entrance transit hub. Comfort stations would be renovated or replaced, and accessible trails would be established in the ecologically restored lower Grove area and at the iconic Grizzly Giant. The historic Washburn Trail from South Entrance would be extended as a pedestrian trail from its current terminus at the Mariposa Grove Road picnic area to the lower part of Mariposa Grove. The intersection of Mariposa

Grove Road and Wawona Road at South Entrance would be realigned, and a roundabout could replace the current T-intersection to improve traffic flow.

Under Alternative 2 (Preferred) there would be a net gain of 1.00-acre of wetlands in highly valued giant sequoia habitat. Overall, there would be a 3.98-acre reduction of developed areas in the Grove. The reduction in development would form a natural buffer around wetlands and improve overall hydrologic flows throughout the Grove. To achieve these objectives there would be 0.37-acre of permanent wetland loss, in lower value habitat. (Table F-1).

Between the Draft and the Final EIS, NPS evaluated changes to the layout to further minimize potential impacts near the South Entrance. Although changes to the parking configuration were made to reduce direct impacts, it is expected that there would still be indirect impacts on those wetland areas due to the new facilities at the South Entrance hub.

Alternative 3

Alternative 3, Grizzly Giant Hub, would relocate public parking and visitor services from the lower Grove areas to a location outside giant sequoia habitat in the vicinity of Grizzly Giant. This would include removing the lower Grove area parking lot, gift shop, and commercial tram staging area and operations to allow for comprehensive restoration of giant sequoia habitat, wetlands, and soundscapes. A new road segment with two bridges would be constructed to skirt the lower Grove, and the existing road to Grizzly Giant would be removed. Accessible trails would be constructed in the lower and mid-Grove areas, and comfort stations would be upgraded or replaced. The intersection at South Entrance would be reconstructed as a modified T-intersection to improve traffic flow. All toilets in the Grove would be vault toilets.

Under Alternative 3 there would be a net gain of 1.00-acre of wetlands in highly valued giant sequoia habitat. Overall, there would be a 5.75-acre reduction of developed areas in the Grove. The reduction in development would form a natural buffer around wetlands and improve overall hydrologic flows throughout the Grove. There would be little permanent wetland loss (<0.03-acre). To achieve this large area of restoration, a new road and pedestrian hub would be constructed (mostly outside of giant sequoia habitat). The new road would be constructed in prime fisher denning habitat, due to a lack of alternative locations (Table F-1).

Alternative 4

Alternative 4, South Entrance Hub with Modified Commercial Tram Service, would maintain the commercial tram operations for visitor access and enjoyment, but tram staging would be moved to a South Entrance Hub, similar to that described for Alternative 2, and the route and hours of operation would be reduced to provide a balance between visitor access and opportunities for quiet enjoyment and solitude in the upper part of the Grove. As under Alternative 2, the majority of public parking and visitor services would be relocated to the South Entrance. An accessible trail would be constructed through the lower Grove area, and an accessible overlook to the Grizzly Giant would be provided. The historic Washburn Trail from South Entrance would be extended to the Grove. The current T-intersection design of Mariposa Grove Road and Wawona Road at South Entrance would be retained.

Under Alternative 4, there would be a net gain of 0.77-acre of wetlands in highly valued giant sequoia habitat. Overall, there would be a 1.84-acre reduction of developed areas in the Grove. The reduction in development would form a natural buffer around wetlands and improve overall hydrologic flows throughout the Grove. To achieve these objectives there would be 0.37-acre of permanent wetland loss, mainly in lower value habitat (Table F-1).

Table F-1. Summary of Restoration, including Wetlands, by Alternative

	Alternative 1: No Action	Alternative 2: South Entrance Hub	Alternative 3: Grizzly Giant Hub	Alternative 4: South Entrance with Modified Commercial Tram Service
Wetland restoration	N/A			
Lower Grove restoration		0.85 acre	0.85 acre	0.75 acre
Road narrowing/Trail conversion		0.15 acre	0.15 acre	0.02 acre
TOTAL		1.00 acre	1.00 acre	0.77 acre
Wetland loss	N/A			
Water tank relocation (artificial wetland)		0.10 acre	0.00 acre	0.10 acre
South Entrance wetland		0.24 acre	0.00 acre	0.24 acre
Roadside wetlands (artificial wetlands)		0.02 acre	0.02 acre	0.02 acre
Piers associated with boardwalk		0.01 acre	0.01 acre	0.01 acre
TOTAL		0.37 acre	0.03 acre	0.37 acre
Net change in development project-wide[1]	N/A			
Net reduction of developed area within Grove		-3.98 acre	-5.75 acre	-1.84 acre
New development at South Entrance		+4.72 acre	0.00 acre	+4.72 acre
New development at Grizzly Giant and bypass road		0.00 acre	6.25 acre	0.00 acre
TOTAL		0.74 acre addition of developed area projectwide	0.50 acre addition of developed area projectwide	2.88 acre addition of developed area

[1] Excluding areas needed for new leach fields

Selection of the Preferred Alternative

Alternative 2 of the Final Mariposa Grove EIS best meets the goals and objectives of the project, which include protection and enhancement of wetland resources. Under Alternative 2, the NPS would move the existing parking area out of the core of the Mariposa Grove to a site near the South Entrance to Yosemite and restore a total of 1.0 acre of wetland. A shuttle would take visitors into the Grove to a drop-off site near the former parking area. Wetland impacts are unavoidable at the proposed site near the South Entrance. Essentially, Alternative 2 (Preferred) removes existing development from areas in the Mariposa Grove with high ecological value and moves parking to a site of lower ecological value. Alternative 3 would also enable 1.0-acre of wetland restoration in giant sequoia habitat, and result in no wetland impacts because a parking lot at the South Entrance would not be constructed. Under Alternative 3, a bypass road and parking area near the Grizzly Giant would be constructed. Under Alternative 3 there would be substantial impacts to pacific fisher habitat with creation of the new road and parking area. Overall, under Alternative 2 there would be 0.74-acre *addition* of developed areas in the project area. Under Alternative 3 there would be 0.50-acre *addition* of developed areas in the project area. Alternative 4 would avoid construction of the new road proposed under Alternative 3, but overall, there would be a net gain of 2.88 acres of new development.

Alternative 2 protects and enhances fisher habitat and has the lowest overall reduction of developed areas in the Grove. In addition, Alternative 2 best curtails vehicle traffic on the Mariposa Grove road and within the Grove, restores soundscapes by eliminating most private vehicle parking in the Grove, and discontinues operation of the fee-for-service commercial tram. All of these actions would best address visitor and operational services that are adversely affecting giant sequoia (e.g. impeded hydrology, soil compaction in root zones, bark removal and bole damage), and provide the best opportunity to sustain the Mariposa Grove for the enjoyment of future generations.

IMPACTS OF THE PROPOSED ACTION ON WETLANDS

Under Alternative 2 (Preferred), there would be a total of 0.37-acres of permanent loss of wetlands. Potential impacts would be associated with relocation of a water tank (0.1-acre), construction of a parking lot at the South Entrance (0.24-acre), reduction of artificial roadside wetlands that could dry up with road improvements (0.02-acre) , and installation of piers associated with boardwalk construction (0.01-acre).

Relocation of the water tank in the upper Mariposa Grove. Relocation of the water tank could dry up part of an artificial wetland associated with the tank overflow to prevent freezing (0.1- acre).

Parking area construction at the South Entrance. Construction of a parking area near the South Entrance would result in permanent impacts to a 0.24-acre palustrine emergent wetland (figure F-3 – the oval 0.24- acre wetland on the right side of the map). Figure F-4 provides a more detailed drawing of the area.

