Final

Preliminary Environmental Commitments and Mitigation Plan Appendix

Shasta Lake Water Resources Investigation, California

Prepared by:

United States Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

December 2014

Contents

Tables

Abbreviations and Acronyms

BLM	Bureau of Land Management
CalFIRE	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CP	Comprehensive Plan
CWA	Clean Water Act
HMBP	Hazardous Materials Business Plan
LMP	land management plans
NMFS	National Oceanographic Atmospheric Administration's National Marine Fisheries Service
Reclamation	U.S. Department of Interior, Bureau of Reclamation
STNF	Shasta-Trinity National Forest
SWPPP	Stormwater Pollution Prevention Plan
UCACE	U.S. Army Corps of Engineers
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Department of Interior, Fish and Wildlife Service

Chapter 1
Introduction

This appendix describes how possible adverse environmental consequences of the proposed comprehensive plans considered in the Shasta Dam Water Resources Investigation (SLWRI) Environmental Impact Statement (EIS) would be reduced where it is feasible to do so. While any action that reduces the environmental impact of a project may be considered "mitigation," in this appendix, the following distinctions between types of actions are made:

- **Environmental Commitments** – These are non-discretionary actions such as implementation of Best Management Practices (BMPs) at the project site during construction or conditions for operation of the facility when it is completed. Environmental commitments generally occur as part of the project design on-site during construction, or are a required function of project implementation and/or operation. Environmental commitments described in Chapter 2 "Alternatives" of the EIS are more fully described in Chapter 2 of this appendix.

- **Mitigation Measures** – These are actions that would reduce the environmental consequences of an action. Mitigation measures often occur offsite (e.g., away from the construction site) and are intended to address the environmental consequences of the proposed action and alternatives on the broader landscape that may be affected by the project. Mitigation measures are discretionary in the sense that they are not BMPs or permit requirements. Mitigation measures become mandatory when they are included as an element of the project decision. Chapter 3 of this appendix presents the mitigation measures from the SLWRI EIS resource chapters that U.S. Department of Interior, Bureau of Reclamation (Reclamation) would incorporate in the event a decision is made to authorize an action alternative.

Council on Environmental Quality (CEQ) Regulations for implementing the procedural provisions of the National Environmental Quality Act (NEPA) (40 CFR 1502.16 (h)) require that the EIS include a discussion of the "means to mitigate adverse environmental impacts." All relevant, reasonable mitigation measures that could alleviate the environmental consequences of a proposed action should be identified even if they are outside the lead agency's jurisdiction (Forty Questions 19(b)). In compliance with CEQ's regulations (40 CFR 1508.20), mitigation measures for the SLWRI include:

> *(a) Avoiding the impact altogether by not taking a certain action or parts of an action. Examples include:*

- *For recreation facilities, avoiding biologically important or sensitive areas*

- *During the vegetation clearing process, clearing only a portion of the reservoir*

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation. Examples include:

- *Limiting the maximum dam raise to avoid impacts to Pit River Bridge*

- *Use of aggregate materials available within the existing footprint of Shasta Lake*

- *Containing the construction period – focuses the construction impacts to sort-time frame*

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. Examples include:

- *Replacing/relocating recreation facilities, roads, bridges, Pit 7 Dam, utilities, etc.*

- *Rehabilitating and restoring habitat for special-status species*

- *Rehabilitating existing infrastructure (e.g., roads)*

- *Restoring physical and ecological processes (e.g., erosion, fire)*

(d) Reducing or eliminating the impact over time through preservation and maintenance operations during the life of the action.

- *Installing protective dikes for major infrastructure*

(e) Compensating for the impact by replacing or providing substitute resources or environments.

- *Acquisition, conservation easements*

- *Restoration on acquired and Federal lands*

It is important to note the difference between identifying a range of possible mitigation measures as required by NEPA and making a mitigation measure a requirement of a project. NEPA itself does not require that identified measures

actually be implemented. Mandatory implementation of mitigation measures is accomplished by making selected measures a part or condition of the project decision. CEQ regulations for project implementation (40 Code of Federal Regulations (CFR) 1505.3) provide that:

> *Mitigation (Sec. 1505.2(c)) and other conditions established in the environmental impact statement or during its review and committed as part of the decision shall be implemented by the lead agency or other appropriate consenting agency. The lead agency shall:*
>
> *(a) Include appropriate conditions in grants, permits or other approvals.*
>
> *(b) Condition funding of actions on mitigation.*
>
> *(c) Upon request, inform cooperating or commenting agencies on progress in carrying out mitigation measures which they have proposed and which were adopted by the agency making the decision.*
>
> *(d) Upon request, make available to the public the results of relevant monitoring.*

Under CEQA, "mitigation" is defined under Section 15370 of the CEQA Guidelines; this is the same definition set forth in the Federal NEPA regulations (40 CFR 1508.20). However, unlike NEPA, implementation of feasible mitigations of adverse environmental consequences for which the State of California has jurisdiction is a requirement under CEQA (Public Resources Code Sections 21002, 21002.1, 21081, and 21100 (c). CEQA requires that measures to mitigate or avoid significant effects on the environment for which public agencies of the State of California have jurisdiction be fully enforceable through permit conditions, agreements, or other measures (CEQA Chapter 21081.6(b)). Those impacts that are deemed "significant" under CEQA standards and their corresponding mitigations are identified in Chapter 3 of this appendix and in the relevant chapters of the EIS. Public agencies of the State of California (State) would use this information to make those measures mandatory and enforceable through state permits or other actions should decisions subject to CEQA be necessary. Note that decisions required by CEQA would apply only to actions for which a public agency (CEQA Section 21063) has jurisdiction and is required to make a discretionary decision. For example, CEQA would not apply to project impacts on Federal lands or Federal statutes such as the Wild and Scenic Rivers Act.

Purposes of this Appendix

This appendix is intended to:

- Provide a description of the distinction between environmental commitments and mitigation measures
- Disclose environmental commitments that are requirements of implementation of the SLWRI Project
- Disclose all reasonable means to reduce environmental consequences (i.e., mitigation) regardless of jurisdiction (NEPA requirement) available to decision makers at this point in the lead agency's planning process
- Provide a framework for information and support for agencies' (lead, responsible, and cooperating agencies) subsequent decisions
- Support development of a mitigation monitoring program consistent with the CEQ
- Support development of a mitigation monitoring and reporting plan as required by CEQA

Chapter 2
Environmental Commitments

Environmental Commitments Common to All Action Alternatives

Reclamation and/or its contractors would incorporate certain environmental commitments and BMPs into any action alternative identified for implementation to avoid or minimize potential impacts. Reclamation would also coordinate planning, engineering, design and construction, operation, and maintenance phases of any authorized project modifications with applicable resource agencies.

The analysis of potential impacts associated with implementation of the project within the Environmental Consequences and Mitigation Measures section of each resource area chapter of the EIS assumes that the environmental commitments as stated are a part of any action alternative. Thus, where mitigation is warranted, the mitigation measure is developed considering the environmental commitment to be part of any action alternative.

The following environmental commitments would be incorporated into any action alternative for any project-related construction activities. This section does not include mitigation measures.

Develop and Implement Construction Management Plan

Reclamation would develop and implement a construction management plan to avoid or minimize potential impacts on public health and safety during project construction, to the extent feasible. The construction management plan would inform contractors and subcontractors of work hours, modes and locations of transportation, and parking for construction workers; location of overhead and underground utilities; worker health and safety requirements; truck routes; stockpiling and staging procedures; public access routes; terms and conditions of all required project permits and approvals; and emergency response services contact information.

The construction management plan would also include construction notification procedures for the police, public works, and fire departments in the area where construction would occur. In addition, the construction management plan would include similar procedures for Federal and State agencies with similar jurisdictions, including USFS. Notices would also be distributed to neighboring property owners. The health and safety component of the construction management plan would be monitored for the implementation of the plan on a day-to-day basis by a Certified Industrial Hygienist.

The construction management plan would include effort to notify businesses, residents, and visitors associated with recreation activities on and surrounding Shasta Lake. In addition to information available at the Shasta Lake Visitors Center, informational signs and booths would be placed at key locations to be identified by Reclamation in conjunction with agencies and local business organizations. Reclamation will also develop and maintain a project-specific website that will be used for a wide range of informational purposes.

Comply with Permit Terms and Conditions

If any action alternative is approved and authorized for construction, Reclamation would require its contractors and suppliers, its general contractor, and all of the general contractor's subcontractors and suppliers to comply with all of the terms and conditions of all required project permits, approvals, and conditions attached thereto. If necessary, additional information (e.g., detailed designs and additional documentation) would be prepared and provided for review by decision makers and the public. Reclamation would ultimately be responsible for the actions of its contractors in complying with permit conditions. Compliance with applicable laws, policies, and plans for this project is discussed in the EIS, Chapter 26 "Other Required Disclosures."

Provide Relocation Assistance through Federal Relocation Assistance Program

All Federal, State, and local government agencies and others receiving Federal financial assistance for public programs and projects that require the acquisition of real property must comply with the policies and provisions set forth in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act) (49 CFR 24). All relocation and property acquisition activities would be performed in compliance with the Uniform Act. Any individual, family, or business displaced by implementation of any of the action alternatives would be offered relocation assistance services for the purpose of locating a suitable replacement property, to the extent consistent with the Uniform Act.

Under the Uniform Act, relocation services for residences would include providing a determination of the housing needs and desires a list of comparable properties, transportation to inspect housing referrals, and reimbursement of moving costs and related expenses. For business relocation activities, relocation services would include providing a determination of the relocation needs and requirements; a determination of the need for outside specialists to plan, move, and reinstall personal property; advice as to possible sources of funding and assistance from other local, State, and Federal agencies; listings of commercial properties; and reimbursement for costs incurred in relocating and reestablishing the business. No relocation payment received would be considered as income for the purpose of the Internal Revenue Code.

Remain Consistent with USFS Built Environment Image Guide

Any facilities subject to USFS authorization that are constructed or reconstructed facilities would be consistent with USFS Built Environment

Image Guide. The architectural character of facilities on National Forest System lands would be constructed using materials and design that keep with the visual and cultural identity of the landscape in which they are constructed.. Reclamation would seek to maintain the quality of visitor experiences, affected facilities capacity will be replaced with facilities providing equivalent visual resource quality and amenities.

Protect Public Land Survey System Monuments and Property Corners

Reclamation would identify Public Land Survey System (PLSS) monuments or survey property corners affected by either inundation due to increased lake levels or construction activities. Reclamation or its contractors would protect all PLSS monuments and associated references and all property corners, either by positioning, or, where necessary, creating new references. The results will be filed with BLM and Shasta County.

Evaluate and Protect Paleontological Resources Discovered During Construction

If paleontological resources are discovered during construction activities, all work in the immediate vicinity of the discovery will stop immediately and Reclamation will be notified (as applicable). A qualified paleontologist will be retained to evaluate the find and recommend appropriate conservation measures, such as data recovery or protection in place. The conservation measures will be implemented prior to re-initiation of activities in the immediate vicinity of the discovery.

Develop and Implement Stormwater Pollution Prevention Plan

Any project authorized for construction would be subject to the construction-related stormwater permit requirements of the Federal Clean Water Act (CWA) National Pollutant Discharge Elimination System program. Reclamation would obtain any required permits through the Central Valley Regional Water Quality Control Board before any ground-disturbing construction activity. According to the requirements of Section 402 of the CWA, Reclamation and/or its contractors would prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) before construction, identifying BMPs to prevent or minimize erosion and the discharge of sediments and other contaminants with the potential to affect beneficial uses of or lead to violations of water quality objectives for surface waters. The SWPPP would include site-specific structural and operational BMPs to prevent and control impacts on runoff quality, and procedures to be followed before each storm event. BMPs would control short-term and long-term erosion and sedimentation effects and stabilize soils and vegetation in areas affected by construction activities. The SWPPP would contain a site map that shows the construction-site perimeter; existing and proposed buildings, lots, roadways, and stormwater collection and discharge points; drainage patterns across the project; and general topography both before and after construction. Additionally, the SWPPP would contain a visual monitoring program, a chemical monitoring program for “non-visible” pollutants that would be implemented if a BMP fails, and a sediment monitoring plan to be implemented if a particular site discharges directly to a water body listed on the CWA 303(d)

list for sediment. BMPs for the project could include, but would not be limited to, silt fencing, straw bale barriers, fiber rolls, storm drain inlet protection, hydraulic mulch, and stabilized construction entrances.

Develop and Implement Erosion and Sediment Control Plan

As part of the SWPPP, Reclamation would prepare and implement an erosion and sediment control plan to control short-term and long-term erosion and sedimentation effects and to stabilize soils and vegetation in areas affected by construction activities. The plan would include all of the necessary local jurisdiction requirements regarding erosion control and would implement BMPs for erosion and sediment control, as required. Types of BMPs may include, but would not be limited to, earth dikes and drainage swales, stream bank stabilization, and use of silt fencing, sediment basins, fiber rolls, and sandbag barriers.

Develop and Implement Feasible Spill Prevention and Hazardous Materials Management

As part of the SWPPP, Reclamation and/or its contractors would develop and implement a spill prevention and control plan to minimize effects from spills of hazardous, toxic, or petroleum substances for project-related construction activities occurring in or near waterways. The accidental release of chemicals, fuels, lubricants, and nonstorm drainage water into water bodies would be prevented to the extent feasible. Spill prevention kits would always be close by when hazardous materials would be used (such as in crew trucks and other logical locations). Feasible efforts would be implemented so that hazardous materials would be properly handled, and the quality of aquatic resources would be protected by all reasonable means during work in or near any waterway. No fueling would be done within the ordinary high-water mark, immediate floodplain, or full-pool inundation area, unless equipment stationed in these locations could not be readily relocated. Any equipment that could be readily moved out of the water body would not be fueled in the water body or immediate floodplain. For all fueling of stationary equipment at the construction site, containments would be installed so that any spill would not enter the water, contaminate sediments that may come in contact with the water, or damage wetland or riparian vegetation. Any equipment that could be readily moved out of the water body would not be serviced within the ordinary high-water mark or immediate floodplain.

Additional BMPs designed to avoid spills from construction equipment and subsequent contamination of waterways would also be implemented. These could include, but would not be limited to, the following:

- Storage of hazardous materials in double-containment and, if possible, under a roof or other enclosure.

- Disposal of all hazardous and nonhazardous products in a proper manner.

- Monitoring of on-site vehicles for fluid leaks and regular maintenance to reduce the chance of leakage.

- Containment (using a prefabricated temporary containment mat, a temporary earthen berm, or other feature that can provide containment) of bulk storage tanks.

Haulers delivering materials to the project site would be required to comply with regulations for the transport of hazardous materials codified in 49 CFR Part 173, 49 CFR Part 177, and CCR Title 26, Division 6. These regulations provide specific packaging requirements, define unacceptable hazardous materials shipments, and prescribe safe-transit practices, including route restrictions, by carriers of hazardous materials.

Water Quality Protection for In-River Construction

The measures discussed below would be implemented to minimize potential adverse effects to water quality.

Implement In-River Construction Work Windows

All construction activities along the Sacramento River would be conducted during months when instream flows are managed outside the flood season (e.g., June to September). In-river work between Keswick Dam and the Red Bluff Pumping Plant would be conducted from mid-August through September to minimize impacts to Sacramento River winter-run Chinook salmon.

