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Restoration of the Mariposa Grove of Giant Sequoias

Draft Environmental Impact Statement

February 2013

Yosemite National Park

Lead Agency: National Park Service

ABSTRACT

In 1864, the U.S. Congress passed landmark legislation preserving the Mariposa Grove of Big Trees (now known as the Mariposa Grove of Giant Sequoias) and Yosemite Valley. This was the first time Congress set aside public lands for the express purpose of preserving scenic and natural values, stating that these areas "shall be held for public use, resort, and recreation ... inalienable for all time" (Act of June 30, 1864, 13 Stat., 325). Nearly 150 years later, comprehensive actions are needed to ensure that the Mariposa Grove of Giant Sequoias continues to thrive and provide inspiration and enjoyment for future generations. The primary goals of this project are to restore degraded habitat and natural processes critical to the long-term health of the Grove, improve traffic circulation near the South Entrance to Yosemite National Park, and improve the overall experience for visitors to Mariposa Grove. Other objectives include protection and rehabilitation of cultural resources, repair or replacement of deteriorated infrastructure to improve water-use and energy efficiency, and upgrading visitor facilities to improve functionality and accessibility. These project objectives are compatible with goals established for the Mariposa Grove of Giant Sequoias and South Entrance in the 1980 Yosemite *General Management Plan*.

The National Park Service initiated public scoping for this project in late summer 2011. Yosemite National Park hosted several public meetings, open houses, and site visits during the public scoping period, and received more than 40 comment letters. Public comments were considered in the development of three design alternatives for the ecological restoration of Mariposa Grove, improvement of traffic circulation en route to and within the Grove, and improvements to enhance visitor experience. This Draft Environmental Impact Statement describes the environmental setting and potential project impacts of the "no-action" alternative and the three action alternatives. These alternatives are briefly described below; components common to all action alternatives are summarized following the alternative descriptions.

Alternative 1, No Action, serves as a baseline against which effects of the action alternatives are compared. Alternative 1 would include continued maintenance and operations of existing facilities and concessioner-provided commercial services (i.e. commercial tram and gift shop) at the Mariposa Grove of Giant Sequoias. Ecological restoration efforts would be limited to current prescribed fire application, some invasive plant removal, and minor decompacting and mulching.

Alternative 2, South Entrance Hub, is the National Park Service's preferred alternative. Principal actions under this alternative would include removal of most of the public parking from Mariposa Grove; relocation of visitor parking and information services to a new transit hub at the park's South Entrance, with free shuttle service to and from the Grove; removal of the in-Grove gift shop and commercial tram staging area, elimination of tram service, limited restoration of wetlands and giant sequoia habitat in the lower portion of the Grove; improvements to soundscapes; and roadway and drainage improvements on Mariposa Grove Road at the entrance of the Grove (which could include a bridge or box culvert). A pedestrian trail would be established between South Entrance and Mariposa Grove and if continuing congestion warrants it, a new roundabout would be constructed at the intersection of Wawona Road and Mariposa Grove Road at South Entrance to improve traffic flow. Actions to improve accessibility would include construction of accessible pathways in the lower Grove area and at the Grizzly Giant, and improving a picnic area along Mariposa Grove Road.

Alternative 3, Grizzly Giant Hub, would relocate public parking and visitor information services from the lower part of the Grove to a more centralized location in proximity to the Grizzly Giant, but

outside the extent of giant sequoia habitat. The existing road, gift shop, parking area, and commercial tram staging would be removed from the lower Grove area to allow for comprehensive restoration of wetland and giant sequoia habitat. Tram operations would be eliminated within the Grove. A new road would be constructed around the lower Grove area to the new Grizzly Giant visitor parking area. Alternative 3 also would add accessible trails in the lower part of the Mariposa Grove and at the Grizzly Giant. The existing T-intersection would be retained at South Entrance.