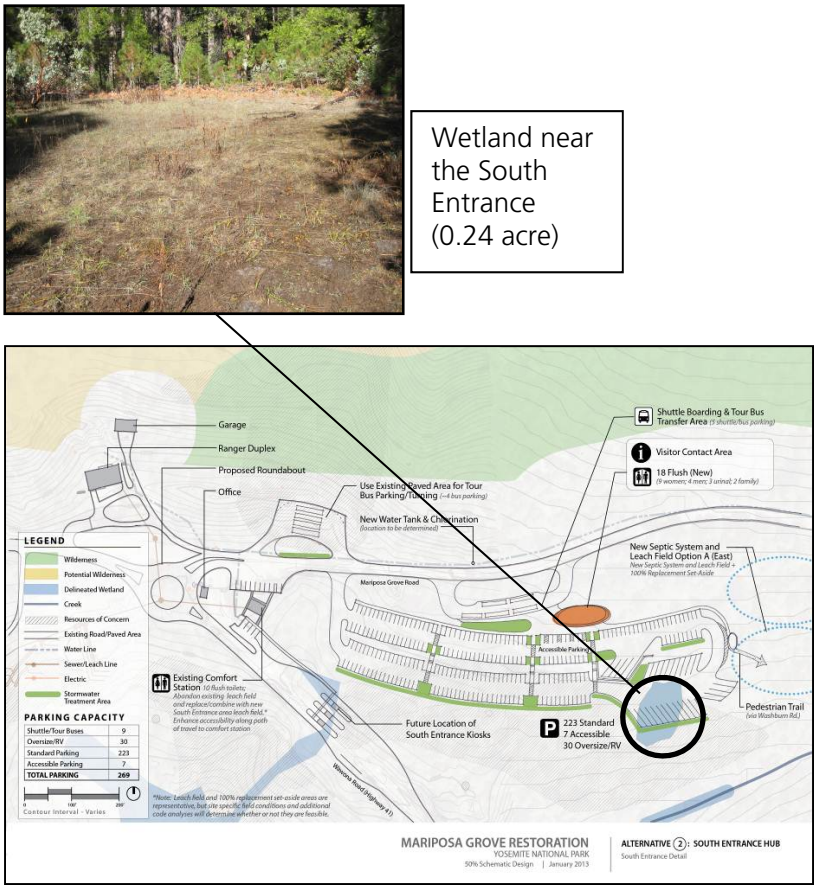


Figure F-4 – Wetland that would be permanently impacted at South Entrance (0.24-acre)

The forest surrounding the 0.24-acre wetland at the South Entrance was disturbed by past logging activities. The parking area would obliterate most of the wetland, and harden the area where water enters the wetland. The NPS assumes that and portions of the wetland not under asphalt would dry up and not function as wetland.

This wetland is dominated by grasses, sedges, and forbs, with scattered small trees and tree seedlings. Three of the six dominant vegetative species across all strata have a wetland indicator status assigned by the U.S. Fish and Wildlife Service. Ponderosa pine and Kentucky bluegrass (*Poa pratensis*) are rated "facultative upland" species, and the grass *Muhlenbergia richardsonia* is rated a "facultative" species. Three *Carex spp*., one *Juncus sp*., and one *Epilobium sp*. were dominant in places. While the NPS did not identify these five plants to the species-level because of the season, most species in these genera are found in wetlands at this elevation in Yosemite National Park. The other dominant species, incense cedar, white fir, and sticky cinquefoil (*Potentilla glandulosa*) are not rated. Kentucky bluegrass and incense cedar commonly grow in wetlands in the park. Overall, the vegetation was determined to be hydrophytic. Soils have a redox dark surface, with common mottles in a dark matrix.

Wetland hydrology was not present at the time of the site visit, which took place after the first rain and snow events following a historically dry winter and summer. The NPS assumed that hydrology is present to sustain the wetland, which forms an opening in an otherwise continuous forest. Wetland hydrology indicators included the geomorphic position at a terrace at the foot of a mountain slope and the presence of reduced iron in the soil. Wetland hydrology was found in adjacent areas with similar vegetation and soils during a wetland delineation conducted in late summer of the previous year.

While the site was disturbed in the past by logging, the position of this wetland as a forest opening could provide a small area of hunting habitat for owls. The wetland could provide browsing opportunities for deer and other herbivores, especially in late season, though additional browsing opportunities are common in the area.

Artificial roadside wetlands resulting from berms and failed culverts. Some roadside wetlands are likely to dry up once flows are restored to natural patterns (< 0.02 acre). These artificial wetlands were created on previously dry (upland) as a result of human activities and are low-value wetlands.

Piers associated with the construction of boardwalks. There would be a small loss of wetlands (< 0.01-acre) as a result of installation of small piers to extend the existing footbridge in the lower Grove to protect the wetland from trampling impacts and replacement of drainage culverts to accommodate larger flows. These actions are designed for the purpose of public enjoyment and education, and wetland protection.

There would also be site-specific temporary impacts on wetlands during the construction phase. All wetlands would be protected using best management practices (see Attachment A). The removal of impervious surfaces associated with existing buildings could temporarily increase groundwater infiltration by exposing soils. A temporary change in surface runoff during construction would not be noticeable in the Mariposa Grove and would have a minimal effect on function or value of the wetlands in the Mariposa Grove.

The repair of leaking water pipes could have small local impacts on water tables, as it would eliminate unintended leakage. It is difficult to quantify or locate site-specific underground leaks in this complex and large system, but overall, replacement of water lines could contribute to localized minor decreases in water levels leading to restoration of natural water levels.

Beneficial wetland impacts. There would be 1.00-acre of wetland habitat gain due to ecological restoration activities in the lower Grove (figure F-5) and removal of trails and narrowing of roads in the upper Grove (figure F-6).

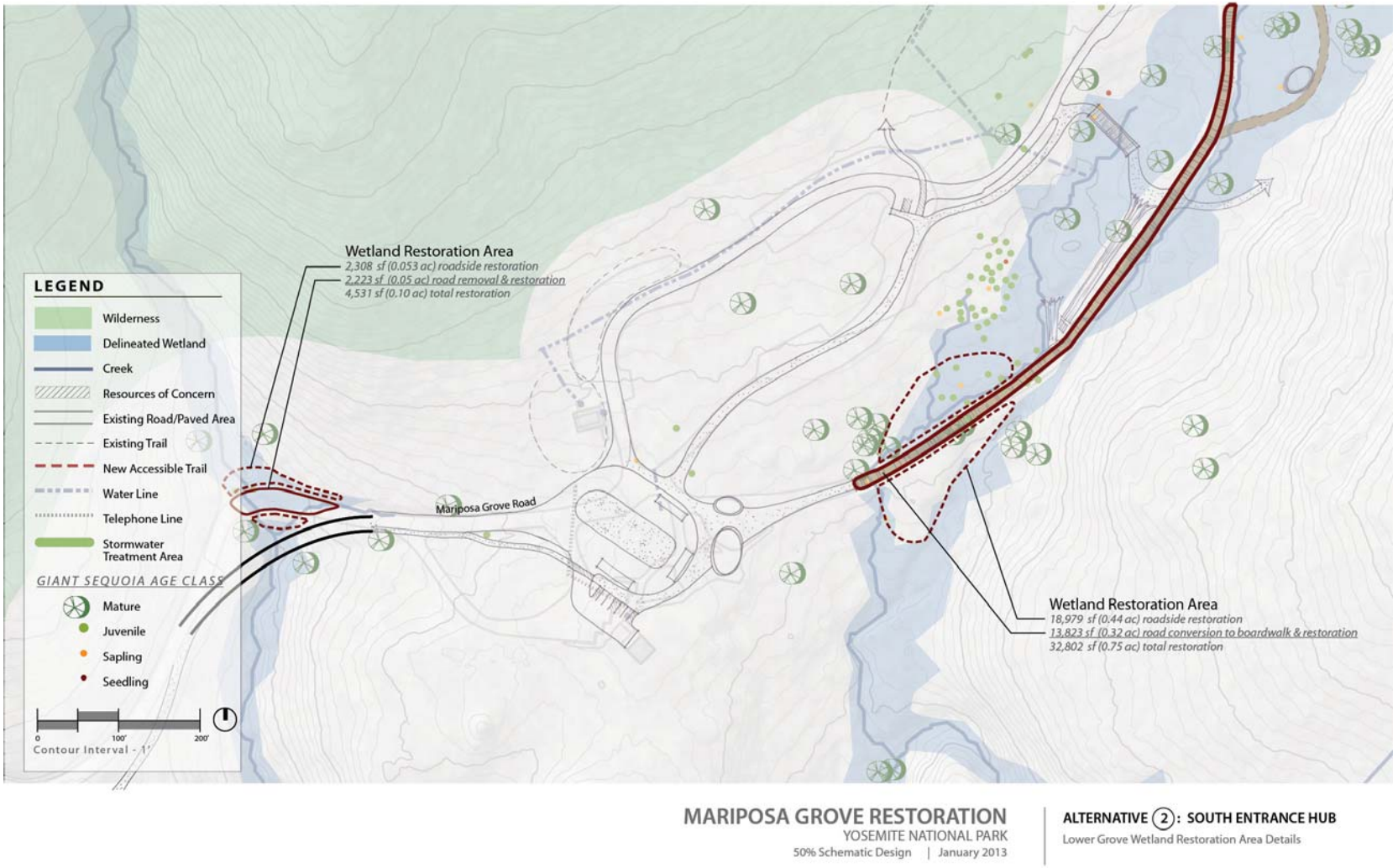


Figure F-5. Wetland Restoration proposed in the lower Grove under Alternative 2 (Preferred) (0.85-acre)