Comply with All Water Quality Permits and Regulations

Project activities would be conducted to comply with all additional requirements specified in required permits relating to water quality protection. Relevant permits anticipated to be obtained for the proposed action include a CWA Section 401 certification, and CWA Section 404 compliance through the U.S. Army Corps of Engineers (USACE).

Implement Water Quality Best Management Practices

BMPs that would be implemented to avoid and/or minimize potential impacts associated with construction and the 10-year-long spawning gravel augmentation program are described below.

Handle Spawning Gravel to Minimize Potential Water Quality Impacts

Gravel would be sorted and transported in a manner that minimizes potential water quality impacts (e.g., management of fine sediments). Gravel would be washed at least once and have a cleanliness value of 85 or higher based on California Department of Transportation (Caltrans) Test No. 227. Gravel would also be completely free of oils, clay, debris, and organic material.

Minimize Potential Impacts Associated with Equipment Contaminants

For in-river work, all equipment would be steam-cleaned every day to remove hazardous materials before the equipment entered the water. Biodegradable

hydrocarbon products would be utilized in the heavy equipment in the stream channel.

Implement Feasible Spill Prevention and Hazardous Materials Management The accidental release of chemicals, fuels, lubricants, and non-storm drainage water into channels would be prevented to the extent feasible. Spill prevention kits would always be in close proximity when using hazardous materials (e.g., crew trucks and other logical locations). Feasible measures would be implemented to ensure that hazardous materials are properly handled and the quality of aquatic resources is protected by all reasonable means. No fueling would be done within the ordinary high-water mark or immediate floodplain, unless equipment stationed in these locations was not readily relocated (i.e., pumps, generators). For stationary equipment that must be fueled on site, containments would be provided in such a manner that any accidental spill of fuel would not be able to enter the water or contaminate sediments that could come in contact with water. Any equipment that was readily moved out of the channel would not be fueled in the channel or immediate floodplain. All fueling done at the construction site would provide containment to the degree that any spill would be unable to enter the channel or damage wetland or riparian vegetation. No equipment servicing would be done within the ordinary high-water mark or immediate floodplain, unless equipment stationed in these locations could not be readily relocated (i.e., pumps, generators). Additional BMPs designed to avoid spills from construction equipment and subsequent contamination of waterways would also be implemented.

Minimize Potential Impacts Associated with Access and Staging Existing access roads would be used to the extent possible. Equipment staging areas would be located outside of the Sacramento River ordinary high water mark or the Shasta Dam full pool inundation area, and away from sensitive resources.

Remove Temporary Fills as Appropriate Temporary fill for access, side channel diversions, and/or side channel cofferdams, would be completely removed after completion of construction.

Remove Equipment from River Overnight and During High Flows Construction contractors would remove all equipment from the river on a daily basis at the end of the workday. Construction contractors would also monitor Reclamation's Central Valley Operations Office Web site daily for forecasted flows posted there to determine and anticipate any potential changes in releases. If flows were anticipated to inundate a work area that would normally be dry, the contractor would immediately remove all equipment from the work area.

Extend and Enhance Existing Fish Habitat Structures in Shasta Lake

Reclamation and USFS, in conjunction with resource management agencies, will identify areas at appropriate elevations to replace, extend, and enhance existing structural fish habitat. The structures will be installed concurrently with construction activities in the vicinity of construction sites or at locations

identified by resource agencies. These activities will include maintaining shallow water and transitional riverine habitat with the placement of manzanita brush structures, large woody debris, and rock-boulder clusters. To the extent feasible, vegetation cleared for construction and borrow pit areas will be used to extend and enhance fish habitat structures. Excess vegetative materials cleared from construction and borrow pit areas would be stockpiled for future fish habitat enhancement. Additionally, areas within the enlarged reservoir having appropriate conditions to establish living plants, including willow (*Salix sp.*), buttonbush (*Cephalanthus sp.*), and cottonwood (*Populus sp*.), will be identified for the purposes of providing structural fish habitat when the established plants are inundated.

Fisheries Conservation

The efforts discussed below would be implemented to minimize potential adverse effects on fish species.

Implement In-Water Construction Work Windows

Reclamation would identify and implement feasible in-water construction work windows in consultation with National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and California Department of Fish and Wildlife (CDFW). In-water work windows would be timed to occur when sensitive fish species were not present or would be least susceptible to disturbance (e.g., July through September).

Monitor Construction Activities

A qualified biologist would monitor potential impacts to important fishery resources throughout all phases of project construction. Monitoring may not be necessary during the entire duration of the project if, based on the monitor's professional judgment (and with concurrence from Reclamation), a designated on-site contractor would suffice to monitor such activities and would agree to notify a biologist if aquatic organisms are in danger of harm. However, the qualified biologist would need to be available by phone and Internet and be able to respond promptly to any problems that arose.

Perform Fish Rescue/Salvage

If spawning activities for sensitive fish species were encountered during construction activities, the biologist would be authorized to stop construction activities until appropriate corrective measures were completed or it was determined that the fish would not be harmed.

A qualified biologist would identify any fish species that may be affected by the project. The biologist would facilitate rescue and salvage of fish and other aquatic organisms that become entrapped within construction structures and cofferdam enclosures in the construction area. Any rescue, salvage, and handling of listed species would be conducted under appropriate authorization (i.e., incidental take statement/permit for the project, Federal Endangered

Species Act Section 4(d) scientific collection take permit, or a Memorandum of Understanding).

If fish were identified as threatened with entrapment in construction structures, construction would be stopped and efforts made to allow fish to leave the project area before resuming work. If fish were unable to leave the project area of their own volition, then fish would be collected and released outside the work area. Fish entrapped in cofferdam enclosures would be rescued and salvaged before the cofferdam area was completely dewatered. Appropriately sized fish screens would be installed on the suction side of any pumps used to dewater in-water enclosures.

Reporting

A qualified biologist would prepare a letter report detailing the methodologies used and the findings of fish monitoring and rescue efforts. Monitoring logs would be maintained and provided, with monitoring reports. The reports would contain, but not be limited to, the following: summary of activities; methodology for fish capture and release; table with dates, numbers, and species captured and released; photographs of the enclosure structure and project site conditions affecting fish; and recommendations for limiting impacts during subsequent construction phases, if appropriate.

Survey and Monitor Fish Migration Between Shasta Lake and Squaw Creek

Reclamation will fund and implement an adaptive management measure to survey and monitor fish migration between Shasta Lake and Squaw Creek, within and immediately upstream from the new inundation zone, before and immediately after project completion, to determine if warm-water fish (bass) actively migrate into and cause adverse effects on native fish, amphibians, and mollusks. These study and monitoring activities are warranted due to uncertainties associated with the potential for warm-water fish accessing tributary stream reaches currently isolated by passage barriers near the head of the existing reservoir. The surveys will document occurrences and abundances of warm-water fish species and the U.S. Forest Service (USFS) special-status species in lower Squaw Creek before and immediately after project completion to evaluate if reservoir enlargement coincides with increases in warm-water predator species and declines of special-status indicator species. If warm-water fish abundance increases or adverse effects attributed to warm-water fish predation on native fish, amphibians or mollusks is documented within 3-5 years after the project is completed, a fish barrier or other acceptable measure will be implemented to prevent or minimize further invasions and colonization by warm-water fish.

Revegetation Plan

Reclamation, in conjunction with cooperating agencies and private landowners, would prepare a comprehensive revegetation plan to be implemented in conjunction with other management plans (e.g., SWPPP). This plan would apply to any area included as part of an action alternative, such as inundation,

relocation, or mitigation activities. Overall objectives of the revegetation plan would be to reestablish native vegetation to control erosion, provide effective ground cover, minimize opportunities for nonnative plant species to establish or expand; and provide habitat diversity over time. Reclamation would work closely with cooperating agencies, private landowners, and revegetation specialists to develop the sources of native vegetation, site-specific planting patterns and species assemblages necessary for a revegetation effort of this magnitude.

Invasive Species Management

Reclamation would develop and implement a control plan to prevent the introduction of zebra/quagga mussels, invasive plants, and other invasive species to project areas. The control plan would cover all workers, vehicles, watercraft, and equipment (both land and aquatic) that would come into contact with Shasta Lake, the shoreline of Shasta Lake, the Sacramento River, and any riverbanks, floodplains, or riparian areas. Plan activities could include, but would not be limited to, the following:

- Pre-inspection and cleaning of all construction vehicles, watercraft, and equipment before being shipped to project areas
- Re-inspection of all construction vehicles, watercraft, and equipment on arrival at project areas
- Inspection and cleaning of all personnel before work in project areas

All inspections would be conducted by trained personnel and would include both visual and hands-on inspection methods of all vehicle and equipment surfaces, up to and including internal surfaces that have contacted raw water.

Approved cleaning methods would include a combination of the following:

- **Pre-cleaning** – Draining, brushing, vacuuming, high-pressure water treatment, thermal treatment
- **Cleaning** – Freezing, desiccation, thermal treatment, high-pressure water treatment, chemical treatment

On-site cleanings would require capture, treatment, and/or disposal of any and all water needed to conduct cleaning activities.

Fire Protection and Prevention Plan

Reclamation would prepare and implement a fire protection and prevention plan to minimize the risk of wildfire or threat to workers, property, and the public. The USFS will maintain a plan similar to this Fire Protection and Prevention Plan which addresses preventing and controlling wildfires in the National Recreation Area as described by the interagency agreement with the California

Department of Forestry and Fire Protection (CalFIRE) and other associated entities. Reclamation's contractors would follow relevant safety standards/procedures related to fire prevention would be incorporated into the project design, and would be used during construction activities and project operation and maintenance. Safety standards and procedures include the California Building Code; the Shasta County Fire Plan; USFS safety requirements regarding fire hazards; CalFIRE requirements for private lands; and California Public Utilities Code General Order 95, which provides procedures for proper removal, disposal, and placement of poles, wires, and associated infrastructure; and the National Electric Safety Code (a voluntary code that provides safety procedures for electric utility installation and operation). Precautionary measures to prevent construction-related fires include locating utilities a safe distance from vegetation and structures, proper construction of power lines, and construction worker safety training. Post-construction infrastructure operation and maintenance would follow current safety practices associated with fire prevention and would include clearing vegetation from power utility facilities and other sources using combustion engines (e.g., water pumps) on a regular basis.

Construction Material Disposal

Reclamation's contractors would take measures to recycle or reuse demolished materials, such as steel or copper wire, concrete, asphalt, and reinforcing steel, as required and where practical. Other demolished materials would be disposed of in local or other identified permitted landfills in compliance with applicable requirements.

To reduce the risk to construction workers, the public, and the environment associated with exposure to hazardous materials and waste, Reclamation would implement the following:

- A Hazardous Materials Business Plan (HMBP) would be developed and implemented to provide information regarding hazardous materials to be used for project implementation and hazardous waste that would be generated. The HMBP would also define employee training, use of protective equipment, and other procedures that provide an adequate basis for proper handling of hazardous materials to limit the potential for accidental releases of and exposure to hazardous materials. All procedures for handling hazardous materials would comply with all Federal, State, and local regulations.

- Soil to be disposed of at a landfill or recycling facility shall be transported by a licensed waste hauler

- All relevant available asbestos survey and abatement reports and supplemental asbestos surveys would be reviewed. Removal and disposal of asbestos-containing materials would be performed in accordance with applicable Federal, State, and local regulations

- A lead-based paint survey would be conducted to determine areas where lead-based paint is present and the possible need for abatement prior to construction.

Asphalt Removal

Per the California Fish and Game Code 5650 Section (a), all asphaltic roadways and parking lots inundated by project implementation would be demolished and removed according to Shasta County standards. Asphalt would be disposed of at an approved and permitted waste facility. Dirt roads inundated by project implementation would remain in place.

This page left blank intentionally.

Chapter 3
Mitigation Measures

Mitigation measures must be part of an EIS, but a "fully developed" mitigation plan is not required at this stage of the SLWRI planning process. NEPA requires that mitigation be discussed in sufficient detail to ensure that environmental consequences have been fully evaluated; NEPA does not require a fully developed plan that will mitigate all environmental harm before an agency can act. Mitigation measures become mandatory under NEPA regulations when they are included as a part of the decision to implement a project (40 CFR 1505.3). This appendix to the EIS provides a mitigation plan that is responsive to project impacts however the project authorization will determine which mitigation measures are to be implemented. On-the-ground projects will be developed in response to the elements of the mitigation plan if the SLWRI is authorized. If one of the comprehensive plans is selected, at the time of decision, or if appropriate, in any recommendation to Congress, a monitoring and enforcement program shall be adopted for any included mitigation actions (40 CFR 1505.2). Regulation for NEPA (40 CFR 1508.28) allow a subsequent phase of a project, such as environmental mitigation to "tier" to this EIS to ensure implementation is consistent with project objectives as planned.

Compliance with CEQA requires public agencies to initiate the environmental review of discretionary projects early in the planning process to facilitate public involvement and provide the basis for informed decision-making. This enables the project proponent to work with agencies that have a CEQA responsibility to identify and develop the project, identify and analyze alternatives and reduce or avoid impacts prior to project authorization. A common challenge faced by CEQA lead and responsible agencies is "deferred mitigation." A recent court decision (Oakland Heritage Alliance v. City of Oakland (2011)) drew upon a number of relevant principles from case law including:

- Determinations of significance and development of mitigation measures must occur before project approval
- If an agency has identified significant impacts and identified mitigation measures that will mitigate them, it does not have to comment to a specific identifiable mitigation measure as long as it commits to mitigate the impacts
- The details of exactly how mitigation will be achieved under the identified measures can properly be deferred pending completion of a future investigation or study

- Where impacts are of a type for which mitigation is known to be feasible, but the planning process has not progressed to the point that its practical to develop specific measures, the agency can describe specific performance criteria and commit to ultimately devising mitigation measures that will satisfy the criteria

Development of Mitigation Measures

During project design leading to the DEIS, environmental commitments and mitigation measures were developed by interagency, interdisciplinary teams with representatives from Reclamation, cooperating and responsible federal agencies and state agencies. These commitments and preliminary mitigation measures were published in the June 2013 DEIS. After receiving and considering public comments, Reclamation revised Chapter 2 "Alternatives" of the EIS to clarify the distinction between environmental commitments and mitigation measures and compiled them into this appendix. The mitigation measures presented in this appendix are derived from chapters 4-25 of the EIS. In many cases, these measures have been revised or enhanced by an interagency, interdisciplinary team based on new information, coupled with comments received on the DEIS.

Through a series of interagency workshops that focused on impacts to the physical environment and biological resources, resource specialists for Reclamation, USFS, USFWS, Bureau of Land Management (BLM), Environmental Protection Agency (EPA) and the USACE developed a framework to quantify impacts (where appropriate) and establish mitigation ratios that were applicable to a number of impacts related to terrestrial wildlife habitat and in some instances specific special-status species. A key element of this framework emphasized specifically considering impacts on discrete habitat types (e.g., Gray Pine) and refining mitigation measures that respond to the diverse array of habitats and species that would be impacted. In other words, mitigation measures acknowledge the ecologic diversity of the project area and are intended to reduce specific project-related impacts.

In a number of instances during these workshops, Reclamation, with concurrence from cooperating agencies identified the need to enhance or revise mitigation measures. Considerable effort went into comparing project effects with the likely needed amount of mitigation activity. For example, each action alternative potentially affects a different quantity of low-gradient stream reaches within the project area (Impact Geo-2). A corresponding mitigation measure to restore comparable amounts of currently degraded low-gradient streams was developed to compensate for this impact. In another example, potential adverse impacts to known sites of BLM and USFS sensitive species were identified (Impact Bot-3). A corresponding mitigation measure to reestablish plant populations, and acquire (purchase) or otherwise secure replacement habitat

with conservation easements or other agreements was developed to compensate for this impact.