Alternative 4, South Entrance Hub with Modified Commercial Tram Service, would be generally similar to Alternative 2, but under this alternative, the commercial tram staging area would be moved to South Entrance, and tram operations would continue in the Mariposa Grove, but the route and hours of operation would be reduced. The overall duration of the tram ride would be lengthened to incorporate the distance between the South Entrance and the Mariposa Grove and would extend to the vicinity of the Mariposa Grove Museum in the upper portion of the Grove. The loop road in the upper portion of the Grove would be converted into a pedestrian trail. The interpretive information offered during the tour would be refocused on the revised route, eliminating current interpretation of the upper Grove area beyond the Mariposa Grove Museum. Under this alternative, an accessible trail would be established through the ecologically restored lower Grove area, and an accessible overlook would be provided at the Grizzly Giant. A pedestrian trail would be established between South Entrance and Mariposa Grove. A modified T-intersection would be constructed at South Entrance to improve traffic flow.

In addition to the actions described above for Alternatives 2, 3, and 4, each of these alternatives would incorporate several other resource management, ecological restoration, historic rehabilitation, and visitor experience enhancement actions that would be similar under each alternative. These actions would include road, trail, and drainage improvements to restore more natural hydrologic flows; project-specific prescribed fire and fuel reduction treatments; soil decompaction; and improvements to visitor orientation and interpretation. Utilities and visitor facilities would be repaired, renovated, or replaced. Under all action alternatives, the gift shop and much of the existing hardscape near the entrance to the Grove would be removed, and visitor amenities would be improved including the addition of accessible trails to the giant sequoias. Rehabilitation of historic features at Wawona Point and in the Grove also would be common to Alternatives 2, 3, and 4.

The alternative ultimately adopted in a Record of Decision would guide the future ecological restoration, infrastructure improvement, historic rehabilitation, and resource management activities in the Mariposa Grove of Giant Sequoias and at the South Entrance to Yosemite National Park.

The Draft Environmental Impact Statement and other information are available online at the park's Planning, Environment, and Public Comment (PEPC) website (http://www.parkplanning.nps.gov/mariposagrove). Commenters are encouraged to submit their comments electronically through PEPC or by mail. All comments must be postmarked or transmitted not later than 60 days after the EPA's notice of filing of the EIS is published in the Federal Register. Hard copies or CDs of this document can be requested via email, mail, fax, or phone using the contact information provided below.

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EXECUTIVE SUMMARY

INTRODUCTION

In compliance with the National Environmental Policy Act, this EIS assesses the potential environmental impacts associated with implementation of, the "no-action" alternative and three comprehensive design alternatives for restoring natural conditions and protecting natural and cultural resources, to the extent practicable, in the Mariposa Grove of Giant Sequoias, and for improving visitor experience in accessing and wayfinding within the Grove and at the nearby South Entrance to Yosemite National Park. This document also fulfills the public review requirements of Section 106 of the National Historic Preservation Act and the California Environmental Quality Act.

PURPOSE OF AND NEED FOR THE PROJECT

Project Purpose

The primary purpose of the proposed project is to implement actions and management policies to address conditions at the Mariposa Grove of Giant Sequoias that are contributing to alteration of natural systems that support the giant sequoias, wetlands, and associated wildlife and other plant communities and the degradation of cultural resources, and that affect the quality of visitor experience. The project is intended to conserve and protect natural and cultural resources at the Mariposa Grove of Giant Sequoias for the enjoyment of current and future visitors, and to implement National Park Service (NPS) policies and support the goals established for the Mariposa Grove of Giant Sequoias and the South Entrance in the 1980 *General Management Plan* for Yosemite National Park.

Additional project objectives are to improve wayfinding within the Grove; enhance interpretation of natural and cultural resources; and meet accessibility requirements consistent with Director's Order 42. This includes addressing compliance requirements consistent with the Architectural Barriers Act of 1968, as amended and Section 504 of the Rehabilitation Act of 1973. These requirements would guide actions to improve accessibility 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.