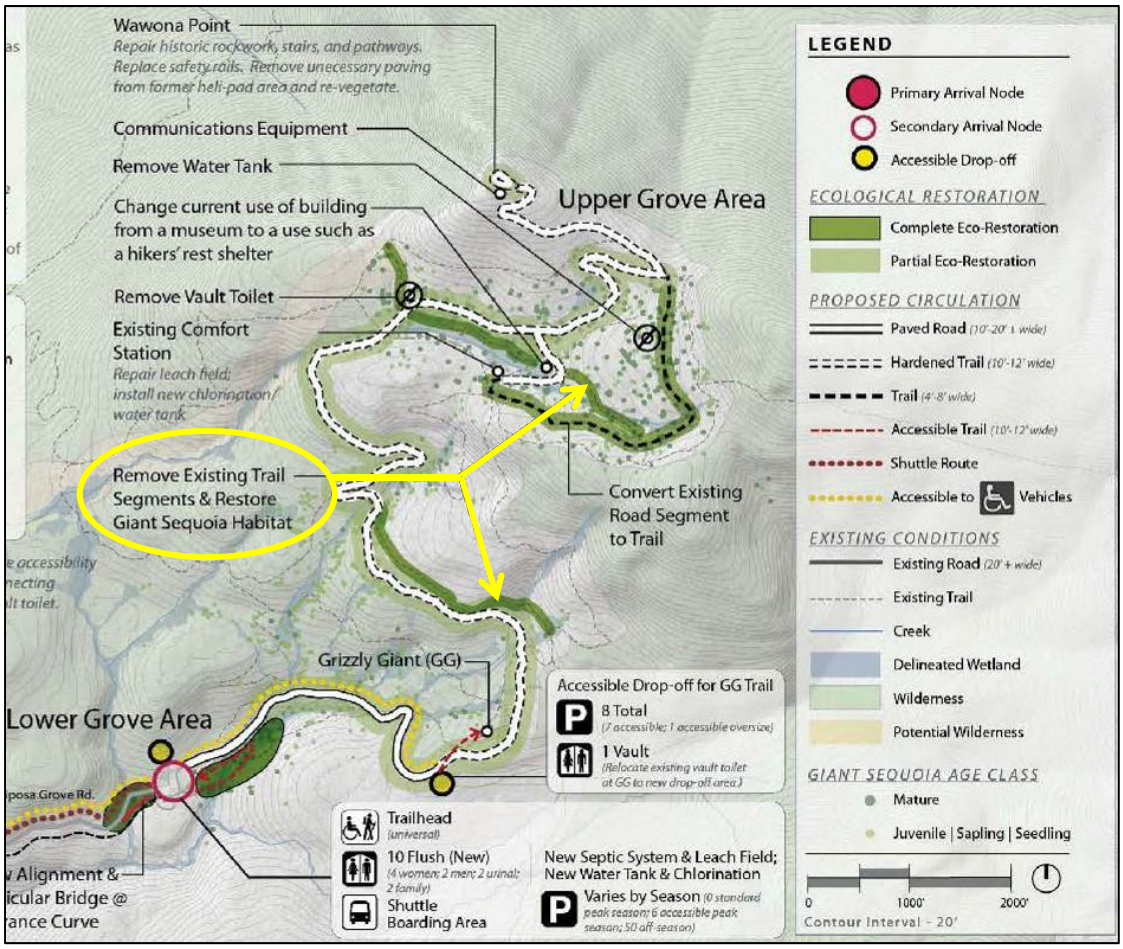


Figure F-6. Wetland restoration proposed in the upper Grove under Alternative 2 (Preferred) (Trail removal and road narrowing would restore 0.15-acre of wetland habitat)

Additionally, infrastructure and development would be removed from the Grove and subsequent ecological restoration would take place in natural areas outside of wetlands (3.93 acres, including wetland restoration). The principal values of this large wetland complex include important hydrologic support for the Mariposa Grove such as aquifer recharge, storm runoff abatement, sediment retention, prevention of erosion through streambank stabilization, and stream/river temperature moderation. Wetlands in this area are likely thousands of years old, and they encompass a great diversity of habitats, plants, and wildlife. The area supports quality habitat for the pacific fisher, a candidate for listing under the Federal Endangered Species Act with a high likelihood of being listed prior to project completion. Prime denning habitat for the fisher includes and snags, multiple canopy layers, and few openings, conditions all found in the Mariposa Grove and confirmed by the presence of a nearby fisher den. The area supports a range of wetland types including several fens, which have a limited distribution in the Sierra Nevada. About 82% of giant sequoias in the Mariposa Grove are located within 200 feet of delineated wetlands (Kuhn 2011).

There would be substantial positive impacts to overall wetland functions in the Mariposa Grove. For example, removal of impermeable surfaces such as asphalt roads and trails would create natural buffers around existing and restored wetlands. Hydrologic connectivity (surface flow and shallow groundwater) would be restored by cleaning, repairing, and replacing dysfunctional culverts and

outsloping road trail surfaces. The watershed would be restored to a more natural configuration, infiltration in the Grove would increase, and stormwater runoff would decrease, resulting in beneficial impacts on surface water quality. Leaky water pipes in the upper Grove would be repaired and monitored. Repair of septic systems and leach fields would reduce the potential to introduce nutrients to shallow groundwater.

In the long term, removal of facilities and elimination of associated uses such as commercial tram service from the Mariposa Grove would protect and restore wetland habitat. Realignment of the Grove road northward out of the delineated wetland, and conversion of the original alignment to an accessible trail, would beneficially impact wetlands in that portion of the Grove. Closing the existing road in the Mariposa Grove would reduce operation activities and reduce the potential for inadvertent impacts on wetlands from trampling, although some recreational foot traffic in nearby wetlands would continue. Discharge of waterborne pollutants directly into wetland communities from road and parking areas would be reduced in the Mariposa Grove, but would increase at the South Entrance.

Cumulative Impacts

Cumulative 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 the proposed actions. Past, present, and reasonably foreseeable future actions affecting wetlands include implementation of the park's Merced Wild and Scenic River Comprehensive Management Plan, Merced River Ecological Restoration at Eagle Creek Project, Wawona Meadow Restoration, South Entrance Kiosk project, and fuel reduction projects on adjacent Forest Service land.

The South Entrance Kiosk project (Categorical Exclusion 39501) is of particular importance, as it takes place directly adjacent to the Mariposa Grove project, and wetland impacts associated with the kiosk project will be compensated as part of the Mariposa Grove project. The U.S. Army Corps of Engineers authorization for the kiosk replacement project under Section 404 of the Federal Clean Water Act requires the NPS to create 0.6 acre of similar wetlands as part of the Mariposa Grove project to mitigate impacts under the South Entrance Kiosk project (see Compensatory Mitigation Section).

Alternative 1 (No Action), in conjunction with past and future actions, would continue to contribute to adverse cumulative impacts on wetlands due to existing infrastructure in the lower Grove wetlands, continued diversion of water within the Grove, and existing erosion and channelization and resultant sedimentation. Alternatives 2, 3, and 4 in conjunction with past and future actions may contribute to temporary negligible or minor local adverse impacts to wetlands; however, there would be long-term major cumulative beneficial impacts from wetland habitat restoration.