This systematic review:

1. Confirmed that some impacts had no feasible mitigation

2. Identified mitigation measures presented in the DEIS that were deemed adequate by Reclamation and the participating responsible/cooperating agencies

3. Clarified the expected scale and magnitude of an impact that resulted in a revision to the respective chapter of the EIS

4. Clarified mitigation measures with respect to level of specificity (e.g., timing, location, magnitude)

5. Identified new mitigation measures responsive to impacts associated with biological resources (e.g., Shasta Snow wreath) and physical processes (Shoreline erosion) and evaluated their feasibility and potential effectiveness

Environmental consequences were grouped into three classes that were used to drive development of mitigation measures:

- **Impacts for which no Mitigation is required –** Certain impacts were identified in each action alternative that do not have a significant adverse impact on the environment. Actions for which no significant adverse impact on the environment has been identified do not require mitigation under CEQA. For the purposes of this assessment, actions that do not require mitigation under CEQA are presumed not to require mitigation under NEPA.

- **Significant adverse impacts for which no feasible mitigation exists –** Certain impacts were identified in each action alternative that have no feasible mitigation. Neither CEQA nor NEPA require development of mitigation measures that cannot be implemented, are not feasible, or that are not responsive to the impact described.

- **Significant adverse impacts for which feasible mitigations exist, or that are addressed by environmental commitments –** Certain impacts were identified in each action alternative that had a significant adverse environmental impact and for which feasible mitigations exist. A mitigation framework with objectives has been identified to address these impacts. A full list of impacts and associated mitigation actions organized by resource chapter is shown in the following section. To the extent possible, environmental effects of mitigations projects are considered in the respective chapters of the EIS, Reclamation

acknowledges that some mitigation measures may be required supplemental planning efforts to comply with NEPA and other statutory requirements in the event the SLWRI is authorized. Individual projects to accomplish mitigation objectives are shown where they have been developed.

As a part of this interagency, interdisciplinary process, mitigation measures were reviewed to ensure they were comparable with the expected impact and that they were feasible to implement. For a number of mitigation measures developed to address biological resources and physical processes, mitigation measures were then grouped or "bundled" to the degree possible with similar mitigation measures for similar environmental consequences. Mitigation measures that are "bundled" are noted in Table 3-1.

Key outcomes of this interagency, interdisciplinary process included the following:

- Acknowledgement that any land acquisition should be considered in proportion to the relevant impact (i.e., habitat impacts on NFS lands offset with acquired lands placed into NFS management)
- Acknowledgement of acquisition priorities (i.e., within boundary of Shasta Unit of NRA, within boundary of Shasta Lake Ranger District, within Shasta-Trinity National Forest (STNF) boundary)
- Commitment to resource management and habitat enhancements on lands acquired
- Continuation of interagency mitigation working group

Mitigation Groups

The DEIS identified the eight mitigation groups listed in Table 3-1. Types of actions that would be associated with mitigation groups are identified.

Summary of Mitigation Measures

Table 3-2 provides a comprehensive summary of the mitigation measures presented in Chapters 4-25 of the EIS. In most cases mitigation measures are the same or similar for all action alternatives. In some instances, mitigation measures are applicable to more than one impact.

Table 3-1. Mitigation Groups and Types of Actions

Mitigation Group	Types of Actions
Land acquisition	Land acquisition can be used to secure multiple benefits. Acquisition is an effective means to secure specialized habitats.
Conservation easements	Conservation easements can be used to secure multiple benefits. Easements are an effective means to secure specialized habitats.
Upland habitat improvements	Pre-commercial Thinning Large woody debris upland placement Snag creation Noxious weed treatments (Integrated weeds/vegetation management plan which includes herbicide use) Pre-fire suppression Wildlife structures Genome sequencing (i.e., Shasta snow-wreath) Off-site populations established at conservation oriented institution (i.e., National arboretum)
Wetland mitigation	Road realignment Riparian planting Fencing wetland/riparian areas Enhancement and/or development of wetland features
Riparian habitat improvements (riparian reserves)	Riparian planting Fencing riparian areas Riparian vegetation fuels reduction Habitat planting Enhancement and/or development of wetland features
Aquatic habitat improvements (river and tributaries)	Large Woody Debris instream placement Fish passage Stream/road crossings
Water quality actions (metals, temperature, sediment)	Fire suppression capacity Integrated stand density and fuels reduction Under-burning Road decommissioning Road closure Road surfacing and drainage improvement Storm-proofing Stabilization and culvert replacement Mine land reclamation Enhancement and/or development of wetland features
Visuals and aesthetics actions	Vegetation management plan (with integrated vegetation management) Planting/recovering native species