Project Need

Comprehensive actions to address impacts of past development and management practices, and ongoing operations on the human environment at the Mariposa Grove of Giant Sequoias are needed to ensure that the giant sequoias continue to thrive and, along with other natural and cultural resources associated with the Grove, provide inspiration and enjoyment for current and future generations. Current conditions adversely affecting the ecological health and historic context of the Mariposa Grove of Giant Sequoias 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 encroaches on individual giant sequoias and their roots, and reduce habitat for giant sequoia propagation.
- Ongoing foot and vehicle traffic throughout the 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 (primarily in the form of downed trees and heavy duff and litter) and high tree density in forested areas surrounding the Grove.
- 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:

- Road congestion at the South Entrance is a chronic problem, often creating extensive back-ups during peak use periods.
- Frequent closures of the Grove parking lot and Mariposa Grove Road contribute to visitor frustration in accessing the Grove.
- 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.
- Wayfinding information is in areas in need of improvement to properly orient visitors upon arrival at the Grove and while on trails within the Grove.
- Much of the infrastructure within the Grove does not meet current accessibility standards.
- The vault toilets adjacent to the lower Grove parking lot are one of the most common visitor complaints in Grove, particularly the nuisance odors that detract from the Grove experience.
- Operation of the commercial tram within the Grove creates vehicle/pedestrian conflicts along the roadway, and affects natural soundscapes throughout the Grove.
- Historic features at Wawona Point overlook are in poor condition and require repair.

Peak visitation at Mariposa Grove exceeds 4,200 visitors per day. In accordance with the park's design criteria, alternatives that were developed to respond to the purpose and need would be designed to accommodate 85th percentile visitation levels.

OVERVIEW OF THE ALTERNATIVES

This Draft EIS presents environmental analysis of action alternatives for the restoration of the Mariposa Grove of Giant Sequoias, as well as the 'no action' alternative. To address the issues facing the Grove and its visitors, and consistent with goals outlined in the 1980 Yosemite National Park *General Management Plan*, the National Park Service developed three design alternatives that include major actions to ecologically restore the Grove and improve 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; project-specific prescribed fire and hazardous fuel reduction treatments; 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 involve continuation of the current level of maintenance and operations at the Mariposa Grove of Giant Sequoia. 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 part of the Grove, 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 continue to be redirected to Wawona to board a park shuttle bus and return to the Grove, an inefficient process that can take up to two hours. 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 sequoias, wildlife, special status species, and other natural and cultural resources in the Grove and at South Entrance would not be addressed, and visitor experience 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, 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. 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. Parking, shuttle facilities, and visitor services would be relocated to a South Entrance transit hub. 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 picnic area adjacent to Mariposa Grove Road. Where 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 bridget across Rattlesnake Creek. At 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 to improve traffic flow.

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 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, 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. 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 adjacent to the Mariposa Grove Road. 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 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 1.39 acres, a 48% reduction of impervious surfaces.	Removal of 2.38 acres, an 82% reduction of impervious surfaces.	Removal of 1.55 acres, a 53% 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	3.93 acres removal of built footprint within the Grove (27% reduction)	5.75 acres removal of built footprint within the Grove (39% reduction)	1.79 acres removal of built footprint within the Grove (12% reduction)
Net, project-wide change in development, excluding areas for leach fields	N/A	0.05 acre *reduction* developed area (comprised of 3.93 acre net reduction of developed area within the Grove plus 3.88 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)	2.13 acre *addition* of developed area (comprised of 1.79 acre net reduction of developed area within the Grove plus 3.88 acres new development at the South Entrance)
Infrastructure Redesign and Relocation				
Accessible parking spaces	2 at lower Grove area	7 at South Entrance; 6 at lower Grove area; 1 accessible pullout at picnic area; 8 at Grizzly Giant drop-off	7 at Grizzly Giant; 10 at lower Grove area	7 at South Entrance; 6 at lower Grove area; 4 at Grizzly Giant; 4 at upper Grove area
Standard vehicle parking spaces	25-30 at South Entrance, 115 seasonal at lower Grove area. Over 100 spaces at Wawona are used for overflow parking.	223 at South Entrance, 50 seasonal at lower Grove area	25-30 seasonal at South Entrance, 189 at Grizzly Giant	223 at South Entrance, 50 seasonal at lower Grove area
South Entrance area build out (net footprint after construction)	N/A	3.88 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 with Modified Commercial Tram Service**
Grizzly Giant area build out (net footprint after construction)	N/A	N/A	3.13 acres of non-giant sequoia forest	N/A
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 PREFERABLE ALTERNATIVE