COMPENSATORY MITIGATION

Ecological restoration within the Mariposa Grove will include restoration of 1.00-acre of wetland restoration (figures F-5 and F-6). Following construction activities, artificial fill material will be removed with excavator and skid steer and the area will be revegetated with appropriate wetland, riparian and upland native plant species. Ground surface treatment will include decompaction, salvaging top soil, seeding, and planting. Accepted erosion protection measures, including jute mesh and hydro mulch, may be used, if necessary, to prevent soil loss. The NPS will prepare a prescription for revegetating disturbed areas including riverbanks in construction specifications. This prescription would comply with the Yosemite *Vegetation Management Plan* (NPS 1997) and the *Invasive Plant Management Plan* (2008) and the *Invasive Plant Management Plan Update* (2011b). Revegetation of disturbed sites would be conducted by park staff immediately following

construction to reduce the potential for non-native plant invasion. All plant materials will be from genetic stock indigenous to Yosemite National Park, including trees, shrubs, and forbs salvaged from the construction site or by propagating container plants from seed or cuttings. Following restoration efforts, revegetated sites will be monitored to determine if revegetation efforts were successful and if additional remedial actions are necessary. Remedial actions could include the installation of erosion control structures, reseeding, and/or replanting the area, and controlling non-native plant species.

Avoidance of wetlands and adherence to mitigation measures described in the *Draft Mariposa Grove EIS* would minimize short-term impacts (see below). Construction equipment staging areas would not be located adjacent to or within wetlands. Implementation of construction Best Management Practices would be employed to minimize impacts associated with erosion and sedimentation (see Attachment A). Best Management Practices would include, but not be limited to, installation of silt fencing and sediment traps, application of water sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, where appropriate. Alternative 2 (Preferred) would have a long-term major beneficial impacts on wetlands from the removal of facilities, decreases in vehicular traffic, and the restoration of natural surface and subsurface water flows throughout the Grove.

Compensation

There would be 0.37-acre of wetland habitat compensation required under Alternative 2 (Preferred) of the Mariposa Grove project. Wetland impacts would be associated with:

- Relocation of a water tank (0.1-acre)
- Construction of a parking lot at the South Entrance (0.24-acre)
- Artificial roadside wetlands that could dry up with road improvements (0.02-acre)
- Piers associated with boardwalk construction (0.01-acre)

The compensation for wetland impacts from the Mariposa Grove project can be accommodated within the one acre of wetland restoration in the Mariposa Grove illustrated in figure F-5 and figure F-6. In addition, the NPS intends to count 0.6 acre of wetland restoration (out of the remaining 0.63-acre of wetland restoration in the Mariposa Grove) as mitigation specified required under a previous project, the South Entrance Station Kiosk Replacement project (Categorical Exclusion 39501).

The U.S. Army Corps of Engineers authorization for the kiosk replacement project under Section 404 of the Federal Clean Water Act specifically notes:

> *In order to properly mitigate for the impacts to waters of the United States with the creation of this* [kiosk replacement] *project you shall create 0.6 acres of similar wetlands as part of the adjacent Mariposa Grove wetland restoration project by September 30, 2015. These 0.6 acres of wetlands shall be monitored for five years or until it is determined to be a success by our office having at least 75% absolute coverage of dominate by native vegetation. For this site to be considered successful it must function as a wetland on its own at full vegetative coverage for three consecutive years without human intervention.*[Letter dated August 22, 2012 from the U.S. Army Corps of Engineers Regulatory Division to Supt. Don Neubacher, Yosemite National Park (SPK-2012-00685)

The Mariposa Grove project (Alternative 2) and the South Entrance kiosk replacement project comprehensively require a total of 0.97 acre of wetland compensation. Wetland compensation will be accommodated within the 1.00 acre of wetland restoration within Mariposa Grove illustrated in figure F-5 and figure F-6.

WETLAND IMPACT ANALYSIS AND FUNCTIONAL ASSESSMENT

Wetland impacts under Alternative 2 (Preferred) of the Draft Mariposa Grove EIS would take place near the South Entrance to Yosemite National Park. This is also the location of the wetlands that would be impacted as part of the South Entrance Station Kiosk Replacement project (Categorical Exclusion 39501), which requires compensation under the Mariposa Grove project (see Compensation section above). Potential impacts would take place in palustrine emergent wetlands in a portion of the park that was logged prior to designation as part of a national park. The 0.24 acre wetland to be impacted near the proposed parking lot could provide a small area of hunting habitat for owls. The wetland could provide browsing opportunities for deer and other herbivores, especially in late season. Alternative browsing opportunities are common in the area.

Wetlands that would be restored would enhance a portion of a large, complex, very high-value wetland that encompasses 90.3 acres of palustrine forested wetland, 1.6 acres of palustrine scrub shrub wetland, 8.8 acres of palustrine emergent wetland, and 2.0 acres of riverine wetland. The restored 1.00-acre wetland would be primarily palustrine emergent wetland, but it would be adjacent to the mix of additional wetland types. The principal values of this large wetland complex are hydrologic support for Mariposa Grove including aquifer recharge, storm runoff abatement, sediment retention, prevention of erosion through streambank stabilization, and stream/river temperature moderation. The area has never been logged. The Mariposa Grove supports quality habitat for the pacific fisher, a candidate for listing under the Federal Endangered Species Act with a high likelihood of listing prior to project completion. Prime denning habitat for the fisher includes snags, multiple canopy layers, and few openings, conditions found in the Mariposa Grove and confirmed by the presence of a nearby fisher den. The area supports a range of wetland types including several fens, which have a limited distribution in the Sierra Nevada. About 82% of giant sequoias in the Mariposa Grove are located within 200 feet of delineated wetlands (Kuhn 2011).

Overall there would be 0.37-acre of wetland impact in a wetland of low-moderate value and 1.00-acre of wetland restoration in a very high-value wetland. In addition to specific wetland restoration, there would be substantial positive impacts to overall wetland functions in the Mariposa Grove. About 3 acres of wetland buffer and surrounding habitat would be restored, in addition to direct wetland habitat gain. For example, removal of impermeable surfaces such as asphalt roads and trails would create natural buffers around existing and restored wetlands. Hydrologic connectivity (surface flow and shallow groundwater) would be restored by cleaning, repairing, and replacing dysfunctional culverts and outsloping road and trail surfaces. Overall, there would be a long-term, major beneficial impact on wetlands as a result of Alternative 2 (Preferred) in the Draft Mariposa Grove EIS.

COMPLIANCE

This document is required in order to comply with the National Park Service's Director's Order #77-1: Wetland Protection. Compliance with other agency regulations will be completed (if appropriate for this project) separately from this document. Separate compliance with other appropriate federal laws and regulations is required per NPS Director's Order #77-1: Wetland Protection and Procedural Manual. For example, NPS activities that involve the discharge of dredged or fill material into wetlands or other waters of the United States may have to comply with Sections 401 and 404 of the Clean Water act and Section 10 of the Rivers and Harbors Act. And if

appropriate, the NPS may also have to comply with the Fish and Wildlife Coordination Act; the Endangered Species Act; the National Historic Preservation Act; and other relevant laws and regulations governing actions in wetlands and other aquatic environments.

CONCLUSION

Alternative 2 will restore 1.00-acre of wetlands in the Mariposa Grove. Construction activities would result in adverse impacts on 0.37- acre of wetlands. The 0.37- acre of wetlands lost will be compensated with the ecological restoration of 1.00-acre of high-value wetlands to be restored in the core of the Mariposa Grove. The remaining 0.63-acre of wetland restored in the Grove will serve as compensation for 0.6-acre of impact to wetlands created by a separate project, already approved and in progress, which involves filling 0.6-acre of wetland for the construction of kiosks near the south entrance.

Individual permits with other federal and cooperating state and local agencies, for example under Clean Water Act Section 404 or 401, will be obtained or updated as appropriate prior to restoration or construction activities. There would be no change to the natural and cultural integrity of the park, or discernable effects to resource values identified in the 1980 Yosemite National Park *General Management Plan* (NPS 1980). The NPS finds the proposed action to be consistent with the policies and procedures of under Executive Order 11990 for the protection of wetlands and NPS Director's Order #77-1: Wetland Protection, including the "no-net-loss of wetlands" policy.

REFERENCES

Central Valley Regional Water Quality Control Board (CVRWQCB). 1983. *Guidelines for Protection of Water Quality During Construction and Operation of Small Hydro Projects*.

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National Park Service (NPS). 1980. *Yosemite General Management Plan,* Yosemite National Park, California.

