



## 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
<b>Common to All Resources</b>		
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 <i>A Sense of Place: Design Guidelines for Yosemite National Park</i> (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
<b>Specific to Natural Resources</b>		
Air Quality and Dust Abatement	<p>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:</p> <ul style="list-style-type: none"> <li>• Water or apply soil stabilizers to disturbed areas;</li> <li>• Cover and/or seal truck beds and stockpiles to minimize blowing dust or loss of debris;</li> <li>• 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;</li> <li>• Minimize vegetation clearing;</li> <li>• Re-vegetate post construction.</li> </ul>	Yosemite National Park, Contractor
	<p>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:</p> <ul style="list-style-type: none"> <li>• 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;</li> <li>• Require that all construction equipment, diesel trucks, and generators be equipped with Best Available Control Technology for emission reductions of NOx and PM;</li> </ul>	Yosemite National Park, Contractor

Topic	Mitigation Measure	Responsibility
	<ul style="list-style-type: none"> <li>• Require all contractors use equipment that meets CARB’s most recent certification standard for off-road heavy duty diesel engines;</li> <li>• Require all equipment operations to occur during daytime hours to minimize effects of local inversions.</li> </ul>	
	<p>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.</p>	Contractor
Hydrology, Water Quality, and Wetlands	<p>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:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• All disturbed soil and fill slopes shall be stabilized in an appropriate manner.</li> <li>• Surface drainage facilities shall be designed to transport runoff in a non-erosive manner.</li> <li>• 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.</li> <li>• 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: <ul style="list-style-type: none"> <li>○ Where natural turbidity is between 0 and 5 nephelometric turbidity units (NTUs), increases shall not exceed 1 NTU.</li> <li>○ Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20% of the natural turbidity.</li> <li>○ Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs.</li> <li>○ Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10%.</li> </ul> </li> <li>• Implement stormwater management measures to reduce nonpoint-source pollution discharge. This could include measures such as oil/sediment containment or street sweeping.</li> </ul>	

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	<ul style="list-style-type: none"> <li>• Remove hazardous waste materials generated during implementation of the project from the project site immediately.</li> <li>• 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.</li> <li>• Final design and installation of site drainage improvements will be closely coordinated with the park’s Resources Management and Science Division.</li> <li>• 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.</li> <li>• Incorporate trench plugs into new and abandoned utility corridors through wetland areas where required to prevent formation or continuation of groundwater conduits.</li> </ul>	
	<p>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:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>	Contractor
	<p>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.</p>	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 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.	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
	<p>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).</p> <p>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.</p> <ul style="list-style-type: none"> <li>• Measure depth of compaction with a penetrometer and decompact to that depth (typically 6 to 10 inches) (Demetry 1997).</li> </ul>	



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	<ul style="list-style-type: none"> <li>• Decomact 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).</li> <li>• Avoid large roots during decompaction; a rototiller or hand decompaction may be more appropriate in these areas.</li> <li>• Add locally gathered duff to provide seeds and organic matter.</li> <li>• If available, add local native soil and topsoil.</li> <li>• If determined that soil conditions are not conducive to plant reestablishment, amendments such as peat moss, kelp, or other natural fertilizers may be used.</li> <li>• 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.</li> </ul>	
	<p>Depending on the degree of alteration in landform, a variety of recontouring and topography restoration actions may be implemented and are listed below:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• Leave final grades uneven to provide microhabitat for seed germination and establishment.</li> </ul>	
	<p>After decompacting soils, particularly on sloped areas, erosion potential can be high. Following is a list of available erosion-control measures:</p> <ul style="list-style-type: none"> <li>• Duff: Spread locally gathered litter and woody debris over disturbed areas for erosion control and to provide a source of seeds and organic matter.</li> <li>• 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).</li> <li>• 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.</li> <li>• 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.</li> </ul>	