This page left blank intentionally

Table 3-2. Summary of Mitigation Measures

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Chapter 4, "Geology, Geomorphology, Minerals, and Soils"					
Impact Geo-2: Alteration of Fluvial Geomorphology and Hydrology of Aquatic Habitats	Mitigation Measure Geo-2: Replace Lost Ecological Functions of Aquatic Habitats by Restoring Existing Degraded Aquatic Habitats in the Vicinity of the Impact.	CP1	The loss of 18.5 miles of intermittent and perennial streams (including 6.2 miles of streams with a gradient less than 7 percent) will be mitigated by compensating for the impact by replacing or providing substitute resources or environments. As described in Appendix 11 "Preliminary Environmental Commitments and Mitigation Plan" to the EIS, Reclamation convened an interagency working group to enhance mitigation measures presented in the DEIS. This working group had the benefit of additional information from the recently completed Tributary Fisheries Characterization Report (Reclamation 2014). This report, summarized in Chapter 11 "Fisheries and Aquatic Ecosystems" provides detailed information on tributaries that flow into Shasta Lake, with an emphasis on those channel reaches upstream of the current drawdown zone. The environmental commitments described in Chapter 2, "Alternatives," and Appendix 11 of the EIS are intended to address impacts to channels within the existing drawdown zone (1070 msl). An outcome of the interagency work group discussions was the agreement that this mitigation measure would encompass efforts within the channels actually impacted by this comprehensive plan, but would also be expanded to restore degraded aquatic habitat in channels upstream of Shasta Lake. In general, this mitigation measure would follow the approach to characterize, prioritize and identify specific restoration actions described in the California Salmonid Stream Habitat Restoration Manual – Fourth Edition (CDFG, et al. 2010). For CP1, this mitigation measure would result in restoration of up to 18.5 miles of channel, with an emphasis on low gradient perennial channel reaches within the proposed inundation zone and upstream reaches to be identified by an interagency work group to be convened by Reclamation. This mitigation focuses on restoring and enhancing the aquatic functions of these channels This interagency working group would focus on identification of specific tributaries to Shasta Lake that may benefit from various mitigation techniques using available information. Examples of techniques that may be used include channel and bank stabilization, channel redirection, channel reconstruction, culvert replacement and elimination of barriers to fish passage, and enhancement of habitat physical structure (e.g., placement of woody debris, rocks). The nature and extent of the restoration and enhancement activities will be based on an assessment of the ecological functions that are lost as a consequence of implementing this alternative.	S	LTS
		CP2	The loss of 25.5 miles of intermittent and perennial streams (including 8.2 miles of streams with a gradient less than 7 percent) will be mitigated by compensating for the impact by replacing or providing substitute resources or environments. Compensation will be accomplished by restoring and enhancing the aquatic functions of existing, degraded aquatic habitats in or near the Shasta Lake and vicinity area. Examples of techniques that may be used include channel and bank stabilization, channel redirection, channel reconstruction, culvert replacement and elimination of barriers to fish passage, and enhancement of habitat physical structure (e.g., placement of woody debris, rocks). The nature and extent of the restoration and enhancement activities will be based on an assessment of the ecological functions that are lost as a consequence of implementing this alternative.	S	LTS
		CP3	The loss of 36.5 miles of intermittent and perennial streams (including 12.1 miles of streams with a gradient less than 7 percent) will be mitigated by compensating for the impact by replacing or providing substitute resources or environments. Compensation will be accomplished by restoring and enhancing the aquatic functions of existing, degraded aquatic habitats in or near the Shasta Lake and vicinity area. Examples of techniques that may be used include channel and bank stabilization, channel redirection, channel reconstruction, culvert replacement and elimination of barriers to fish passage, and enhancement of habitat physical structure (e.g., placement of woody debris, rocks). The nature and extent of the restoration and enhancement activities will be based on an assessment of the ecological functions that are lost as a consequence of implementing this alternative.	S	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Geo-2 (CP3).	S	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Geo-2 (CP3).	S	LTS
Impact Geo-9: Substantial Increase in Channel Erosion and Meander Migration	Mitigation Measure Geo-9: Modification of Flow Releases in Response to River Management and Habitat Restoration Efforts between Keswick Dam and Red Bluff.	CP1	No mitigation is required for Impact Geo-9 as the result of implementing any proposed alternatives (CP1, CP2, CP3, CP4, CP4A, or CP5). On an annual basis, Reclamation will coordinate with relevant river management and habitat restoration efforts between Keswick Dam and Red Bluff, including but not limited to the members of the Sacramento River Temperature Task Group. The purpose of this coordination will be to discuss how releases from Shasta and Keswick dams could be managed to best enhance downstream objectives, such as ramping rates or temperature targets, that are consistent with the CVP's capabilities and primary operating objectives.	LTS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Geo-9 (CP1).	LTS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Geo-9 (CP1).	LTS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Geo-9 (CP1).	LTS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Geo-9 (CP1).	LTS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact AQ-1: Short-Term Emissions of Criteria Air Pollutants and Precursors at Shasta Lake and Vicinity During Project Construction	Mitigation Measure AQ-1: Implement Standard Measures and Best Available Mitigation Measures to Reduce Emissions Levels	CP1	Reclamation (referred to below as "the project applicant" or "the applicant") and its primary construction contractor(s) will implement the mitigation measures listed below to reduce emissions of criteria air pollutants and precursors generated during construction. *Standard Mitigation Measures* The following SCAQMD SMMs are applicable to all projects. PM10 Controls • Alternatives to open burning of vegetative material on the project site shall be used by the project applicant unless otherwise deemed infeasible by SCAQMD. Among suitable alternatives is chipping, mulching, or conversion to biomass fuel. • The applicant shall be responsible for ensuring that all adequate dust control measures are implemented in a timely and effective manner during all phases of project development and construction. • All material excavated, stockpiled, or graded shall be sufficiently watered to prevent fugitive PM10 dust emissions from leaving the property boundaries and causing a public nuisance or a violation of an ambient air standard. Watering shall occur at least twice daily with complete site coverage, preferably in the mid-morning and after work is completed each day. • All areas (including unpaved roads) with vehicle traffic shall be watered periodically or dust palliatives applied for stabilization of fugitive PM10 dust emissions. • All on site vehicles shall be limited to a speed of 20 miles per hour on unpaved roads developed for construction. • All land clearing, grading, earthmoving, or excavation activities on a project shall be evaluated and suspended when winds exceed 20 miles per hour if particulate matter becomes airborne. • All inactive portions of the development site shall be seeded and watered until a suitable grass cover is established. • The applicant shall be responsible for applying Shasta County Department of Public Works-approved nontoxic soil stabilizers (according to manufacturers' specifications) to all inactive construction areas (previously graded areas that remain inactive for 96 hours) in accordance with the Shasta County Grading Ordinance. • All trucks hauling dirt, sand, soil, or other loose material shall be covered or maintain at least 2 feet of freeboard (i.e., minimum vertical distance between top of the load and the trailer) in accordance with the requirements of California Vehicle Code Section 23114. This provision shall be enforced by local law enforcement agencies. • All material transported off site shall be either sufficiently watered or securely covered to prevent a public nuisance. • During initial grading, earthmoving, or site preparation, the project shall be required to construct a paved (or dust palliative-treated) apron, at least 100 feet in length, onto the project site from the adjacent paved road(s). • Paved streets adjacent to the development site shall be swept or washed at the end of each day to remove excessive accumulations of silt and/or mud that may have accumulated as a result of activities on the development site. • Adjacent paved streets shall be swept (water sweeper with reclaimed water recommended) at the end of each day if substantial volumes of soil materials have been carried onto adjacent public paved roads from the project site. • Wheel washers shall be installed where project vehicles and/or equipment enter and/or exit onto paved streets from unpaved roads. Vehicles and/or equipment shall be washed before each trip. • Before final occupancy, the applicant shall reestablish ground cover on the construction site through seeding and watering in accordance with the Shasta County Grading Ordinance. Streets • The project shall provide for temporary traffic control as appropriate during all phases of construction to improve traffic flow as deemed appropriate by the Shasta County Department of Public Works and/or the California Department of Transportation. • Construction activities shall be scheduled that direct traffic flow to off-peak hours as much as practicable.	S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact AQ-1: Short-Term Emissions of Criteria Air Pollutants and Precursors at Shasta Lake and Vicinity During Project Construction	Mitigation Measure AQ-1: Implement Standard Measures and Best Available Mitigation Measures to Reduce Emissions Levels	CP1 (contd.)	*Energy Conservation* For any new or relocated structures, the following features will be incorporated as much as practicable: • The project shall provide for the use of energy-efficient lighting, including controls, and process systems such as water heaters, furnaces, and boiler units. • The project shall use a central water heating system featuring the use of low-NOX hot water heaters. *Best Available Mitigation Measures* None of the SCAQMD BAMMs are appropriate for the project. Therefore, the following measures will be incorporated into the project: • The project applicant will prepare and submit to SCAQMD for approval a plan demonstrating that the heavy-duty (equal to or greater than 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased, and subcontractor vehicles, shall achieve a project-wide fleet-average 20 percent NO_X reduction and 45 percent particulate reduction compared to the most recent ARB fleet average at time of construction. Acceptable options for reducing emissions may include use of late-model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available. • The project applicant will locate all construction equipment maintenance and staging areas at the farthest distance possible from nearby sensitive land uses. • Idling of diesel-powered vehicles and equipment will not be permitted during periods of nonactive vehicle use. Diesel-powered engines will not be allowed to idle for more than 5 consecutive minutes in a 60-minute period when the equipment is not in use, occupied by an operator, or otherwise in motion, except under the following conditions: • When equipment is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control • When it is necessary to operate auxiliary systems installed on the equipment, only when such system operation is necessary to accomplish the intended use of the equipment • To bring the equipment to the manufacturer's recommended operating temperature • When the ambient temperature is below 40ºF or above 85ºF • When equipment is being repaired Implementation of the above mitigation measure would reduce ROG, NO_X, and PM_{10} emissions from on-site heavy-duty equipment exhaust by approximately 5 percent, 20 percent, and 45 percent, respectively, and fugitive PM_{10} dust emissions by 75 percent. However, NO_X emissions generated during construction would still exceed the SCAQMD Level B threshold of 137 lb/day.		
		CP2	This mitigation measure is identical to Mitigation Measure AQ-1 (CP1).	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure AQ-1 (CP1).	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure AQ-1 (CP1).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure AQ-1 (CP1).	S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Chapter 7, "Water Quality"					
Impact WQ-1: Temporary Construction-Related Sediment Effects on Shasta Lake and Its Tributaries that Would Cause Violations of Water Quality Standards or Adversely Affect Beneficial Uses	Mitigation Measure WQ-1: Develop and Implement a Comprehensive Multi-scale Sediment Reduction and Water Quality Improvement Program Within Watersheds Tributary to the Primary Study Area.	CP1	The type and nature of actions described in the EIS, Chapter 2 "Alternatives" will require a wide array of mitigation activities to reduce sediment impacts to Shasta Lake and the upper Sacramento River. Watershed analysis and assessments prepared for most of the watersheds tributary to these water bodies consistently document that roads and modified fire regimes have increased sediment contributions to receiving waters, particularly in those watersheds that have been subjected to mining, forest management, and other types of large-scale developments (CVWRCB 2011, The River Exchange 2010). This mitigation measure focuses on proactive activities intended to reduce sediment delivery to receiving waters using a framework approach. At this point in Reclamation's planning process, there is substantial uncertainty with respect to the specific location and types of mitigation activities that may be appropriate and/or effective. At a minimum, the framework includes four fundamental components intended to meet the primary objectives of reducing sediment impacts and improving water quality. These components are generally consistent with the type of management opportunities identified in the Upper Sacramento River Watershed Assessment and Management Strategy (The River Exchange 2010): • Stabilize and/or remediate localized point-source locations that are directly affecting waters tributary to Shasta Lake and/or the upper Sacramento River (e.g., active landslides). • Reduce road-related sediment and improve hydrologic functions by implementing erosion prevention and sediment control and stormproofing measures at the appropriate scale (5th-field watersheds). • Use fuels and vegetation management techniques to manage fuel loads in a manner that restores ecological processes with the intention of reducing the potential for large-scale, high-intensity wildfires (like the Bagley fire) that often result in wide-spread erosion and resulting water quality impacts. This mitigation element may be implemented at multiple scales, but likely planning efforts would focus on the scale of 5th-field watersheds in order to effectively mitigate impacts to water quality and other landscape values. • Stabilize and/or restore channels using both active (construction) and passive (revegetation) measures that reestablish form and function in a manner that improves water quality. This component is consistent with the objectives for Mitigation Measure Geo-2 (Chapter 4). The following discussion is intended to demonstrate Reclamation's commitment to using the best science available to fully develop and implement this mitigation measure in a manner that fully mitigates impact WQ-1 for CP1. Reclamation acknowledges that efforts are ongoing to fully develop this mitigation measure; however the approach outlined below describes efforts to date to identify a number of site-specific actions intended to reduce road-related sediment and improve the hydrologic function of existing roads within the watersheds encompassed by BLM's Shasta-Chappie Off-Highway Vehicle (OHV) area – drainages that enter the Main Arm of Shasta Lake. Reclamation is committed to continuing with similar efforts in other watersheds tributary to arms of Shasta Lake (e.g., McCloud, Squaw Creek). Within an understanding that off-site, out-of-kind mitigation would be required for WQ-1, Reclamation initiated a Sediment Source Inventory (SSI) of 113 miles of road and OHV trails throughout the OHV area (Reclamation 2013) in cooperation with the BLM and other land owners. This SSI included a road analysis process (RAP) developed by the USFS (USFS 1999) that was used to prioritize road-related projects intended to reduce sediment impacts and improve water quality in the watersheds contributing to Shasta Lake. Using this RAP approach, 32-miles of road segments inventoried were considered a moderate-high to high risk. Seven out of the 19 moderate-high to high risk roads are located within the South Fork Squaw Creek and Dry Creek drainages that are tributary to the Main Arm of Shasta Lake. Within these drainages, approximately 20 miles of roads received a high risk rating. The amount of sediment reduction that occurs through road stabilization, stormproofing, and/or decommissioning can be assessed through the WEPP model developed for the USFS (USFS 2010). The WEPP model provides a tool that can be used to characterize the benefits of Mitigation Measure WQ-1 for various types of mitigation components. An example of this has been developed for the road restoration and stabilization opportunities identified in the Westside Lands SSI. For example, for each mitigation treatment an "x" amount of sediment reduction occurs with "y" number of mitigation treatments. In the sediment budget approach, the amount of sediment produced as a result of short-term construction impacts and long-term shoreline erosion would be offset by a combination of the mitigation of these disturbances with various types of mitigation treatments in high priority areas identified through the RAP process and other applicable criteria developed through the mitigation planning process.	PS	LTS
		CP2	This mitigation measure is similar to Mitigation Measure WQ-1 (CP1); however, it will be modified to increase the number of mitigation activities and treatments to address the predicted increase in erosional impacts associated with CP2.	PS	LTS
		CP3	This mitigation measure is similar Mitigation Measure WQ-1 (CP1); however, it will be modified to increase the number of mitigation activities and treatments to address the predicted increase in erosional impacts associated with CP3.	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure WQ-1 (CP3).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure WQ-1 (CP3).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact WQ-4: Long-Term Sediment Effects that Would Cause Violations of Water Quality Standards or Adversely Affect Beneficial Uses in Shasta Lake or Its Tributaries	Mitigation Measure WQ-4: Implement Mitigation Measure WQ-1 (CP1): Develop and Implement a Comprehensive Multi-scale Sediment Reduction and Water Quality Improvement Program Within Watersheds Tributary to the Primary Study Area.	CP1	Reclamation will implement Mitigation Measure WQ-1 (CP1) as described above to reduce long-term effects related to sediment. The SWPPP may be customized to address long-term construction-related impacts associated with this impact. Implementation of this mitigation measure would reduce Impact WQ-4 (CP1) to a less-than-significant level. Customization of Mitigation Measure WQ-4 (CP1) to address long-term construction-related impacts will be completed in a similar manner to Mitigation Measure WQ-1 (CP1), described above. The application of the shoreline erosion model with WEPP can be used to customize Mitigation Measure WQ-4 (CP1). The mitigation activities and treatments would be modified to address long-term construction impacts as predicted by the models.	PS	LTS
		CP2	Reclamation will implement Mitigation Measure WQ-4 (CP1) to reduce long-term effects related to sediment.	PS	LTS
		CP3	Reclamation will implement Mitigation Measure WQ-4 (CP1) to reduce long-term effects related to sediment.	PS	LTS
		CP4/CP4A	Reclamation will implement Mitigation Measure WQ-4 (CP3) to reduce long-term effects related to sediment.	PS	LTS
		CP5	Reclamation will implement Mitigation Measure WQ-4 (CP3) to reduce long-term effects related to sediment.	PS	LTS