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ATTACHMENT A
BEST MANAGEMENT PRACTICES AND RESOURCE-SPECIFIC MITIGATION MEASURES

Best Management Practices and resource-specific mitigation measures would be implemented, as appropriate, prior to, during, and/or after construction.

Best Management Practices During Construction Activities

The NPS (and its contractors) would implement the following Best Management Practices, as appropriate, prior to, during, and/or after construction activities. Specific tasks would include, but are not limited to, the following:

- Prior to entry into the park, steam-clean heavy equipment to prevent importation of non-native plant species, tighten hydraulic fittings, ensure hydraulic hoses are in good condition and replace if damaged, and repair all petroleum leaks. Implement compliance monitoring to ensure the project remains within the parameters of National Environmental Policy Act and National Historic Preservation Act compliance documents, USACE Section 404 permits, etc. Compliance monitoring would ensure adherence to mitigation measures and would include reporting protocols.
- Inspect the project to ensure that impacts stay within the parameters of the project area and do not escalate beyond the scope of the environmental assessment, as well as to ensure that the project conforms with all applicable permits or project conditions. Store all construction equipment within the delineated work limits. Confine work areas within creek channels to the smallest area necessary.
- Provide a project orientation for all construction workers to increase their understanding and sensitivity to the challenges of the special environment in which they will be working. Ensure equipment allowed within the river channel is equipped with a hazardous spill containment kit. Ensure that personnel trained in the use of hazardous spill containment kits are on site at all times during construction activities.
- 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. Store all construction equipment within the delineated work limits.
- 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. The park shall develop a Communications Strategy Plan to alert necessary NPS and concessioner employees, residents, and visitors to pertinent elements of the construction work schedule.
- Develop an emergency notification plan that complies with park, federal, and state requirements and allows contractors to properly notify park, federal, and/or state personnel in the event of an emergency during construction activities. This plan will address notification requirements related to fire, personnel, and/or visitor injury, releases of spilled material, evacuation processes, etc. The emergency notification plan will be submitted to the park for review/approval prior to commencement of construction activities.

- Notify utilities prior to construction activities. Identify locations of existing utilities prior to removal activity to prevent damage to utilities. The Underground Services Alert and NPS maintenance staff will be informed 72 hours prior to any ground disturbance. Construction-related activities will not proceed until the process of locating existing utilities is completed (water, wastewater, electric, communications, and telephone lines). An emergency response plan will be required of the contractor.
- Avoid damage to natural surroundings in and around the work limits. Provide temporary barriers to protect existing trees, plants, and root zones, if necessary, as determined by vegetation management staff. Trees and other vegetation shall not be removed, injured, or destroyed without prior written approval. Ropes, cables, or fencing shall not be fastened to trees. All existing resource protection fencing (post and rope) shall be left in place and protected from heavy equipment.
- Remove all tools, equipment, barricades, signs, surplus materials, and rubbish from the project work limits upon project completion. Repair any asphalt surfaces that are damaged due to work on the project to original condition. Remove all debris from the project site, including all visible concrete, timber, and metal pieces. Grade disturbed areas and rake them smooth to eliminate tire tracks and tripping hazards.
- Locate, contain, and stabilize excavated and stored materials within upland staging areas and prevent re-entry into wetland or aquatic habitats.
- Use approved siltation and sediment control devices appropriate to the situation in grading areas to capture eroding soil before discharge to riparian channels.
- Delineate wetlands and apply protection measures during construction. Wetlands shall be delineated by qualified NPS staff or certified wetland specialists and clearly marked prior to work. Perform activities in a cautious manner to prevent damage caused by equipment, erosion, siltation, etc.

Resource-Specific Mitigation Measures

Hydrology and Water Quality

Prepare an erosion control plan specifying measures to prevent erosion/sedimentation problems during project construction. Include a map of the project site delineating where erosion control measures will be applied. Include the following minimum criteria, adapted from the *Guidelines for Protection of Water Quality During Construction and Operation of Small Hydro Projects* (CVRWQCB 1983):

- Where working areas are adjacent to or encroach on live streams, barriers shall be constructed that are adequate to prevent the discharge of turbid water in excess of specified limits.
- Material from construction work shall not be deposited where it could be eroded and carried to the stream by surface runoff or high stream flows.
- All disturbed soil and fill slopes shall be stabilized in an appropriate manner.
- Surface drainage facilities shall be designed to transport runoff in a non-erosive manner.
- Wastewater contaminated with by-products from construction activities shall be contained in a holding or settling tank to prevent contaminated material from entering watercourses or wetlands.

- Waters shall be free of changes in turbidity that cause a nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits, as described in *The Water Quality Control Plan* for the Central Valley Regional Water Quality Control Board (CVRWQCB 1998). In determining compliance with the limits below, appropriate averaging periods may be applied, provided that beneficial uses will be fully protected:
  - Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases shall not exceed 1 NTU.
  - Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20%.
  - Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs.
  - Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10%.
- Implement stormwater management measures to reduce nonpoint-source pollution discharge. This could include measures such as oil/sediment containment or street sweeping.
- Remove hazardous waste materials generated during implementation of the project from the project site immediately.
- Dispose of volatile wastes and oils in approved containers for removal from the project site to avoid contamination of soils, drainages, and watercourses. Keep absorbent pads, booms, and other materials onsite during projects that use heavy equipment to contain oil, hydraulic fluid, solvents, and hazardous materials spills.
- Final design and installation of site drainage improvements will be closely coordinated with the park's Resources Management and Science Division.
- Salvage hydric soils and use them as fill in wetland excavations to the maximum extent possible. Minimize use of fill materials with high permeability in wetland areas to prevent development of unnatural groundwater conduits.
- Incorporate trench plugs into new and abandoned utility corridors through wetland areas where required to prevent formation or continuation of groundwater conduits.

Vegetation

- The contractor will develop a Revegetation Plan in conjunction with the park's Resources Management and Science Division, to be approved prior to construction activities.
- Ensure that all earth-moving equipment and hand tools enter the park free of mud or seed-bearing material to prevent the introduction of non-native plants. The NPS will inspect all equipment prior to use on the project.
- Map and treat noxious weeds prior to construction. Certify all seeds and straw material as weed-free. Ensure that imported top-soil is weed-free. The NPS will approve sources of imported fill material that will be used within the top 12 inches of the finished grade. Monitor and treat invasive plants for three years post-construction.
- Install temporary fencing (black silt fencing or orange construction fencing) around the entire project area to protect natural surroundings (including sensitive plants, trees, and root zones) from damage. Avoid fastening ropes, cables, or fences to trees.

- Use native seed mix or seed-free mulch to minimize surface erosion and the introduction of noxious weeds.
- If special-status plant species are identified within the construction disturbance zone, in particular within restoration and revegetation areas, avoid special-status plant populations during construction activities. If the project manager is unable to avoid adverse impacts to rare plants, immediately contact the Park Botanist prior to work. Adverse impacts to the Yosemite bog orchid, in particular, are not acceptable. The Park Botanist will work with the project manager to mitigate unavoidable impacts to other special-status plants in the vicinity.
- If it is not feasible for construction activities to avoid special-status plant species (with the exception of the Yosemite bog orchid, which must be avoided), species conservation measures will be developed in coordination with Yosemite National Park natural resources staff. Measures may include salvage of special-status plants for use in revegetating disturbed areas and transplantation of special-status plants wherever possible using methods and monitoring identified in the revegetation plan, monitoring to ensure successful revegetation, protection of plantings, and replacement of unsuccessful plant materials if practicable.
- Provide proper and timely maintenance for vehicles and equipment used during construction to reduce the potential for mechanical breakdowns.
- Use silt fencing at drainages to prevent construction materials from escaping work areas.

Wildlife

Based on available anecdotal and scientific evidence, 78 amphibian, reptile, mammal, and bird species occur in the Mariposa Grove and South Entrance project area. Of these 78 species, 17 are special status species, including 10 bird species (northern goshawk, golden eagle, peregrine falcon, bald eagle, long-eared owl, great gray owl, California spotted owl, Vaux's swift, olive-sided flycatcher, and yellow warbler) and 7 mammal species (pallid bat, Townsend's big-eared bat, spotted bat, western red bat, western mastiff bat, Sierra Nevada mountain beaver, and Pacific fisher).