In accordance with NPS *Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making* and Council on Environmental Quality requirements, 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 preferable 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 meet goal 1 to varying degrees by reducing development footprints within the Mariposa Grove, restoring hydrologic and ecological systems to more natural (i.e. predevelopment) conditions, and protecting, stabilizing, and/or rehabilitating cultural resources at South Entrance, the Grove, and Wawona Point. Analysis of environmental consequences associated with each alternative indicates that Alternative 2 best meets goal 1 relative to Alternatives 1, 3, and 4 because it would result in a net reduction of developed areas across the project area and would minimize new development within the Grove; implement substantial restoration of wetlands and giant sequoia ecology; best curtail vehicle traffic on the Mariposa Grove Road and within the Grove (thereby better protecting Pacific fisher from road fatalities); and restore soundscapes throughout the Grove by eliminating most private vehicle Grove parking and discontinuing operation of the fee-for-service commercial tram. All of these actions would 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 from visitor and tram impacts), and provide the best opportunity for sustaining the Mariposa Grove for the enjoyment of future generations.

(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 fulfills goal 2 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; relocation of traffic- and parking-related impacts outside of the Grove to South Entrance; universal access to a quality giant sequoia Grove experience in the lower Grove area while preserving a less developed, more natural visitor experience in the upper Grove area through elimination of commercial tram operations and reducing the footprint of trails and roadways; and assuring 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.

As described under goals 1 and 2, Alternative 2 attains the widest range of beneficial uses of the Mariposa Grove 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 management, shuttle stops, and parking.Alternative 2 would also improve visitor safety by 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.

(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.

Consistent with goal 4, Alternative 2 best restores and preserves the giant sequoias of the Mariposa Grove, which are an important natural aspect of our national heritage and representative of the country's environmental movement and the NPS mission. All of the action alternatives would preserve historic and traditional cultural aspects of the Grove and Wawona Point to similar degrees; Alternative 3 would have the least effect on the historic context 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 outside of the Grove to a new visitor parking and information hub near 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 reduces in-Grove infrastructure and consolidates it outside of the Grove. Alternative 2 best conserves energy by significantly restricting private vehicle access to the Grove and eliminating diesel-powered generator use and commercial tram operations within the Grove. All action alternatives improve accessibility to the giant sequoia Grove for visitors with mobility limitations, which contributes to the wide sharing of life's amenities. Alternative 2 offers the best opportunity for expanding the range of visitor experiences by expanding accessible trail opportunities in diverse areas with increased solitude 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.

Consistent with goal 6, all of the action alternatives would implement sustainable technologies designed to minimize impacts on natural resources, 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, diesel-powered generators, 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.

In summary, Alternative 2 (the preferred alternative) on balance best achieves these national environmental policy goals, and therefore is identified as the environmentally preferable 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 long 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 the 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 higher-capacity 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 0.05 acre reduction of developed areas project-wide, which would be comprised of 3.93 acre net reduction of developed area within the Grove plus 3.88 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 Sentinals 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 minor to moderate long-term, adverse impacts on soundscapes in the mid-Grove area of the Grizzly Giant. 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 higher-capacity 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 higher capacity 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, demolition 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 2.13 acres of developed area project-wide, which would be comprised of 1.79 acre net reduction of developed area within the Groce plus 3.88 acres of new development at the South Entrance. Alternative 4 construction cost would be greater than that of Alternatives 1 and 2, but less than Alternatives 2 and 3. If the optional new bridge/box culvert across the Rattlesnake Creek drainage in the vicinity of the Three Sentinals were constructed under this alternative, it would add an additional major capital cost

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
BMP	Best Management Practice
CBA	Choosing by Advantages
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FRID	Fire Return Interval Departure
LEED®	Leadership in Energy and Environmental Design
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
PEPC	Planning, Environment and Public Comment
SHPO	State Historic Preservation Officer
SITES	Sustainable Sites Initiative
US	United States
USFWS	United States Fish and Wildlife Service