Impact WQ-6: Long-Term Metals Effects that Would Cause Violations of Water Quality Standards or Adversely Affect Beneficial Uses in Shasta Lake or Its Tributaries	Mitigation Measure WQ-6: Prepare and Implement a Site-Specific Remediation Plan for Historic Mine Features Subject to Inundation in the Vicinity of the Bully Hill and Rising Star Mines.	CP1	Reclamation will prepare and implement a plan to remove or otherwise remediate two sites related to historic mining activities that have the potential to introduce metals into Shasta Lake, a Section 303(d)-listed water body. This plan will include requirements to coordinate with Federal, State, and local agencies and landowners to ensure that measures taken will reduce the potential for a discharge of metals into Shasta Lake. Reclamation will obtain any required permits, approvals, and authorizations before any ground-disturbing remediation activity occurs.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure WQ-6 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure WQ-6 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure WQ-6 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure WQ-6 (CP1).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact WQ-7: Temporary Construction-Related Sediment Effects on the Upper Sacramento River that Would Cause Violations of Water Quality Standards or Adversely Affect Beneficial Uses	Mitigation Measure WQ-7 (CP1–CP3): Implement Mitigation Measure WQ-1 (CP1): Develop and Implement a Comprehensive Multi-scale Sediment Reduction and Water Quality Improvement Program Within Watersheds Tributary to the Primary Study Area.	CP1	Reclamation will implement Mitigation Measure WQ-1 (CP1) to reduce temporary construction-related effects related to sediment.	PS	LTS
		CP2	Reclamation will implement Mitigation Measure WQ-1 (CP1) to reduce temporary construction-related effects related to sediment.	PS	LTS
		CP3	Reclamation will implement Mitigation Measure WQ-1 (CP1) to reduce temporary construction-related effects related to sediment.	PS	LTS
		CP4/CP4A	Reclamation will implement (a) Mitigation Measure WQ-1 (CP3); and (b) specific BMPs for the gravel augmentation program. Gravel augmentation BMPs will include, but will not be limited to: • Construction Work Windows – All gravel augmentation construction activities will be conducted outside of the flood season (e.g., June 15 to September 15). • Source and Handle Gravel So As to Minimize Potential Water Quality Impacts – Gravel will be sorted and transported in a manner that minimizes potential water quality impacts (e.g., management of fine sediments). Gravel will be washed at least once and have a cleanliness value of 85 or higher based on California Department of Transportation Test No. 227. Gravel will also be completely free of oils, clay, debris, and organic material. • Minimize Potential Impacts Associated with Equipment Contaminants – For in-river work, all equipment will be steam cleaned every day to remove hazardous materials before the equipment enters the water. • Implement Feasible Spill Prevention and Hazardous Materials Management – The accidental release of chemicals, fuels, lubricants, and non-storm drainage water into channels will be prevented to the extent feasible. Spill prevention kits will always be in close proximity when using hazardous materials (e.g., crew trucks and other logical locations). Feasible measures will be implemented to ensure that hazardous materials are properly handled and the quality of aquatic resources is protected by all reasonable means. No fueling will be done within the ordinary high-water mark or immediate floodplain, unless equipment stationed in these locations is not readily relocated (i.e., pumps, generators). For stationary equipment that must be fueled on site, containments will be provided in such a manner that any accidental spill of fuel will not be able to enter the water or contaminate sediments that may come in contact with water. Any equipment that is readily moved out of the channel will not be fueled in the channel or immediate floodplain. All fueling done at the construction site will provide containment to the degree that any spill will be unable to enter the channel or damage wetland or riparian vegetation. No equipment servicing will be done within the ordinary high-water mark or immediate floodplain, unless equipment stationed in these locations cannot be readily relocated (i.e., pumps, generators). Additional BMPs designed to avoid spills from construction equipment and subsequent contamination of waterways will also be implemented. • Minimize Potential Impacts Associated with Access and Staging – Existing access roads will be used. Equipment staging areas will be located outside of the ordinary high-water mark and away from sensitive resources. • Remove Temporary Fills as Appropriate – Temporary fill, such as for access, side channel diversions, and/or side channel cofferdams, will be completely removed upon the completion of construction.	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure WQ-7 (CP4 and CP4A).	PS	LTS
Impact WQ-12: Long-Term Metals Effects that Would Cause Violations of Water Quality Standards or Adversely Affect Beneficial Uses in the Upper Sacramento River	Mitigation Measure WQ-12: Implement Mitigation Measure WQ-6 (CP1): Prepare and Implement a Site-Specific Remediation Plan for Historic Mine Features Subject to Inundation in the Vicinity of the Bully Hill and Rising Star Mines	CP1	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS
		CP2	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS
		CP3	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS
		CP4/CP4A	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS
		CP5	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact WQ-18: Long-Term Metals Effects that Would Cause Violations of Water Quality Standards or Adversely Affect Beneficial Uses in the Extended Study Area	Mitigation Measure WQ-18: Implement Mitigation Measure WQ-6 (CP1): Prepare and Implement a Site-Specific Remediation Plan for Historic Mine Features Subject to Inundation in the Vicinity of the Bully Hill and Rising Star Mines	CP1	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS
		CP2	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS
		CP3	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS
		CP4/CP4A	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS
		CP5	Reclamation will implement Mitigation Measure WQ-6 (CP1) to reduce long-term metals effects.	PS	LTS
Chapter 8, “Noise and Vibration”					
Impact Noise-1: Exposure of Sensitive Receptors in the Primary Study Area to Project-Generated Construction Noise	Mitigation Measure Noise-1: Implement Measures to Prevent Exposure of Sensitive Receptors to Temporary Construction Noise at Project Construction Sites.	CP1	Reclamation and its primary construction contractors will implement the measures listed below during construction: • Construction activities producing high impact noise at non-dam sites will be limited to the less noise-sensitive daytime hours and days (7 a.m. to 10 p.m., Monday through Friday). Nighttime (10 p.m. to 7 a.m.) construction activities at non-dam sites noise levels shall not exceed county standards. • All contractors and subcontractors shall be specific in their contracts and purchase orders for equipment, gravel, aggregate, and other building supplies, as well as for debris removal, that all truck deliveries and debris removal trips that use roadways that pass within 50 feet of inhabitable rooms of residential dwellings shall be limited to the less noise-sensitive daytime hours (7 a.m. to 10 p.m.). Applicable roadways where nighttime truck travel shall be prohibited include the segment of Shasta Dam Boulevard (State Route 151) between Interstate 5 and Lake Boulevard (Road 415) and/or the segments of Lake Boulevard immediately north and south of Shasta Dam Boulevard. • All construction equipment and staging areas will be located at the farthest distance feasible from nearby noise-sensitive land uses. • All construction equipment will be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers’ recommendations. Equipment engine shrouds will be closed during equipment operation. • All motorized construction equipment will be shut down when not in use to prevent idling. • A temporary barrier will be placed as close to the noise source or receptor as possible and will break the line of sight between the source and receptor. • A disturbance coordinator will be designated and the person’s telephone number conspicuously posted around the project sites and supplied to nearby residences. The disturbance coordinator will receive all public complaints and be responsible for determining the cause of the complaint and implementing any feasible measures to alleviate the problem. Implementation of Mitigation Measure Noise-1, as revised above, would reduce temporary project generated construction source noise levels and limit them to the less sensitive daytime hours, thus preventing exposure of sensitive receptors to temporary construction noise at dam and non-dam sites. Implementation of this mitigation measure would also eliminate exposure of off-site residential uses to truck-generated SELs that would cause substantial levels of sleep disturbance. As a result, Impact Noise-1 would be reduced to a less-than-significant level for all the action alternatives.	S	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Noise-1 (CP1).	S	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Noise-1 (CP1).	S	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Noise-1 (CP1).	S	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Noise-1 (CP1).	S	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Chapter 9, "Hazards and Hazardous Materials and Waste"					
Impact Haz-1: Wildland Fire Risk (Shasta Lake and Vicinity and Upper Sacramento River)	Mitigation Measure Haz-1: Coordinate and Assist Public Services Agencies to Reduce Fire Hazards.	CP1	Reclamation will coordinate all proposed road closures, detours, and traffic control measures with SCSO and the Tehama County Sheriff's Office, which are the designated offices of emergency services for the primary study area. Reclamation will also coordinate all proposed road closures, detours, and traffic control measures with USFS,BLM, Caltrans, the CHP, the City of Shasta Lake, and the surrounding Shasta Lake communities. Reclamation will appoint a public liaison to communicate construction schedules, road closures, and project activities with the public. The liaison will organize and conduct public meetings for communicating project information. The liaison will meet with all affected public services agencies to coordinate public meetings and information exchanges. Reclamation will meet with public services agencies to determine that traffic controls for infrastructure, utility, and structure relocation do not impede emergency access for wildland fire response capabilities. Reclamation will require that all project workers receive fire prevention safety training, which identifies local wildland fire hazards and informs workers of the relevant fire prevention procedures, rules, and regulations.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Haz-1 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Haz-1 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Haz-1 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Haz-1 (CP1).	PS	LTS
Impact Haz-2: Release of Potentially Hazardous Materials or Hazardous Waste (Shasta Lake and Vicinity and Upper Sacramento River)	Mitigation Measure Haz-2: Reduce Potential for Release of Hazardous Materials and Waste.	CP1	Reclamation will update the Shasta Dam facilities HMBP (or like document). The update will provide information regarding the hazardous materials used for project implementation and hazardous waste that would be generated. Reclamation will coordinate hazardous materials and waste information with SCSO and the Tehama County Sheriff's Office (the designated offices of emergency services for the primary study area), USFS, the City of Shasta Lake, and the surrounding Shasta Lake communities. Transportation coordination efforts will also include the CHP and Caltrans, and will include disclosing and planning proposed hazardous material transportation routes to ensure use of the route(s) having the least impact. Reclamation will appoint a public liaison to communicate hazardous material transportation routes related to project activities with the public. The liaison will organize and conduct public meetings, which will include discussions of hazardous waste transport in the primary and extended study areas. The liaison will meet with all affected public services agencies to coordinate public meetings and information exchanges. Project workers who may come into contact with hazardous materials or waste will be required to receive hazardous material safety training, which identifies hazardous materials on the project site and informs workers of the relevant safety procedures, rules, and regulations that address hazardous waste handling, storage, and transportation. Reclamation will ensure that project construction sites have staging areas that minimize potential hazardous waste releases and that meet best management practices for short-term construction site hazardous material storage.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Haz-2 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Haz-2 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Haz-2 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Haz-2 (CP1).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Haz-4: Exposure of Sensitive Receptors to Hazardous Materials (Shasta Lake and Vicinity and Upper Sacramento River)	Mitigation Measure Haz-4: Reduce Potential for Exposure of Sensitive Receptors to Hazardous Materials or Waste.	CP1	Reclamation will coordinate hazardous materials transportation routes with SCSO and the Tehama County Sheriff's Office (which are the designated offices of emergency services for the primary study area), USFS, Caltrans, CHP, the City of Shasta Lake, a representative from the Shasta Lake Elementary School, and other affected local agencies within the primary and extended study areas. Coordination efforts will include disclosing and planning proposed hazardous material transportation routes and schedules to allow for site-specific modifications that would lessen the potential impact on sensitive receptors. Reclamation will appoint a public liaison to communicate hazardous material transportation routes related to project activities with the public. The liaison will organize and conduct public meetings, which will include a discussion of hazardous waste transport near local sensitive receptors. The liaison will meet with all affected public services agencies to coordinate public meetings and information exchanges. Reclamation will identify sensitive receptor sites for all project workers who would use, handle, or transport hazardous materials, and require workers transporting hazardous materials past the sensitive receptors to proceed with extreme caution. Reclamation will place road signs identifying sensitive receptor sites for hazardous material haulers and post reduced speed limits if local jurisdictions find it necessary to prevent potential impacts.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Haz-4 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Haz-4 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Haz-4 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Haz-4 (CP1).	PS	LTS
Chapter 11, "Fisheries and Aquatic Ecosystems"					
Impact Aqua-4: Effects on Special-Status Aquatic Mollusks	Mitigation Measure Aqua-4: Implement Mitigation Measure Geo-2: Replace Lost Ecological Functions of Aquatic Habitats by Restoring Existing Degraded Aquatic Habitats in the Vicinity of the Impact.	CP1	The loss of 18.5 miles of intermittent and perennial streams (including 6.2 miles of streams with a gradient less than 7 percent) will be mitigated by compensating for the impact by replacing or providing substitute resources or environments. Reclamation convened an interagency working group to enhance mitigation measures presented in the EIS. The environmental commitments described in Chapter 2 are intended to address impacts to channels within the existing drawdown zone (1070 msl). An outcome of the interagency work group discussions was the agreement that this mitigation measure would encompass efforts within the channels actually affected by the comprehensive plan, but would also be expanded to restore degraded aquatic habitat in channels upstream of Shasta Lake. In general, this mitigation measure would follow the approach to characterize, prioritize, and identify specific restoration actions described in the California Salmonid Stream Habitat Restoration Manual – Fourth Edition (DFG 2010). For CP1, this mitigation measure would result in result in restoration of up to 18.5 miles of channel, with an emphasis on low-gradient perennial channels to be identified by an interagency work group to be convened by Reclamation. This mitigation focuses on restoring and enhancing the aquatic functions of existing, degraded aquatic habitats in or near reaches within the proposed inundation zone and upstream reaches. The interagency working group would focus on identification of specific tributaries to Shasta Lake that may benefit from various mitigation techniques using available information. Examples of techniques that may be used include channel and bank stabilization, channel redirection, channel reconstruction, culvert replacement and elimination of barriers to fish passage, and enhancement of habitat physical structure (e.g., placement of woody debris, rocks). The nature and extent of the restoration and enhancement activities will be based on an assessment of the ecological functions that are lost as a consequence of implementing the alternative.	PS	LTS
		CP2	This mitigation measure is the same as Mitigation Measure Geo-2 (CP2).	PS	LTS
		CP3	This mitigation measure is the same as Mitigation Measure Geo-2 (CP3).	PS	LTS
		CP4/CP4A	This mitigation measure is the same as Mitigation Measure Geo-2 (CP3).	PS	LTS
		CP5	This mitigation measure is the same as Mitigation Measure Geo-2 (CP3).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Aqua-7: Effects on Spawning and Rearing Habitat of Adfluvial Salmonids in Low-Gradient Tributaries to Shasta Lake	Mitigation Measure Aqua-7: Implement Mitigation Measure Aqua-4: Replace Lost Ecological Functions of Aquatic Habitats by Restoring Existing Degraded Aquatic Habitats in the Vicinity of the Impact.	CP1	This mitigation measure is the same as Mitigation Measure Aqua-4 (CP1).	S	LTS
		CP2	This mitigation measure is the same as Mitigation Measure Aqua-4 (CP2).	S	LTS
		CP3	This mitigation measure is the same as Mitigation Measure Aqua-4 (CP3).	S	LTS
		CP4/CP4A	This mitigation measure is the same as Mitigation Measure Aqua-4 (CP4 and CP4A).	PS	LTS
		CP5	This mitigation measure is the same as Mitigation Measure Aqua-4 (CP5).	LTS	LTS
Impact Aqua-14: Reduction in Ecologically Important Geomorphic Processes in the Upper Sacramento River Resulting from Reduced Frequency and Magnitude of Intermediate to High Flows	Mitigation Measure Aqua-14: Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	This measure is identical to Mitigation Measure Bot-7 (CP1).	PS	LTS
		CP2	This measure is identical to Mitigation Measure Bot-7 (CP2).	PS	LTS
		CP3	This measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS
		CP4/CP4A	This measure is identical to Mitigation Measure Bot-7 (CP4 or CP4A).	PS	LTS
		CP5	This measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS
Impact Aqua-15: Changes in Flow and Water Temperatures in the Lower Sacramento River and Tributaries and Trinity River Resulting from Project Operation – Fish Species of Primary Management Concern	Mitigation Measure Aqua-15: Maintain Flows in the Feather River, American River, and Trinity River Consistent with Existing Regulatory and Operational Requirements and Agreements.	CP1	Flows in the Feather, American, and Trinity rivers will be maintained pursuant to existing operational agreements, BOs, criteria, and standards that are protective of fisheries resources.	PS	LTS
		CP2	Flows in the Feather, American, and Trinity rivers will be maintained pursuant to existing operational agreements, BOs, criteria, and standards that are protective of fisheries resources.	PS	LTS
		CP3	Flows in the Feather, American, and Trinity rivers will be maintained pursuant to existing operational agreements, BOs, criteria, and standards that are protective of fisheries resources.	PS	LTS
		CP4/CP4A	Flows in the Feather, American, and Trinity rivers will be maintained pursuant to existing operational agreements, BOs, criteria, and standards that are protective of fisheries resources.	PS	LTS
		CP5	Flows in the Feather, American, and Trinity rivers will be maintained pursuant to existing operational agreements, BOs, criteria, and standards that are protective of fisheries resources.	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Aqua-16: Reduction in Ecologically Important Geomorphic Processes in the Lower Sacramento River Resulting from Reduced Frequency and Magnitude of Intermediate to High Flows	Mitigation Measure Aqua-16: Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	This measure is identical to Mitigation Measure Bot-7 (CP1).	PS	LTS
		CP2	This measure is identical to Mitigation Measure Bot-7 (CP2).	PS	LTS
		CP3	This measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS
		CP4/CP4A	This measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS
		CP5	This measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Chapter 12, "Botanical Resources and Wetlands"					