Mitigation to Protect Key Habitat Features for Fishers, Bats, And Owls

- Schedule construction activities with seasonal consideration of wildlife lifecycles to minimize impacts during sensitive periods (i.e., after bird nesting seasons, when bats are neither hibernating nor have young, etc.
- Limit the effects of light and noise on adjacent habitat through controls on construction equipment.
- In construction zones, conduct owl and bird surveys and bat acoustic surveys and install carnivore cameras as needed to inform proper mitigation actions that would reduce impacts on wildlife.
- Avoid disturbing basal hollows (created by repeated fires), deep bark furrows, and cavities and crevices of tree crowns important for bats and other wildlife (Pierson et al. 2006).

Snags are an essential habitat element for the majority of special status species documented using the Mariposa Grove. Removal of snags may indirectly result in decreased rates of reproduction and increased rates of mortality for fishers (USDA Forest Service 2001), and spotted owls use cavities in snags for nesting and raising young. If hazard tree (snag) removal cannot be avoided:

- Remove snags only under consultation with the park biologist and park forester.
- A wildlife biologist should examine any trees and snags for nesting, denning, or roosting wildlife, or the potential for such use, prior to removal.

Mitigation to Protect Fisher Dens

Protect all known fisher natal (birthing) and maternal (kit rearing) den structures within Yosemite, and any den structures located in the future. This measure is particularly compelling because female fishers have been known to reuse past dens (i.e. same fisher returning to the same den the next season or another female using a den occupied by a different fisher from a previous season) (R. Sweitzer, pers. comm.).

- Protect verified fisher birthing and kit rearing dens from March 1 - June 30 with 700-acre buffers consisting of the highest quality habitat (CWHR size 4 or greater and canopy closure greater than 60%) in a compact arrangement surrounding the den site in the largest, most contiguous blocks available.
- For active dens, within this buffer, (1) enforce a night closure of any paved roads and (2) halt construction, restoration, fire management, or other disturbing activities until the cessation of denning season (June 30).

Mitigation Specific to the Pacific fisher

- Continue monitoring fishers in the park (in conjunction with fisher researchers working in and around Yosemite National Park) to establish whether fishers are actively foraging or denning near the project area. Establish buffers to prevent disturbance around any active dens.
- Add wildlife crossing structures at riparian crossings near South Entrance and Mariposa Grove along Wawona and Mariposa Grove roads as construction work is being conducted.
- Conduct fuels reduction activities outside of fisher denning season.
- Time construction and restoration activities to avoid the most sensitive time periods for fishers (i.e. during denning season (March 1 - June 30) and during juvenile dispersal (from early February onward)
- Adaptively manage for fishers through continued targeted surveys during key time periods during construction/restoration/fire management activities.
- Retain habitat features important to fishers including: large diameter black oaks, large diameter conifers, large diameter snags, large decayed logs, high canopy closure/multiple layer canopy, and coarse woody debris on the ground, in areas with moderate to steep slopes and drainages with running and/or pooled water (Zielinski et al. 2004).
- Retain and recruit large-diameter (>11 inches diameter at breast height (DBH)) snags (Freel 1991; Buskirk and Powell 1994) and large-diameter (>24 inches DBH) live conifer and oak trees with decadence such as broken tops or cavities (Freel 1991).
- Maintain dense canopy cover (>60%) in the vicinity of large trees (Buskirk and Powell 1994).
- Retain and recruit large woody debris, including large-diameter (at least 15-inches DBH by 15 feet long) downed logs (Freel 1991, Buskirk and Powell 1994) and complex structure near the ground (e.g., downed logs, large downed branches, root masses, live branches) (Buskirk and Powell 1994).

- Retain a mosaic of late-successional coniferous or mixed forests and perform fuel treatments in patches, allowing adequate dispersal habitat for fishers and avoiding creation of large, open areas that have no overstory or shrub cover.
- Identify additional protection measures as deemed necessary to avoid disturbance during construction or restoration-related activities.

OWLS: Conduct surveys in the spring (beginning March 15) to determine if spotted owls are nesting or foraging in the vicinity of the construction/restoration area. If owls are present, the park construction project manager will work with park biologists to determine appropriate measures to avoid disturbance, such as no construction activities between 30 minutes before dusk and 30 minutes after dawn, and an approximate 1,250-foot buffer of no disturbance (light or noise) around nest trees from March 15 through August 31.

BATS: If a project targets any trees for removal during the winter, a biologist will survey for roosting bats the preceding fall (September and October). If the biologist suspects hibernation in a tree, do not remove that tree until mid-April to mid-May. If a project targets any trees for removal during the summer, a biologist should survey for roosting bats within one week prior to removal to determine if a bat maternal colony occurs in the tree.

The following are additional Best Management Practices from Appendix 2 of NPS *Procedural Manual 77-1: Wetland Protection*:

1. **Effects on hydrology and fluvial processes:** Action must have only negligible to minor, new adverse effects on site hydrology and fluvial processes, including flow, circulation, velocities, hydroperiods, water level fluctuations, sediment transport, channel morphology, and so on. Care must be taken to avoid any rutting caused by vehicles or equipment.
2. **Effects on fauna:** Action must have only negligible to minor, new adverse effects on normal movement, migration, reproduction, or health of aquatic or terrestrial fauna, including at low flow conditions.
3. **Water quality protection and certification:** Action is conducted so as to avoid degrading water quality to the maximum extent practicable. Measures must be employed to prevent or control spills of fuels, lubricants, or other contaminants from entering the waterway or wetland. Action is consistent with state water quality standards and Clean Water Act Section 401 certification requirements (check with appropriate state agency).
4. **Erosion and siltation controls:** Appropriate erosion and siltation controls must be maintained during construction, and all exposed soil or fill material must be permanently stabilized at the earliest practicable date.
5. **Proper maintenance:** Structure or fill must be properly maintained so as to avoid adverse impacts on aquatic environments or public safety.
6. **Heavy equipment use:** Heavy equipment use in wetlands must be avoided if at all possible. Heavy equipment used in wetlands must be placed on mats, or other measures must be taken to minimize soil and plant root disturbance and to preserve preconstruction elevations.
7. **Stockpiling material:** Whenever possible, excavated material must be placed on an upland site. However, when this is not feasible, temporary stockpiling of excavated material in wetlands must be placed on filter cloth, mats, or some other semipermeable surface, or comparable measures must be taken to ensure that underlying wetland habitat is protected. The material must be stabilized with straw bales, filter cloth, or other appropriate means to prevent reentry into the waterway or wetland.

8. **Removal of stockpiles and other temporary disturbances during construction:** Temporary stockpiles in wetlands must be removed in their entirety as soon as practicable. Wetland areas temporarily disturbed by stockpiling or other activities during construction must be returned to their pre-existing elevations, and soil, hydrology, and native vegetation communities must be restored as soon as practicable.
9. **Topsoil storage and reuse:** Revegetation of disturbed soil areas should be facilitated by salvaging and storing existing topsoil and reusing it in restoration efforts in accordance with NPS policies and guidance. Topsoil storage must be for as short a time as possible to prevent loss of seed and root viability, loss of organic matter, and degradation of the soil microbial community.
10. **Native plants:** Where plantings or seeding are required, native plant material must be obtained and used in accordance with NPS policies and guidance. Management techniques must be implemented to foster rapid development of target native plant communities and to eliminate invasion by exotic or other undesirable species.
11. **Boardwalk elevations:** Minimizing shade impacts, to the extent practicable, should be a consideration in designing boardwalks and similar structures. (Placing a boardwalk at an elevation above the vegetation surface at least equal to the width of the boardwalk is one way to minimize shading.)
12. **Wild and Scenic Rivers:** If the action qualifies as a water resources project pursuant to Section 7(a) of the Wild and Scenic Rivers Act, then appropriate project review and documentation requirements under Section 7(a) are required.
13. **Endangered species:** Action must not jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, including degradation of critical habitat (see *NPS Management Policies 2006* and guidance on threatened and endangered species).
14. **Historic properties:** Action must not have adverse effects on historic properties listed or eligible for listing in the National Register of Historic Places.

Refer to the *Restoration of the Mariposa Grove of Giant Sequoias Project Environmental Assessment* Appendix B for a complete list of Standard Mitigation Measures and resource-specific mitigation measures applicable to the proposed action. The proposed action has been designed to avoid or mitigate harmful effects to wetlands.