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.	
	<p>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.</p> <ul style="list-style-type: none"> <li>• Natural regeneration: Rely on natural regeneration from adjacent seed sources and duff.</li> <li>• 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.</li> <li>• 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.</li> </ul>	

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	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul>	
	<p>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.</p>	
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.	
	<p>Alternative-specific mitigation measures:</p> <ul style="list-style-type: none"> <li>Alternative 3: Grizzly Giant Hub. Close the road to the Grizzly Giant transit hub from dusk until dawn.</li> <li>Alternative 4: South Entrance Hub with Modified Commercial Tram Service. Limit hours of commercial tram operation to reduce noise impacts on wildlife.</li> </ul>	
	<p>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).</p> <p>In order to mitigate impacts to special status species during construction and maintenance activities, we recommend (1) timing construction activities to avoid the most sensitive time</p>	Yosemite National Park, Project Manager

Topic	Mitigation Measure	Responsibility
	<p>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.</p>	
	<p>Mitigation to protect key habitat features for fishers, bats, and owls:</p> <ul style="list-style-type: none"> <li>• Limit the effects of light and noise on adjacent habitat through controls on construction equipment.</li> <li>• 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.</li> <li>• 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).</li> </ul> <p>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:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• A wildlife biologist should examine any trees and snags for nesting, denning, or roosting wildlife, or the potential for such use, prior to removal.</li> </ul>	
	<p>Mitigation to protect fisher dens:</p> <ul style="list-style-type: none"> <li>• 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.).</li> <li>• 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.</li> <li>• 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).</li> </ul>	
	<p>Mitigation specific to the Pacific fisher:</p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>	

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	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Conduct fuels reduction activities outside of fisher denning season.</li> <li>• 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]).</li> <li>• Adaptively manage for fishers through continued targeted surveys during key time periods during construction/restoration/fire management activities.</li> <li>• 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).</li> <li>• Retain and recruit large-diameter (&gt;11 inches diameter at breast height [DBH]) snags (Freel 1991; Buskirk and Powell 1994) and large-diameter (&gt;24 inches DBH) live conifer and oak trees with decadence such as broken tops or cavities (Freel 1991).</li> <li>• Maintain dense canopy cover (&gt;60%) in the vicinity of large trees (Buskirk and Powell 1994).</li> <li>• 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).</li> <li>• 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.</li> <li>• Identify additional protection measures as deemed necessary to avoid disturbance during construction or restoration-related activities.</li> </ul>	
	<p><b>OWLS:</b> 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.</p>	

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	<p><b>BATS:</b> 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).</p>	
<b>Specific to Cultural Resources and Historic Properties</b>		
<p>Archeological Resources</p>	<p>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.</p> <p>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.</p> <p>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.</p> <p>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).</p>	<p>Yosemite National Park, Project Manager</p>

<b>Topic</b>	<b>Mitigation Measure</b>	<b>Responsibility</b>
	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	Yosemite National Park, Project Manager
	<p>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.</p> <p>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.</p>	Yosemite National Park, Project Manager

Topic	Mitigation Measure	Responsibility
Historic Properties	Avoidance, minimization, 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.	
<b>Specific to Sociocultural Resources</b>		
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).	



<b>Topic</b>	<b>Mitigation Measure</b>	<b>Responsibility</b>
	<p>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.</p>	<p>Yosemite National Park, Project Manager</p>
<p>Visitor Experience and Recreation</p>	<p>Fence construction staging areas and construction activity areas to visually screen construction activity and materials.</p>	<p>Contractor</p>
	<p>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.</p>	<p>Contractor</p>
	<p>Provide protective fencing enclosures around construction areas, including utility trenches to protect public health and safety.</p>	<p>Contractor</p>
	<p>Limit construction activities to the off-season to allow for continued visitor access to the ski area during the winter.</p>	<p>Yosemite National Park, Project Manager, Contractor</p>
	<p>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.</p>	<p>Contractor</p>
	<p>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.</p>	<p>Yosemite National Park, Project Manager</p>