Impact Bot-2: Loss of MSCS Covered Species	Mitigation Measure Bot-2: Acquire and Preserve Mitigation Lands; Avoid Populations; Relocate MSCS Plants; and Revegetate Affected Areas.	CP1	Reclamation convened an interagency working group to enhance mitigation measures presented in the DEIS. This working group had the benefit of additional information acquired during investigations of nearby private lands available for mitigation and refined analyses of potential project impacts. Using this updated information, the working group developed and refined mitigation measures for botanical and wetland resources, including Shasta snow-wreath. This mitigation measure includes the following components.
			• Reclamation will facilitate and implement actions necessary to acquire and/or propose land exchanges for Shasta snow-wreath populations on private land for transfer into federal ownership, including roads or other access to those lands. Alternatively, if acquisition and/or land exchange efforts are deemed insufficient, Reclamation will work with cooperating and responsible agencies to establish conservation easements at Shasta snow-wreath populations located on private land, including access to the conservation easements by State and Federal resource agencies to monitor the populations.
			• Reclamation will select and/or acquire test plot locations for establishment of experimental Shasta snow-wreath populations. At least four currently unoccupied sites with potential Shasta snow-wreath habitat within the STNF boundary will be selected.
			• Reclamation will develop a program for conservation of genetic material from Shasta snow-wreath sites subject to inundation. This program will include collection of genetic material, including seeds and scions, at all existing Shasta snow-wreath populations within the inundation area. Appropriate endowment funding for long-term maintenance and storage of at least two public botanical conservatories, one of which will be a California institution affiliated with the Center for Plant Conservation, will be provided.
			• Reclamation will investigate the feasibility of protecting Shasta snow-wreath populations to be inundated with dikes/berms. Two existing Shasta snow-wreath sites will be chosen for their genetic diversity and and/or extent. Reclamation will then investigate the feasibility of building dike or berm structures designed to eliminate the flooding that would otherwise occur at the new inundation level at these Shasta snow-wreath sites.
			• Reclamation will develop an active management program for existing Shasta snow-wreath populations. The program, which will be led by Reclamation and include appropriate stakeholders, will provide active management of known Shasta snow-wreath populations outside of the project area on USFS lands to enhance and protect these existing populations. Management activities will include measures to increase fire suppression capacity, use of prescribed fire under rigorous experimental conditions, fencing, integrated weeds management including weed inventory, control (mechanical, chemical, cultural, and biological), abatement, monitoring, and public education. This mitigation measure applies to known and any newly established experimental populations.
			• Additional studies to determine the biology of Shasta snow-wreath will be conducted by Reclamation. Studies will be undertaken to understand the pollination biology of Shasta snow-wreath and the genetic compatibility of different genotypes and to understand the conditions under which sexual reproduction occurs in this species. Seed germination and scion rooting techniques will be explored to find reliable means of producing material for establishment of experimental populations.
			• Reclamation will establish an outreach communication program to local land owners and determine if additional Shasta snow-wreath populations occur on private land. Following development, Reclamation will implement the communications program, including applicable subsequent outreach and monitoring.
			• Reclamation will develop a Shasta Snow-wreath Conservation Agreement. This Conservation Agreement will serve as the overall management document for Shasta snow-wreath and include all responsible State and Federal resource management agencies and appropriate private landowners. At a minimum, the Conservation Agreement will include the following sections:
			  • Introduction
			  • Geographic area and entities included in the agreement
			  • Authority, purpose, objective, and management goal(s) of the Conservation Agreement
			  • Description, status, distribution, ecology, and population biology of the species
			  • Known and potential threats to the species
			  • Current threats of destruction, modification, or curtailment of its habitat or range
			  • Issues related to overutilization for commercial, recreational, scientific, or educational purposes
			  • Disease or predation
			  • Efficacy of existing regulatory mechanisms
			  • Other natural or manmade factors affecting the species' continued existence
				S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Bot-2: Loss of MSCS Covered Species	Mitigation Measure Bot-2: Acquire and Preserve Mitigation Lands; Avoid Populations; Relocate MSCS Plants; and Revegetate Affected Areas.	CP1 (contd.)	• Conservation or management actions that will be implemented • Funding of conservation or management actions • Duration of agreement Signatures • References The STNF has established monitoring transects in eight Shasta snow-wreath populations, with three years of data for seven populations and two years of data for the eighth population. . Reclamation will continue the monitoring efforts at the established populations and expand the effort to additional populations, based on criteria developed by Conservation Agreement participants. The following mitigation measures will reduce impacts on other MSCS plants, if applicable: • When feasible in relocation areas, avoid or minimize actions that can result in harm or mortality to individuals or to the viability of populations. • When feasible, Reclamation will relocate populations of MSCS plants that will be directly affected to suitable habitat within undisturbed portions of the Shasta Lake and vicinity portion of the primary study area. • When feasible, Reclamation will use seed banking and other *ex situ* (off site) conservation methods for MSCS populations that will be directly affected. • When feasible, Reclamation will restore/enhance populations of other MSCS plants in the project vicinity. • A mitigation and monitoring plan will be developed to monitor success of MSCS plant populations that have been relocated or revegetated. The plan will identify suitable sites for mitigation, species to be planted, and numbers and sizes of plantings. It will describe planting techniques, prescribe methods to remove existing noxious weeds, and establish reasonable performance standards and contingency measures. Furthermore, it will establish conservation easements as appropriate. The vegetation restoration plan will be developed in consultation with coordinating and responsible agencies (e.g., USACE, USFWS, and USFS). • Where appropriate, MSCS covered plant species will be used for revegetation. Implementation of this mitigation measure would reduce impacts on MSCS plant species; however, because successful relocation, transplanting, and artificial propagation of Shasta snow-wreath are unproven, impacts would remain significant and unavoidable.		
		CP2	This mitigation measure is identical to Mitigation Measure Bot-2 (CP1).	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure Bot-2 (CP1).	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-2 (CP3).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure Bot-2 (CP3).	S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Bot-3: Loss of USFS Sensitive, BLM Sensitive, or CRPR Species	Mitigation Measure Bot-3: Acquire and Preserve Mitigation Lands; Avoid Populations; Relocate USFS Sensitive, BLM Sensitive, and CRPR Plants and Revegetate Affected Areas.	CP1	Reclamation convened an interagency working group to enhance mitigation measures presented in the DEIS. This working group had the benefit of additional information from recent investigations of nearby private lands available for mitigation and refined analyses of potential project impacts. Using this updated information, the working group developed and refined mitigation measures for botanical and wetland resources, including include land acquisition, habitat management and enhancement, and other measures. Mitigation measure Bot-3 consists of a program to acquire nearby private lands with similar habitat attributes and species composition as those impacted by the SLWRI project. Reclamation has identified several willing private landowners and specific parcels for purchase in the SLWRI project area vicinity. Preliminary investigations of these lands have shown they contain similar and/or additional habitats and special-status species as those impacted by SLWRI. Special-status plant species known to occur on the lands subject to these preliminary investigations include Shasta huckleberry, Shasta arnica, Shasta limestone monkeyflower, Canyon Creek stonecrop, Howell's lewisa, and Shasta eupatory. Additionally, the interagency working group identified other private parcels with similar biological resources in the vicinity of the SLWRI project area, some of which have owners willing to discuss purchase agreements. As discussed during the interagency working group meetings, mitigation measure Bot-3 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. The interagency working group also agreed that additional considerations will be made for other replacement ratios (more or less) depending on habitat quality at a particular site. Emphasis will be placed on lands containing high value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. This mitigation measure includes the following components intended to reduce impacts on USFS sensitive, BLM sensitive, and CRPR plants: • When feasible in relocation areas, avoid or minimize actions that can result in harm or mortality to individuals or to the viability of populations. • When feasible, Reclamation will relocate populations of USFS sensitive, BLM sensitive, and CRPR plants that will be directly affected to suitable habitat within undisturbed portions of the Shasta Lake and vicinity portion of the primary study area. • When feasible, Reclamation will use seed banking and other *ex situ* (off site) conservation methods for USFS sensitive, BLM sensitive, and CRPR plant populations that will be directly affected. • When feasible, Reclamation will restore/enhance populations of other USFS sensitive, BLM sensitive, and CRPR plants in the project vicinity. • Reclamation will develop a mitigation and monitoring plan to monitor success of USFS sensitive, BLM sensitive, and CRPR plant populations that have been relocated or revegetated. The plan will identify suitable sites for mitigation, species to be planted, and numbers and sizes of plantings. It will describe planting techniques, prescribe methods to remove existing noxious weeds, and establish reasonable performance standards and contingency measures. Furthermore, it will establish conservation easements as appropriate. The vegetation restoration plan will be developed in consultation with cooperating and responsible agencies (e.g., USACE, USFWS, USFS). • To the extent feasible, USFS sensitive, BLM sensitive, and CRPR plant species will be used for revegetation.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Bot-3 (CP1).	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Bot-3 (CP1).	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-3 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Bot-3 (CP3).	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Bot-4: Loss of Jurisdictional Waters	Mitigation Measure Bot-4: Mitigate Loss of Jurisdictional Waters.	CP1	Reclamation will prepare a conceptual wetland mitigation plan following current USACE guidance and requirements. The mitigation plan will incorporate wetland habitats within lands acquired under Bot-3 as appropriate, and may include additional mitigation lands. The wetland mitigation plan will also include measures for wetland habitat creation, restoration, and/or enhancement. Under CP1, Bot-4 will mitigate for the loss of approximately 14 acres of wetlands and 19 acres of other waters of the U.S. in the inundation area, and approximately 2 acres of wetlands and 2 acres of other waters of the U.S. in the relocation areas. Collectively Bot-4 (CP1) will mitigate for the loss of approximately 16 acres of wetlands and approximately 21 acres of other waters of the U.S.	S	SU
		CP2	This mitigation measure is identical to Mitigation Measure Bot-4 (CP1). Under CP2, Bot-4 will mitigate for the loss of approximately 19 acres of wetlands and 26 acres of other waters of the U.S. in the inundation area, and approximately 2 acres of wetlands and 2 acres of Other Waters of the U.S. in the relocation areas. Collectively Bot-4 (CP2) will mitigate for the loss of approximately 21 acres of wetlands and approximately 28 acres of other waters of the U.S.	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure Bot-4 (CP1). Under CP3, Bot-4 will mitigate for the loss of approximately 29 acres of wetlands and 48 acres of other waters of the U.S. in the inundation area, and approximately 2 acres of wetlands and 2 acres of Other Waters of the U.S. in the relocation areas. Collectively Bot-4 (CP3) will mitigate for the loss of approximately 31 acres of wetlands and approximately 50 acres of Other Waters of the U.S.	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-4 (CP3).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure Bot-4 (CP3).	S	SU
Impact Bot-5: Loss of General Vegetation Habitats	Mitigation Measure Bot-5: Acquire and Preserve Mitigation Lands for Loss of General Vegetation Habitats.	CP1	As described in Bot-3, mitigation lands will be acquired to mitigate for the loss of vegetation habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Bot-5 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied to each specific habitat type. Additional considerations will be made for other replacement ratios (more or less) depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Bot-5 will mitigate for the loss of 1,227 acres of habitats in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 5,775 acres of mitigation lands containing comparable habitats.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Bot-3 (CP1). Under CP2, Bot-5 will mitigate for the loss of 1,725 acres of habitats in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 7,269 acres of mitigation lands containing comparable habitats.	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Bot-3 (CP1). Under CP3, Bot-5 will mitigate for the loss of 2,492 acres of habitats in the inundation area and 698 acres in the relocation areas by acquiring a minimum 9,570 acres of mitigation lands containing comparable habitats.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-3 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Bot-3 (CP3).	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Bot-6: Spread of Noxious and Invasive Weeds	Mitigation Measure Bot-6: Develop and Implement a Weed Management Plan in Conjunction with Stakeholders.	CP1	Reclamation will develop and implement a weed management plan in conjunction with stakeholders to avoid or minimize the potential for project-related impacts from noxious and invasive plants. This plan will incorporate a combination of inventory, adaptive measures for treatment of existing populations, and measures for controlling spread. The plan will have long-term consideration and be designed as an ongoing program. At a minimum, the plan will include: • Identification of key established weed populations for removal/treatment. • Measures to treat source populations, prevent introduction of new infestations during project construction, and ongoing maintenance. • Provide a mechanism for monitoring and addressing weed populations as the new shoreline develops over time. • Include objective statements which are achievable and can be readily implemented (e.g., to protect potentially impacted sensitive species, to minimize project impacts, to avoid and control weed spread that affects rare and otherwise desirable species, recreation, fuels/fire implications). • Consideration for construction-related species, which may be distinctly different from species likely to invade new inundation areas. Environmental commitments outlined in Chapter 2, “Alternatives,” include measures to use native species for revegetation and erosion control in construction areas, including establishment of local source populations for seed/propagule collection; include standard equipment cleaning provisions in all construction contracts; and use only weed-free road fill, gravel, mulches, and erosion control devices.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Bot-6 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Bot-6 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-6 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-6 (CP1).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Bot-7: Altered Structure and Species Composition and Loss of Sensitive Plant Communities and Special-Status Plant Species Resulting from Altered Flow Regimes	Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	Reclamation will implement a riverine ecosystem mitigation and adaptive management plan to mitigate to the extent feasible the identified effects of an altered Sacramento River flow regime on existing riparian and wetland communities, and associated instream, riparian, and wetland habitat values for aquatic and terrestrial special-status species along the Sacramento River from Shasta Dam to Colusa (River Mile 144). The plan is consistent with and will support implementation of the Senate Bill 1086 program, and will be implemented in coordination with USFWS, NMFS, CDFW, and the Sacramento River Conservation Area Forum. The plan will be implemented before or during project construction. The plan is limited to the Sacramento River from Shasta Dam to Colusa (River Mile 144). The plan mitigates to the existing conditions as of 2010 which are considered the baseline conditions. The goals of the plan, which also serve as performance standards, are to have no net reduction in the average amount of any of the following caused by the project along the Sacramento River from Shasta Dam to Colusa: • Channel migration in selected areas of natural vegetation dominated by native species • Overbank inundation of natural vegetation dominated by native species in selected areas • Regeneration of early-successional riparian vegetation (e.g., cottonwood regeneration) in selected areas The riverine ecosystem mitigation plan includes a menu of potentially feasible elements: • Modeling or monitoring at representative locations to quantify direct and indirect impacts resulting from adaptive management of project implementation. A method of quantifying impacts will be used that ensures repeatability. This would include at least one of the following approaches: - Conducting aerial surveys to evaluate changes in riparian habitat communities - Development and monitoring of up to 15 riparian habitat transects along the Sacramento River at potentially sensitive locations (e.g., downstream from the confluence of tributaries, downstream from diversion structures) Monitoring would be conducted for an initial 10-year period, after which the need for continued monitoring would be re-evaluated. • An evaluation of modifications to the procedures for operating Shasta Dam (e.g., ramping rates) to accomplish any of the following: - Reduce or eliminate adverse impacts on ecologically important bankfull and overbank flows (as feasible within existing flood reduction constraints) - Reduce or eliminate adverse impacts (e.g., reduction) on meander migration rates - Facilitate establishment of cottonwoods and early-successional vegetation at intervals sufficient to sustain cottonwoods and early-successional riparian vegetation along the Sacramento River riparian corridor and floodplain (e.g., at 5- to 15-year intervals) - Avoid any increase in flood risk from implementing this mitigation measure. Feasible modifications to operational procedures are those not in conflict with applicable laws, agreements, and regulations, or with the purpose of the project. • A specific combination of mitigation actions will be implemented to attain the plan's goals. Mitigation actions consist of modifications to dam operation procedures and/or funding of appropriate restoration actions that have been developed by Reclamation, other Federal agencies, State or local governments, or private nonprofits and received applicable Federal and State permits. Appropriate restoration actions include the following: - Enhance connectivity of river side channels (e.g., by modifying the elevation of secondary channels, remnant oxbows, or meander scars) - Expand the river meander zone at selected locations (e.g., by assisting in funding projects that meet this objective) - Increase floodplain connectivity (e.g., by assisting in funding projects that meet this objective) - Control and remove nonnative, invasive plant species from riparian areas to shift dominance to native species - Create riparian and wetland communities (e.g., through plantings) - Increase shaded riverine aquatic habitat (e.g., through plantings)	S	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Bot-7: Altered Structure and Species Composition and Loss of Sensitive Plant Communities and Special-Status Plant Species Resulting from Altered Flow Regimes	Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1 (contd.)	The following will be considered in implementation of the riverine ecosystem mitigation plan: • The adaptive management process will evaluate the performance of the restoration actions towards meeting the performance standards and goals. • The location of restoration actions will be on preserved sites and with funding for management in perpetuity. (Preserved sites will include sites previously preserved by other entities.) A specific restoration plan will be developed for each restoration location and coordinated with resource agencies and local stakeholders. • Mechanisms by which Reclamation will fund implementation will be determined after project approval for implementation. At a minimum, mitigation that will be implemented under this plan will include the following: • Feasible modifications to dam operation procedures identified as reducing adverse impacts on meander migration or ecologically important bankfull and overbank flows, or as facilitating cottonwood establishment, and • Either of the following elements: - Provide actions or funding to increase meander migration, side-channel connectivity, or floodplain connectivity along the Sacramento River, and creation (or conversion of nonnative-dominated to native-dominated) of riparian or wetland communities or - Provide mitigation that has been determined by USFWS, NMFS, and CDFW to be of comparable or greater value and is included in the terms and conditions of permits for impacts on species listed as threatened or endangered by the State or Federal governments Implementation of this mitigation measure would mitigate the impact of altered flow regimes on instream, riparian, and wetland communities, and thus would reduce Impact Bot-7 (CP1) to a less-than-significant level.		