Appendix G:
Draft Memorandum of Agreement

DRAFT
MEMORANDUM OF AGREEMENT BETWEEN THE NATIONAL PARK SERVICE AND THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER REGARDING THE RESTORATION OF THE MARIPOSA GROVE OF GIANT SEQUOIAS, YOSEMITE NATIONAL PARK, MARIPOSA COUNTY, CALIFORNIA

(NOTE: DRAFT MOA will be revised based on ongoing consultation with SHPO and traditionally associated American Indian tribes and groups. Final MOA to be included in Record of Decision.)

WHEREAS, the National Park Service (NPS) has determined that existing infrastructure within the Mariposa Grove of Giant Sequoias (Grove), including buildings roads and parking areas, is effecting the long term health of the giant sequoias within the Grove, and

WHEREAS, the Mariposa Grove of Giant Sequoias was part of the Yosemite Grant, legislation passed by the US Congress and signed by President Lincoln in 1864, which set aside Yosemite Valley and the Mariposa Grove of Giant Sequoias as the first public lands protected for all time for their scenic and natural values, and

WHEREAS, the NPS has developed a plan to restore natural processes at key locations within the Grove, and that this action constitutes an Undertaking as defined by the National Historic Preservation Act (NHPA); and

WHEREAS, the NPS initiated consultation with the California State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (Council), American Indian tribes and groups on September 30, 2011, and has involved the public according to the process specified by the National Environmental Policy Act, and the NPS will maintain ongoing consultation with all parties as required, including the following American Indian tribes and groups: American Indian Council of Mariposa County, Inc. (also known as the Southern Sierra Miwuk Nation), Bishop Paiute Tribe, Bridgeport Paiute Indian Colony of California, Mono Lake Kutzadika[a] Paiute Tribe, North Fork Rancheria of Mono Indians of California, Picayune Rancheria of the Chukchansi Indians, and Tuolumne Band of Me-Wuk Indians; and

WHEREAS, the NPS initiated consultation pursuant to the 1999 *Programmatic Agreement among the National Park Service at Yosemite National Park, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Planning, Design, Operations and Maintenance, Yosemite National Park, California*, and at the request of the SHPO, the NPS agreed to consult (as confirmed by NPS in an April 11, 2012, letter) under the standard review process as identified under 36 CFR Part 800 because of the Undertaking's potential for adverse effects, and

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WHEREAS, the NPS notified the Council by letter dated August 7, 2013 that the proposed Undertaking had the potential to adversely affect historic properties and that a memorandum of agreement would be developed with SHPO and no response to the notification was received by the NPS; and

WHEREAS, the Area of Potential Effect (APE) was defined as the combined Mariposa Grove and the South Entrance Station Historic Districts, which includes the 4-square-mile area comprising the original 1864 Yosemite Grant, the Mariposa Grove Road, and the Mariposa Grove Archeological District, and for which NPS received concurrence from the SHPO on February 5, 2013 (Attachment A of this Agreement provides a map that shows the extent of the APE including associated trails, roads, parking lots, and buildings); and

WHEREAS, through consultation, NPS and SHPO agree that the Undertaking will constitute an adverse effect to the Mariposa Grove Historic District (as amended) as a result of the effects of the proposed actions to the historic road and trail system within the Grove; and

WHEREAS, the NPS and SHPO agree that the Undertaking will adversely affect archeological resources as a result of the construction of parking areas near the South Entrance Station and Grove picnic area and potentially adversely affect archeological resources in the lower Grove area; and

WHEREAS, the NPS and SHPO agree that the Undertaking will adversely affect resources of importance to traditionally associated American Indian tribes and groups; and

WHEREAS, this Memorandum of Agreement (Agreement) provides the mechanism to resolve the adverse effects of the Undertaking and complete any and all requirements of Section 106 of the National Historic Preservation Act (16 U.S.C. Section 470f) and its implementing regulations, 36 CFR 800 with regard to any activities relating to the Undertaking.

NOW, THEREFORE, the NPS and SHPO agree that the Undertaking shall be implemented in accordance with the following stipulations to take into account the effect of the Undertaking on historic properties, American Indian traditional cultural resources, and archeological resources and that these stipulations shall govern the Undertaking until this Agreement expires.

STIPULATIONS

The NPS shall implement the following stipulations:

I. Stipulations for Mitigation Measures to resolve the adverse effects of the Undertaking

A. Update of National Register of Historic Places Nominations and Determinations of Eligibility

1. **Nomination Updates for the Historic Properties Affected**. Within three years of completion of the Undertaking, the NPS will prepare an amendment to the Mariposa Grove Archeological District National Register nomination to update the nomination

with currently available information, incorporate tribal cultural perspectives, and reflect any changes to the district resulting from the Undertaking. The NPS will submit the amendment to the associated American Indian tribes and groups with and SHPO for review and comment. Within six months of the receipt of the comments, the NPS will address the comments and forward the amendment to the Keeper of the National Register.

2. **Determination of Eligibility (DOE) Update for the Historic Properties Affected**. Within three years of completion of the Undertaking associated with the proposed construction of a roundabout at the South Entrance Station, the NPS will prepare amendments to the Cultural Landscape Inventories for the Mariposa Grove Historic District and South Entrance Historic District to reflect changes to the districts resulting from the Undertaking. The NPS will submit amendments to SHPO for review and concurrence.

B. Measures to Address Tribal Cultural Values (*To be determined based on continuing consultations with Yosemite's tribal partners)*

C. Archeological Resources Treatments

1. **Archeological Data Recovery Excavations.** Based on the final designs developed for the project and prior to any ground disturbing actions at CA-MRP-660/H and CA-MRP-661/H associated with the undertaking, the NPS will conduct archeological excavations suitable to recover the scientific information that would otherwise be lost through implementing the undertaking. Further evaluation at CA-MRP-660/H will be required to determine the extent of the archeological site. These excavations will be designed in consultation with traditionally associated American Indian tribes and groups who ascribe religious and cultural significance to these resources, and will incorporate measures to protect these values during conduct of data recovery activities. These excavations will conform to standard archeological preservation practices as specified in the Secretary of the Interior's Standards for Treatment of Archeological and Historic Properties, and NPS guidance for management and treatment of archeological resources. The research design(s) for data recovery will be consistent with the Yosemite Archeological Synthesis and Research Design, and incorporate where appropriate recommendations from more recent archeological studies regarding field, laboratory, and analysis methods. NPS will submit research design(s) and draft report(s) of findings for review by SHPO, traditionally-associated tribes and groups, and professional peers within the agency. NPS will submit copies of final reports to SHPO and traditionally-associated tribes and groups, and incorporate digital versions of the reports into the Yosemite Digital Science Library. All resultant records, data, and archeological materials will be archived into the Yosemite Museum Collections consistent with NPS standards for archeological materials and data.

2. **Archeological Construction Monitoring: (TBD)**

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D. Other Documentation

Prior to implementing any construction, deconstruction, or removal aspects of this Undertaking, the NPS will prepare standard, 5 x 7 archival quality photographic documentation [*Details under discussion with SHPO.*] for those portions of the Mariposa Grove and South Entrance historic districts that will be directly affected by the undertaking, in keeping with the standards of the State of California Historic Resource recording format. Within three years of the completion of the Undertaking, the NPS will prepare the following:

1. **Completion Report.** Documentation will consist of a completion report noting methods, contributing resource documentation, and detailed State of California historic resource records. Photographic documentation will follow standards for State of California Historical Records. Information will also be entered into the NPS List of Classified Structures as a means of tracking changes to contributing elements of the Historic Districts.

2. **Submission of products.** Three copies of the Completion Report, the negatives, prints, and associated records, will be prepared according to the National Park Service archival standards as specified by Yosemite Archives and accessioned into the Yosemite Museum Collections. Image files should be a minimum of 1200 dpi at 8"x10" size in RAW format. Yosemite National Park will file a copy of the Completion Report in the park's Resources Management and Science library and Yosemite Archives.

3. **Digital copies of products.** A digital copy of all materials produced for this project will be included in the archival materials accessioned into the Yosemite Museum Collections, and incorporated into the Yosemite Digital Science Library.

E. Salvage

During field documentation efforts, YOSE historical architect, historical landscape architect, curator and/or preservation specialist will identify any architectural or masonry elements, objects, and materials that may be reused in rehabilitating similar historic structures or landscapes, or that may be suitable for accessioning into the Yosemite Museum Collection.

F. Interpretation

NPS will prepare interpretive materials pertaining to cultural, historical and archeological Resources. Interpretive materials will be developed in conjunction with ongoing consultation with Yosemite's traditionally associated American Indian Tribe and groups and the SHPO's office. Interpretation will include information related to American Indian traditional cultural resources and archeological resources within the Mariposa Grove and Historic District and the Mariposa Grove Archeological District. The history of timber operations in the vicinity of the South Entrance Station will also be addressed through wayside exhibits and other interpretive media and will include interpretation of extant features such as logging machinery, structural remnants of the logging operation and

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remnant trees utilized in support of the logging operation. The history of Chinese involvement in Washburn Family operations, especially road construction, will be incorporated into interpretive components along the Washburn Wagon Road.

G. Site Clean-up

After materials have been salvaged, the following actions will take place in the Mariposa Grove Historic District:

1. **Materials and features to be left in place.** Where the historic road surfacing is being modified, the overall roadway prism (extending from the base of the road fill to the inboard edge of the road) will be retained so that extent of the road as historic feature is still intact. Exceptions include those portions of the road that will be slightly modified/regraded to restore sheet flow of storm water along the uphill side of the roads. In instances where drainage ditches divert water away from the sequoias, the ditches would be modified to restore the natural flow of storm water to the sequoias. In such instances, the extent of the fill slope along the roads would be retained but the cut slope portions would be modified in support of restoring natural hydrologic functions.

II. Standards and Special Conditions

A. Definitions

The definitions provided at 36 CFR 800.16 are applicable throughout this Agreement.

B. Project Standards

The standards, guidelines, regulations, and codes cited below will be followed in execution of the Undertaking:

1. **Professional qualification standards.** All historic preservation activities implemented pursuant to this Agreement shall be carried out by or under the direct supervision of individuals meeting the Secretary of Interior's Professional Qualifications Standards (48 FR 44738-39) for the discipline appropriate to the activity.

2. **Standards for inventory, evaluation, registration, and documentation**. Any inventory, evaluation, registration, or documentation of historic properties completed as per this Agreement shall conform to the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716-44740) and to applicable guidelines and conventions established by NPS and SHPO.

3. **Treatment standards.** Any work on historic buildings, structures, and sites shall conform to the Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties.

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4. **Curation standards.** If applicable, curation of materials and records resulting from actions stipulated by this Agreement shall be in accordance with 36 CFR 79. Such materials and records shall be curated by NPS to the extent permitted by sections 5097.98 and 5097.991 of the California Public Resources Code.

5. **Disclosure of archeological site information.** The Signatories to this Agreement acknowledge that historic properties covered by this Agreement are subject to the provisions of section 304 of the National Historic Preservation Act, as amended, and section 6254.10 of the California Government Code (Public Records Act), relating to the disclosure of archeological site information. All actions and documentation prescribed by this Agreement must be consistent with these sections.

C. Discoveries and Unanticipated Effects

If NPS encounters a previously unidentified property that may be eligible for the National Register during an action of the Undertaking or if it appears that a known historic property will be affected in an unanticipated manner, NPS and SHPO will follow these procedures:

1. **When unanticipated properties are found.**

   a. NPS will halt activities in the vicinity of the previously unidentified property and take all reasonable measures to avoid or minimize harm to the property.

   b. NPS will notify SHPO within two (2) working days of the discovery and provide SHPO with a written assessment via electronic mail. The assessment will evaluate the National Register eligibility of the property and describe actions proposed to resolve any potential adverse effects.

2. **SHPO's recommendation regarding eligibility and proposed actions.**

   a. SHPO shall respond to NPS within two (2) working days of the notification via electronic mail.

   b. NPS shall take into account SHPO's recommendations regarding National Register eligibility and proposed actions. Appropriate actions will then be carried out by NPS. A report of the actions will be submitted to SHPO when they are completed.

III. Administrative Stipulations

A. Amendments

Either signatory party may propose amendments to this Agreement. If a signatory proposes an amendment, the other party shall consult on its appropriateness pursuant to 36 CFR 800.6(c)(7) and (8). This Agreement may be amended only upon the written agreement of both signatories. The amended Agreement shall take effect on the date it is executed by both signatories.

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B. Termination

The following process shall be followed to terminate this Agreement:

1. **Proposed termination.** A signatory party can propose termination of this Agreement in writing to the other signatory, explaining the reasons for proposing termination. The signatories shall consult for 30 days to seek alternatives to termination.

2. **Amendment in lieu of termination.** If the consultation results in an agreement on an alternative to termination, the signatories shall proceed to amend this Agreement in accordance with Stipulation III.A.

3. **Failure to agree.** If consultation does not result in agreement on an alternative to termination, the party proposing termination may terminate this Agreement by promptly notifying the other party in writing. Such termination shall remove all force and effect from this Agreement.

4. **Process to terminate.** Should this Agreement be terminated, NPS shall consult with SHPO to develop a new Agreement in accordance with 36 CFR 800.14(b). Until and unless a new Agreement is executed for the Undertaking, NPS will consult with SHPO in accordance with 36 CFR 800.4 - 6.

C. Dispute Resolution

Should any party to this agreement object at any time to any actions proposed or the manner in which the terms of this Agreement are implemented, all work that is the subject of the dispute will stop until the dispute is resolved according to the procedures in this section and NPS shall consult with the objecting party(ies) to resolve the objection. If NPS determines, within 30 days, that such objections(s) cannot be resolved, NPS will:

1. Forward all documentation relevant to the dispute to the Council in accordance with 36 CFR Section 800.2(b)(2). Upon receipt of adequate documentation, the Council shall review and advise NPS on the resolution of the objection within 30 days. Any comment provided by the Council, and all comments from the parties to the Agreement, will be taken into account by NPS in reaching a final decision regarding the dispute.

2. If the Council does not provide comments regarding the dispute within 30 days after receipt of adequate documentation, NPS may render a decision regarding the dispute. In reaching its decision, NPS will take into account all comments regarding the dispute from the parties to the Agreement.

3. It is the NPS's responsibility to carry out all other actions subject to the terms of this Agreement that are not the subject of the dispute that remain unchanged. NPS will notify all parties of its decision in writing before implementing that portion of the Undertaking subject to dispute under this stipulation. NPS's decision will be final.

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4. **Biennial reporting requirement for this Agreement.** The park will report in writing on the progress made toward the completion of the requirements of this Agreement and the Undertaking in the biennial report required by Section VIII of the 2008 Nationwide Programmatic Agreement between NPS, the National Conference of State Historic Preservation Officer, and the Council.

5. **Duration of this Agreement.** Unless terminated pursuant to Stipulation III.B, the duration of this Agreement is ten (10) years from the date of its execution or until the Undertaking is complete, whichever is shorter.

6. **Effective Date of this Agreement.** This Agreement will take effect on the date that it is executed by NPS and SHPO.

EXECUTION of this Agreement by NPS and implementation of its terms shall be considered evidence that NPS has taken into account the effects of this Undertaking on historic properties and has afforded the Council, SHPO, and tribes and groups an opportunity to comment.

SIGNATORIES

National Park Service

_____ _____

Don L. Neubacher
Superintendent, Yosemite National Park

Date

California State Historic Preservation Officer

_____ _____

Carol Roland-Nawi, Ph.D.
State Historic Preservation Officer

Date

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CONCURRING PARTIES

For the American Indian Council of Mariposa County (Southern Sierra Miwuk):

Name	Title	Date

For the Bishop Paiute Tribe:

Name	Title	Date

For the Bridgeport Paiute Indian Colony:

Name	Title	Date

For the Mono Lake Kutzadika[a] Paiute Tribe:

Name	Title	Date

For the North Fork Rancheria of Mono Indians:

Name	Title	Date

For the Picayune Rancheria of Chukchansi Indians:

Name	Title	Date

For the Tuolumne Band of Me-Wuk Indians:

Name	Title	Date

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Attachment A

Map of Area of Potential Effect, Restoration of the Mariposa Grove of Giant Sequoias