		CP2	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1), except that mitigation in the riverine ecosystem mitigation plan will include either of the following elements: • Increased meander migration, side -channel connectivity, or floodplain connectivity along the Sacramento River, and creation (or conversion from nonnative-dominated to native-dominated) of riparian or wetland communities or • Mitigation that has been determined by USFWS, NMFS, and CDFW to be of comparable or greater value and is included in the terms and conditions of permits for impacts on species listed as threatened or endangered by the State or Federal government	S	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1), except that mitigation in the riverine ecosystem mitigation plan will include either of the following elements: • Increased meander migration, side-channel connectivity, or floodplain connectivity along the Sacramento River, and creation (or conversion from nonnative-dominated to native-dominated) of riparian or wetland communities or • Mitigation that has been determined by USFWS, NMFS, and CDFW to be of comparable or greater value and is included in the terms and conditions of permits for impacts on species listed as threatened or endangered by the State or Federal government.	S	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1).	S	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-7 (CP3).	S	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Bot-8: Conflict with Approved Local or Regional Plans with Objectives of Riparian Habitat Protection or Watershed Management	Mitigation Measure Bot-8: Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	Reclamation will implement Mitigation Measure Bot-7 (CP1). As described under Mitigation Measure Bot-7 (CP1), implementing a riverine ecosystem mitigation plan would reduce conflicts with approved local and regional plans that address and promote the conservation of riparian vegetation communities along the upper Sacramento River in the primary study area.	PS	LTS
		CP2	Reclamation will implement Mitigation Measure Bot-7 (CP2). Implementing this riverine ecosystem mitigation plan would reduce conflicts with approved local and regional plans that address and promote the conservation of riparian vegetation communities along the upper Sacramento River in the primary study area.	PS	LTS
		CP3	Reclamation will implement Mitigation Measure Bot-7 (CP3). The implementation of this riverine ecosystem mitigation plan would reduce conflicts with approved local and regional plans that address and promote the conservation of riparian vegetation communities along the upper Sacramento River in the primary study area.	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
		CP1	No mitigation is needed.	NI	NI
		CP2	No mitigation is needed.	NI	NI
		CP3	No mitigation is needed.	NI	NI
Impact Bot-11: Loss of Sensitive Natural Communities or Habitats Resulting from Implementing the Gravel Augmentation Program or Restoring Riparian, Floodplain, and Side Channel Habitats	Mitigation Measure Bot-11: Revegetate Disturbed Areas, Consult with CDFW and Mitigate Loss of Jurisdictional Waters.	CP4/CP4A	Reclamation will implement the following measures to reduce and compensate for loss of sensitive natural communities: • Before removing any vegetation at the augmentation sites and access areas, a survey will be conducted to map and classify the natural communities present in these areas, including wetland communities. • Augmentation access will be designed to avoid disturbing wetland plant communities to the extent feasible. Removal of mature riparian vegetation and other sensitive vegetation will be minimized to the extent possible while still allowing access to gravel augmentation sites. • CDFW will be consulted with to determine if a Section 1602 streambed alteration agreement will be required for the gravel augmentation activities affecting the bed and bank of the Sacramento River and side channels. • Staging and gravel and equipment storage will be confined to developed or disturbed areas to the extent feasible. • A revegetation plan will be prepared to restore native vegetation in all areas cleared to implement the gravel augmentation program immediately following completion of the gravel augmentation activities at each augmentation site. The revegetation plan will include performance standards and success criteria to ensure that mitigation habitat would be successfully maintained and result in no net loss of sensitive natural communities, including riparian vegetation. • All conditions of the streambed alteration agreement will be implemented to the satisfaction of CDFW, subject to limitations on its authority set forth in Fish and Game Code Section 1600 et seq. In addition, Reclamation will implement the following measures to reduce and compensate for potential loss of sensitive natural communities from the riparian, floodplain, and side channel restoration actions: • A survey will be conducted before removing any vegetation at the augmentation sites and access areas to map and classify the natural communities present in restoration and potential construction areas at restoration sites. • CDFW will be consulted with to determine if a Section 1602 streambed alteration agreement will be required for the restoration and construction activities at each restoration site affecting the bed and bank of the Sacramento River and side channel. • Relocated and/or rehabilitated facilities (e.g., power poles) will be designed to avoid disturbing sensitive plant communities to the extent feasible. • A 100-foot no disturbance buffer will be established around sensitive plant communities that are to be avoided during construction. Removal of mature riparian vegetation and other sensitive vegetation will be minimized to the extent possible. • Staging, equipment storage, and construction access will be designed to avoid disturbing vegetation to the extent feasible. • Native riparian and other sensitive vegetation, if any, removed from restoration sites will be replaced on a no-net-loss basis. Riparian vegetation will be replaced through planting and establishment of comparable native riparian vegetation on-site. Other sensitive plant communities may be replaced through restoration of comparable native vegetation at other sites if necessary. • Planting mix, composition, and density will be determined by a more detailed site analysis, but could include native cottonwood, willow, box elder, valley oak, western sycamore, elderberry, and a variety of understory brush species. Temporary irrigation will be provided on an as-needed basis, where feasible. • All conditions of the streambed alteration agreement will be implemented to the satisfaction of CDFW, subject to limitations on its authority set forth in Fish and Game Code Section 1600 et seq. Reclamation will prepare and implement a wetland mitigation plan following current USACE guidance and requirements. The wetland mitigation plan will include measures for wetland habitat creation, restoration, and/or enhancement.	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-11 (CP4 and CP4A).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Bot-12: Loss of Special-Status Plants Resulting from Implementing the Gravel Augmentation Program Restoring Riparian, Floodplain, and Side Channel Habitats	Mitigation Measure Bot-12: Conduct Preconstruction Surveys for Special-Status Plants and Avoid Special-Status Plant Populations during Construction.	CP1	No mitigation is needed.	NI	NI
		CP2	No mitigation is needed.	NI	NI
		CP3	No mitigation is needed.	NI	NI
		CP4/CP4A	Reclamation will implement the following measures to avoid impacts on special-status plants resulting from the gravel augmentation program: • Botanists will be hired to conduct protocol-level special-status plant surveys before commencing any construction activities that could disturb vegetation. • All special-status plants identified within 250 feet of the proposed augmentation sites will be mapped and identified for avoidance. Access routes and gravel placement will be designed to avoid impacts on special-status plants. • Fencing will be installed a minimum of 100 feet from special-status plants, and no project activity will be permitted within the area occupied by special-status plants or the 100-foot buffer area around these plants. • Insecticides, herbicides, fertilizers, or other chemicals that might harm special-status plants will not be used within 100 feet of the plants. Roadways and disturbed areas within 100 feet of special-status plants will be watered at least twice a day and as needed to minimize dust emissions. In addition, Reclamation will implement the following measures to avoid impacts on special-status plants resulting from the riparian, floodplain, and side channel restoration actions: • Qualified botanists will be hired to conduct protocol-level special-status plant surveys before commencing any construction activities that could disturb vegetation. • All special-status plants identified within 250 feet of the proposed augmentation sites will be mapped and avoided to the extent feasible. Protective fencing will be installed around special-status plant locations and a 100-foot buffer zone during construction activities. • Insecticides, herbicides, fertilizers, or other chemicals that might harm special-status plants will not be used within 100 feet of special-status plants. Roadways and disturbed areas within 100 feet of special-status plants will be watered at least twice a day and as needed to minimize dust emissions.	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-12 (CP4 and CP4A).	PS	LTS
Impact Bot-13: Spread of Noxious and Invasive Weeds Resulting from Implementing the Gravel Augmentation Program Restoring Riparian, Floodplain, and Side Channel Habitats	Mitigation Measure Bot-13: Implement Weed Management Measures and Revegetation.	CP1	No mitigation is needed.	NI	NI
		CP2	No mitigation is needed.	NI	NI
		CP3	No mitigation is needed.	NI	NI
		CP4/CP4A	Reclamation will implement the following measures to reduce the risk of introducing and spreading noxious weeds or invasive plant species during gravel augmentation and riparian, floodplain, and side channel restoration: • Before conducting gravel augmentation activities, invasive plant and noxious weed infestations will be identified and mapped within the augmentation sites, including vegetation clearing sites. • Noxious weeds will be removed at the onset of construction and disposed of properly. If noxious weeds are not removed at the onset of construction, they will be fenced and avoided during construction. • Any clothing, footwear, and equipment used during construction will be ensured free of soil, seeds, vegetative matter or other debris or potential seed-bearing material before entering the project sites or before moving from infested sites to uninfested sites. • Mitigation Measure Bot-11 (CP4 and CP4A) will be implemented to restore native vegetation in all areas disturbed by gravel placement and construction of access routes immediately following completion of the gravel augmentation activities at each augmentation site. • Only weed-free gravel, fill soil, mulch, seed mixes, and straw materials will be used during construction; best management practices will be implemented; and postconstruction revegetation will be conducted. Certified weed-free material will be used if available.	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-13 (CP4 and CP4A).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Bot-14: Altered Structure and Species Composition and Loss of Sensitive Plant Communities and Special-Status Plant Species Resulting from Altered Flow Regimes on the Lower Sacramento River	Mitigation Measure Bot-14: Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1).	S	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Bot-7 (CP2).	S	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Bot-7 (CP3).	S	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1).	S	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-7 (CP3).	S	LTS
Impact Bot-15: Conflict with Approved Local or Regional Plans with Objectives of Riparian Habitat Protection or Watershed Management along the Lower Sacramento River	Mitigation Measure Bot-15: Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	Reclamation will implement Mitigation Measure Bot-7 (CP1). As described under Mitigation Measure Bot-7 (CP1), implementing a riverine ecosystem mitigation plan would reduce conflicts with approved local and regional plans that address and promote the conservation of riparian vegetation communities along the lower Sacramento River in the extended study area.	PS	LTS
		CP2	Reclamation will implement Mitigation Measure Bot-7 (CP2). Implementing this riverine ecosystem mitigation plan would reduce conflicts with approved local and regional plans that address and promote the conservation of riparian vegetation communities along the lower Sacramento River in the extended study area.	PS	LTS
		CP3	Reclamation will implement Mitigation Measure Bot-7 (CP3). The implementation of this riverine ecosystem mitigation plan would reduce conflicts with approved local and regional plans that address and promote the conservation of riparian vegetation communities along the lower Sacramento River in the extended study area.	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Chapter 13, "Wildlife Resources"					
Impact Wild-1: Take and Loss of Habitat for the Shasta Salamander	Mitigation Measure Wild-1: Avoid, Relocate, and Acquire Mitigation Lands for Shasta Salamander.	CP1	Reclamation convened an interagency working group to enhance mitigation measures presented in the DEIS. This working group had the benefit of additional information from recent investigations of nearby private lands available for mitigation and refined analyses of potential project impacts. Using this updated information the working group developed and refined mitigation measures for wildlife resources, including land acquisition, habitat management and enhancement, and other measures. Mitigation measure Wild-1 consists of a program to acquire nearby private lands with similar habitat attributes and species composition as those impacted by the SLWRI project. Reclamation has identified several willing private landowners and specific parcels for purchase in the SLWRI project area vicinity. Preliminary investigations of these lands have shown they contain similar and/or additional habitats and special-status species as those impacted by SLWRI. Special-status wildlife species known to occur on the lands subject to these preliminary investigations include Church's sideband, Klamath shoulderband, Shasta chaparral, Shasta sideband, Shasta hesperian, Shasta salamander, foothill yellow-legged frog, bald eagle, and Pacific fisher. Additionally, the interagency working group identified other private parcels with similar biological resources in the vicinity of the SLWRI project area, some of which have owners willing to discuss purchase agreements. As discussed during the interagency working group meetings, mitigation measure Wild-3 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. The interagency working group also agreed that additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. *Inundation Area* It is unfeasible to quantify the number of individual Shasta salamanders that would be lost in the impoundment area. Direct loss of individuals and of limestone habitat from inundation cannot be mitigated. As described above, mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-1 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-1 will mitigate for the loss of 1,195 acres of Shasta salamander habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 4,860 acres of mitigation lands containing comparable habitats. Potential mitigation lands containing comparable Shasta salamander habitat have been identified adjacent to the project. Shasta salamander has been found in both limestone and nonlimestone habitat in this site. *Vegetation Removal and Construction Activities* • To minimize impacts on individuals, preconstruction surveys, in consultation with CDFW and USFS, will be conducted by a qualified biologist before construction activities during the wet season. Individuals will be relocated to suitable limestone habitat in the vicinity of detection. The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	S	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). Under CP2, Wild-1 will mitigate for the loss of 1,678 acres of Shasta salamander habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 6,309 acres of mitigation lands containing comparable habitats.	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). Under CP3, Wild-1 will mitigate for the loss of 2,415 acres of Shasta salamander habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 8,520 acres of mitigation lands containing comparable habitats.	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-1 (CP3).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-1 (CP3).	S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-2: Impact on the Foothill Yellow-Legged Frog and Tailed Frog and Their Habitat	Mitigation Measure Wild-2: Avoid, Relocate, and Acquire Mitigation Lands for Foothill Yellow-Legged Frog and Tailed Frog.	CP1	To avoid or minimize impacts on the foothill yellow-legged frog and tailed frog, the following measures will be implemented. *Inundation Area* Individual foothill yellow-legged frog and tailed frogs will not be affected by the inundation caused by the raise of the dam. Animals will be able to swim upstream to suitable habitat. This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-2 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-2 will mitigate for the loss of 35 acres of foothill yellow-legged frog and tailed frog habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 108 acres of mitigation lands containing comparable habitats. *Vegetation Removal and Construction Activities* • To the extent feasible, projects planned in relocation areas will be designed to avoid construction in perennial streams and their associated riparian zones. • When instream construction activities must occur, a preconstruction survey of the foothill yellow-legged frog and tailed frog adults, larvae, and eggs will be conducted by a qualified biologist before ground-disturbing activities begin in perennial stream and riparian habitat. This survey will be conducted within the construction boundary no more than 1 week before instream or adjacent riparian construction activities begin. If foothill yellow-legged frog or tailed frog adults, larvae, or eggs are detected, the biologist in coordination with CDFW and USFS will relocate them to a suitable stream habitat outside the construction boundary. If frogs are absent, no further surveys will be required. • If adults are found to use the stream where construction activities are intended to take place, a qualified biologist will relocate all individuals to suitable habitat outside the construction zone daily before instream activities resume. The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-2 (CP2). Under CP2, Wild-2 will mitigate for the loss of 47 acres of foothill yellow-legged frog and tailed frog habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 144 acres of mitigation lands containing comparable habitats.	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-2 (CP3). Under CP3, Wild-2 will mitigate for the loss of 80 acres of foothill yellow-legged frog and tailed frog habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 243 acres of mitigation lands containing comparable habitats.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-2 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-2 (CP3).	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-3: Impact on the Northwestern Pond Turtle and Its Habitat	Mitigation Measure Wild-3: Avoid, Relocate, and Acquire Mitigation Lands for Northwestern Pond Turtle.	CP1	To avoid or minimize impacts on the northwestern pond turtle, the following measures will be implemented. *Inundation Area* Individual northwestern pond turtles will not be impacted by the inundation caused by the raise of the dam. Lacustrine is suitable habitat for the northwestern pond turtle. The loss of northwestern pond turtle nests in the inundation zone if inundated while eggs are in the nest is unavoidable. This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-3 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-3 will mitigate for the loss of 35 acres of northwestern pond turtle habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 108 acres of mitigation lands containing comparable habitats. *Vegetation Removal and Construction Activities* • To the extent feasible, projects planned in relocation areas will be designed to avoid all suitable aquatic habitat and its associated riparian zone. • When construction activities are to occur within suitable northwestern pond turtle habitat as defined in Impact Wild-3 (CP1), a qualified biologist will conduct a minimum of one preconstruction survey for northwestern pond turtles and their nests. The survey will be conducted no more than 1 week before construction. If a pond turtle nest is found, the biologist will flag the site and determine whether construction activities can avoid impacting the nest. If the nest cannot be avoided, CDFW and the USFS will be contacted for further direction and construction activities in that location will be halted. • In the event that a pond turtle is observed within the construction limits, the contractor will temporarily halt construction activities until a qualified biologist has moved the turtle to a safe location within suitable habitat outside of the construction limits. The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-3 (CP1). Under CP2, Wild-3 will mitigate for the loss of 47 acres of northwestern pond turtle habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 144 acres of mitigation lands containing comparable habitats.	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-3 (CP1). Under CP3, Wild-2 will mitigate for the loss of 80 acres of northwestern pond turtle habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 243 acres of mitigation lands containing comparable habitats.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-3 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-3 (CP3).	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-4: Impact on the American Peregrine Falcon	Mitigation Measure Wild-4: Conduct Preconstruction Surveys for the American Peregrine Falcon and Establish Buffers.	CP1	To avoid or minimize impacts on nesting American peregrine falcons, the following measures will be implemented. *Inundation Area* Individual American peregrine falcons will not be impacted by the inundation caused by the raise of the dam. *Vegetation Removal and Construction Activities* • To the extent feasible, projects planned in relocation areas will be designed to avoid suitable cliff habitat. • If vegetation removal or construction occurs outside of the breeding season (August 1 through March 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented. • For proposed construction activities during the breeding season (February 1 and July 31) within 0.5 mile of a known American peregrine falcon eyrie or suitable habitat identified in Impact Wild-4 (CP1), a qualified biologist will conduct a protocol-level survey. The survey will be conducted no more than 2 weeks before construction begins. If an active nest is found, a qualified biologist, in consultation with CDFW, will determine the construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, a plan will be developed to monitor whether construction activity is disturbing the nesting process and to determine when the young have fledged.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Wild-4 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Wild-4 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-4 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Wild-4 (CP1).	PS	LTS
Impact Wild-5: Take and Loss of Habitat for the Bald Eagle	Mitigation Measure Wild-5: Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Bald Eagle and Establish Buffers.	CP1	To avoid or minimize impacts on nesting bald eagles, the following measures will be implemented. *Inundation Area* This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-5 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. For bald eagles, emphasis will also be placed on the location of these mitigation lands relative to large water body features to ensure these lands provide potential bald eagle habitat. Under CP1, Wild-5 will mitigate for the loss of 979 acres of bald eagle habitat in the inundation area and 393 acres in the relocation areas by acquiring a minimum of 4,116 acres of mitigation lands containing comparable habitats. Additional mitigation will be provided by implementing fuels reduction projects within and adjacent to existing bald eagle nest stands at Shasta Lake to help protect those sites from wildfire. *Vegetation Removal and Construction Activities* • For each year of vegetation removal or construction activity, all active bald eagle nests will be located and mapped using the National Bald Eagle Management Guidelines (USFWS 2007). • If vegetation removal or construction occurs outside of the breeding season (August 2 through December 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented. • If vegetation removal is to occur between January 1 and August 1, a 660-foot to 0.5-mile buffer will be established around active nests in consultation with CDFW and USFS. No vegetation removal or construction activity will occur within the established buffer during the limited operating period. The avoidance and relocation measures for vegetation removal and construction activities and the nest protection measures within the inundation area would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-5: Take and Loss of Habitat for the Bald Eagle	Mitigation Measure Wild-5: Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Bald Eagle and Establish Buffers.	CP2	This mitigation measure is identical to Mitigation Measure Wild-5 (CP1). Under CP2, Wild-5 will mitigate for the loss of 1,376 acres of bald eagle habitat in the inundation area and 393 acres in the relocation areas by acquiring a minimum of 5,307 acres of mitigation lands containing comparable habitats.	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-5 (CP1). Under CP3, Wild-5 will mitigate for the loss of 1,989 acres of bald eagle habitat in the inundation area and 393 acres in the relocation areas by acquiring a minimum of 7,146 acres of mitigation lands containing comparable habitats.	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-5 (CP3).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-5 (CP3).	S	SU
Impact Wild-6: Loss of Dispersal Habitat for the Northern Spotted Owl	Mitigation Measure Wild-6: Acquire and Preserve Mitigation Lands, Habitat Enhancement.	CP1	To avoid or minimize impacts on northern spotted owl dispersal habitat, the following measures will be implemented. *Inundation Area* This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-6 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-6 will mitigate for the loss of 438 acres of northern spotted owl dispersal habitat in the inundation area and 341 acres in the relocation areas by acquiring a minimum of 2,337 acres of mitigation lands containing comparable habitats. Providing compensatory mitigation by acquiring and conserving habitat mitigation lands for dispersal habitat will minimize this impact.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Under CP2, Wild-6 will mitigate for the loss of 643 acres of northern spotted owl dispersal habitat in the inundation area and 341 acres in the relocation areas by acquiring a minimum of 2,952 acres of mitigation lands containing comparable habitats.	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Under CP3, Wild-6 will mitigate for the loss of 976 acres of northern spotted owl dispersal habitat in the inundation area and 341 acres in the relocation areas by acquiring a minimum of 3,951 acres of mitigation lands containing comparable habitats.	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-6 (CP3).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Wild-6 (CP3).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-7: Impact on the Purple Martin and Its Habitat	Mitigation Measure Wild-7: Conduct a Preconstruction Survey for the Purple Martin and Establish Buffers.	CP1	Purple martins at Shasta Lake nest in flooded snags within the existing reservoir and snags occurring in recently burned areas at nearby upland locations. To avoid or minimize impacts on nesting purple martins, implement the following mitigation measures: • To the extent feasible, all snags in the Pit Arm will be retained. Vegetation will not be removed from the Pit Arm from Jones Valley north, with exception of Arbuckle Campground, which will provide snag recruitment from trees that will die from inundation. • If vegetation removal or construction occurs outside of the breeding season (September 1 through March 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented. • If proposed vegetation removal and construction activities are to take place on the Pit Arm from April 1 through August 31, a qualified biologist will conduct a protocol-level survey to locate active nests. The survey will be conducted no more than 2 weeks before construction begins. If an active nest is found, a qualified biologist, in consultation with CDFW, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged. In addition these measures, Reclamation will develop a purple martin management plan that details additional specific actions to minimize impacts in the inundation zone and maintain purple martin habitat in adjacent uplands. At a minimum, the management plan will include the following actions: • Determine key upland nesting locations and identify vegetation management prescriptions, including prescribed fire and manual/mechanized techniques, which maintain open habitats and snags to preserve purple martin habitat. • Implement vegetation management that maintains open habitats and snags to preserve purple martin habitat in the key upland locations. • A minimum of 3 years before project construction and initial (new) inundation, develop an experimental artificial nest box program in upland nesting locations, including monitoring and adaptive management. Implementation of this mitigation measure will reduce impacts on individual purple martins nesting during the implementation of the project; however, these measures would not protect purple martins actively nesting within the impoundment area when the lake reaches maximum inundation and might not fully mitigate the loss of snags used for nesting.	S	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-7 (CP1).	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-7 (CP1).	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-7 (CP1).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-7 (CP1).	S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-8: Impacts on the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Their Foraging and Nesting Habitat	Mitigation Measure Wild-8: Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Establish Buffers.	CP1	To avoid or minimize impacts on nesting willow flycatchers, Vaux's swifts, yellow warblers, and yellow-breasted chats, the following measures will be implemented. *Inundation Area* Individuals actively nesting within the impoundment area could be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated. This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-8 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-8 will mitigate for the loss of 954 acres of Vaux's swift habitat in the inundation area and 390 acres in the relocation areas by acquiring a minimum of 1,344 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-8 will mitigate for the loss of 28 acres of willow flycatcher, yellow warbler, and yellow-breasted chat habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 87 acres of mitigation lands containing comparable habitats. *Vegetation Removal and Construction Activities* • To the extent feasible, projects planned in relocation areas will be designed to avoid riparian habitat. • To the extent feasible, construction activities will be avoided within riparian habitat and snags suitable for Vaux's swift nesting. • If vegetation removal or construction occurs outside of the breeding season (September 1 through March 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented. • If proposed vegetation removal and construction activities are to occur within 250 feet of suitable habitat for willow flycatchers, Vaux's swifts, yellow warblers, and yellow-breasted chats between April 1 and August 31, a qualified biologist will conduct a preconstruction survey no more than 2 weeks before construction activities begin. If an active nest is found, a qualified biologist, in consultation with CDFW, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged. • If willow flycatchers are detected during the preconstruction survey, protocol-level surveys using a current approved protocol will be conducted to locate and monitor active nests. The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities; however, these measures would not protect individuals actively nesting within the impoundment area when the lake reaches maximum inundation. Also, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-8 (CP1). Under CP2, Wild-8 will mitigate for the loss of 1,341 acres of Vaux's swift habitat in the inundation area and 390 acres in the relocation areas by acquiring a minimum of 5,193 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-8 will mitigate for the loss of 37 acres of willow flycatcher, yellow warbler, and yellow-breasted chat habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 114 acres of mitigation lands containing comparable habitats.	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-8: Impacts on the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Their Foraging and Nesting Habitat	Mitigation Measure Wild-8: Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Establish Buffers.	CP3	This mitigation measure is identical to Mitigation Measure Wild-8 (CP1). Under CP3, Wild-8 will mitigate for the loss of 1,938 acres of Vaux's swift habitat in the inundation area and 390 acres in the relocation areas by acquiring a minimum of 6,984 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-8 will mitigate for the loss of 58 acres of willow flycatcher, yellow warbler, and yellow-breasted chat habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 177 acres of mitigation lands containing comparable habitats.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-8 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-8 (CP3).	PS	SU
Impact Wild-9: Impacts on the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Their Foraging and Nesting Habitat	Mitigation Measure Wild-9: Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Establish Buffers.	CP1	To avoid or minimize impacts to these species, the following measures will be implemented. *Inundation Area* This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-9 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-9 will mitigate for the loss of 699 acres of long-eared owl and northern goshawk habitat in the inundation area and 327 acres in the relocation areas by acquiring a minimum of 3,078 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-9 will mitigate for the loss of 1,072 acres of Cooper's hawk and great blue heron habitat in the inundation area and 402 acres in the relocation areas by acquiring a minimum of 4,422 acres of mitigation lands containing comparable habitats. *Vegetation Removal and Construction Activities* • To the extent feasible, construction activities will be avoided within riparian habitat. • If vegetation removal or construction takes place outside of the breeding season (March 31 through September 1), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented. • If proposed vegetation removal and construction activities are to take place within 0.25 mile of suitable habitat for the long-eared owl, northern goshawk, Cooper's hawk, and great blue heron between February 1 and August 31, a qualified biologist will conduct a preconstruction survey no more than 2 weeks before construction activities begin. Protocol-level surveys will be conducted in suitable goshawk habitat. • If vegetation removal is to occur between February 1 and August 31, a construction-free buffer will be established around active nests in consultation with CDFW and USFS. No vegetation removal or construction activity will occur within the established buffer during the limited operating period. The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-9 (CP1). Under CP2, Wild-9 will mitigate for the loss of 987 acres of long-eared owl and northern goshawk habitat in the inundation area and 327 acres in the relocation areas by acquiring a minimum of 3,942 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-9 will mitigate for the loss of 1,505 acres of Cooper's hawk and great blue heron habitat in the inundation area and 402 acres in the relocation areas by acquiring a minimum of 5,721 acres of mitigation lands containing comparable habitats.	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-9 (CP1). Under CP3, Wild-9 will mitigate for the loss of 1,428 acres of long-eared owl and northern goshawk habitat in the inundation area and 327 acres in the relocation areas by acquiring a minimum of 5,265 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-9 will mitigate for the loss of 2,167 acres of Cooper's hawk and great blue heron habitat in the inundation area and 402 acres in the relocation areas by acquiring a minimum of 7,707 acres of mitigation lands containing comparable habitats.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-9 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-9 (CP3).	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-10: Take and Loss of Habitat for the Pacific Fisher	Mitigation Measure Wild-10: Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Pacific Fisher and Establish Buffers.	CP1	To avoid or minimize impacts on Pacific fisher natal dens, the following measures will be implemented. *Inundation Area* Pacific fisher natal dens within the impoundment area could be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated. However, female fishers often move young to alternate natal dens if threatened or disturbed. This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-10 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-10 will mitigate for the loss of 749 acres of Pacific fisher habitat in the inundation area and 330 acres in the relocation areas by acquiring a minimum of 3,237 acres of mitigation lands containing comparable habitats. Potential mitigation lands containing comparable habitat and where Pacific fishers are known to occur have been identified adjacent to the project. *Vegetation Removal and Construction Activities* • If vegetation removal or construction occurs outside of the breeding season (February 1 through May 1), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented. • If proposed vegetation removal and construction activities are to occur in suitable habitat for the Pacific fisher between February 1 and May 1, a qualified biologist will conduct a preconstruction survey for potential natal or maternity den trees no more than 2 weeks before construction activities begin. If an active den is found, a qualified biologist, in consultation with USFS, BLM (if on BLM land), and USFWS, will determine a construction-free buffer zone to be established around the den until the mother and young have dispersed. In consultation with USFWS, a plan will be developed to monitor whether construction activity is disturbing the reproductive success and to determine when the young have dispersed. The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-10 (CP1). Under CP2, Wild-10 will mitigate for the loss of 1,057 acres of Pacific fisher habitat in the inundation area and 330 acres in the relocation areas by acquiring a minimum of 4,161 acres of mitigation lands containing comparable habitats. Potential mitigation lands containing comparable habitat and where Pacific fishers are known to occur have been identified adjacent to the project.	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-10 (CP1). Under CP2, Wild-10 will mitigate for the loss of 1,533 acres of Pacific fisher habitat in the inundation area and 330 acres in the relocation areas by acquiring a minimum of 5,589 acres of mitigation lands containing comparable habitats. Potential mitigation lands containing comparable habitat and where Pacific fishers are known to occur have been identified adjacent to the project.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-10 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-10 (CP3).	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-11: Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Long-Eared Myotis, and Yuma Myotis), the American Marten, and Ringtails and Their Habitat	Mitigation Measure Wild-11: Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for Special-Status Bats, American Marten, and Ringtails and Establish Buffers.	CP1	To avoid or minimize impacts on bats and ringtails, the following measures will be implemented. *Inundation Area* Maternity colonies or natal dens within the impoundment area could be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated. However, female western red bats, American martens, and ringtails would be expected to move young to alternate locations if threatened or disturbed. This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-11 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-11 will mitigate for the loss of 31 acres of pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat, Yuma myotis, and fringed myotis habitat in the inundation area and 35 acres in the relocation areas by acquiring a minimum of 198 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-11 will mitigate for the loss of 1,201 acres of western red bat and long-eared myotis habitat in the inundation area and 457 acres in the relocation areas by acquiring a minimum of 4,974 acres of mitigation lands containing comparable habitats. Under CP1, Wild-11 will mitigate for the loss of 1,201 acres of ringtail habitat in the inundation area and 457 acres in the relocation areas by acquiring a minimum of 1,658 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-11 will mitigate for the loss of 724 acres of American marten habitat in the inundation area and 328 acres in the relocation areas by acquiring a minimum of 3,156 acres of mitigation lands containing comparable habitats. *Vegetation Removal and Construction Activities* • A preconstruction survey conducted by a qualified bat biologist for roosting bats will be conducted before the inundation or removal of any bridges, buildings, known caves, or trees 12 inches or larger in diameter at breast height. If no active roosts are found, then no further action will be warranted. If a maternity roost is present, in consultation with CDFW, a qualified bat biologist will determine the extent of construction-free zones around active nurseries. If either a maternity roost or a hibernacula is present, either of the following measures will be implemented. To the extent feasible, the project will be redesigned to avoid the loss of the maternity or hibernacula roost. • If the project cannot be redesigned, removal of the occupied tree or structure should begin before maternity colonies form (i.e., before March 1) or after young are volant (flying) (i.e., after July 31). The established disturbance-free buffer will be observed during the maternity roost season (March 1 through July 31). • If a nonbreeding bat hibernacula is found in a structure or tree scheduled for removal, the individuals will be safely evicted, under the direction of a qualified bat biologist (as determined by a memorandum of understanding with CDFW), by opening the roosting area to allow air flow through the cavity. Removal of the tree or structure will follow not before the following day (i.e., there should be at least 1 night between initial disturbance for air flow and the demolition). This action will allow bats to leave during dark hours, thus increasing their chance of finding new roosts with a minimum of potential predation during daylight. Trees with roosts that need to be removed should first be disturbed at dusk, just before removal that same evening, to allow bats to escape at night. • For the American marten and ringtail, if vegetation removal or construction occurs outside of the breeding season (May 2 through January 31), no further mitigation is necessary. If the breeding season cannot be completely avoided, the following measure will be implemented. • If proposed vegetation removal and construction activities are to occur in suitable habitat for the American marten and ringtail between February 1 and May 1, a qualified biologist will conduct a preconstruction survey for potential natal or maternity den trees no more than 2 weeks before construction activities begin. If an active den is found, a qualified biologist, in consultation with CDFW and USFS, will determine a construction-free buffer zone to be established around the den until the mother and young have dispersed. In consultation with CDFW and USFS, a plan will be developed to monitor whether construction activity is disturbing the reproductive success and to determine when the young have dispersed. The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the loss of some individuals from inundation cannot be mitigated. Also, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-11: Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Long-Eared Myotis, and Yuma Myotis), the American Marten, and Ringtails and Their Habitat (contd.)	Mitigation Measure Wild-11: Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for Special-Status Bats, American Marten, and Ringtails and Establish Buffers. (contd.)	CP2	This mitigation measure is identical to Mitigation Measure Wild-11 (CP1). Under CP2, Wild-11 will mitigate for the loss of 45 acres of pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat, Yuma myotis, and fringed myotis habitat in the inundation area and 35 acres in the relocation areas by acquiring a minimum of 240 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-11 will mitigate for the loss of 1,687 acres of western red bat and long-eared myotis habitat in the inundation area and 457 acres in the relocation areas by acquiring a minimum of 6,432 acres of mitigation lands containing comparable habitats. Under CP2, Wild-11 will mitigate for the loss of 1,687 acres of ringtail habitat in the inundation area and 457 acre in the relocation areas by acquiring a minimum of 6,432 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-11 will mitigate for the loss of 1,022 acres of American marten habitat in the inundation area and 328 acres in the relocation areas by acquiring a minimum of 4,050 acres of mitigation lands containing comparable habitats.	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-11 (CP1). Under CP3, Wild-11 will mitigate for the loss of 69 acres of pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat, Yuma myotis, and fringed myotis habitat in the inundation area and 35 acres in the relocation areas by acquiring a minimum of 312 acres of mitigation lands containing comparable habitats. Also under CP3, Wild-11 will mitigate for the loss of 2,431 acres of western red bat and long-eared myotis habitat in the inundation area and 457 acres in the relocation areas by acquiring a minimum of 8,664 acres of mitigation lands containing comparable habitats. Under CP3, Wild-11 will mitigate for the loss of 2,431 acres of ringtail habitat in the inundation area and 457 acre in the relocation areas by acquiring a minimum of 8,664 acres of mitigation lands containing comparable habitats. Also under CP3, Wild-11 will mitigate for the loss of 1,482 acres of American marten habitat in the inundation area and 328 acres in the relocation areas by acquiring a minimum of 5,430 acres of mitigation lands containing comparable habitats.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-11 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-11 (CP3).	PS	SU
Impact Wild-12: Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat	Mitigation Measure Wild-12: Avoid Suitable Habitat; Acquire and Preserve Mitigation Lands for Special-Status Terrestrial Mollusks.	CP1	To avoid or minimize impacts on special-status terrestrial mollusks, the following measures will be implemented. *Inundated Area* It is infeasible to quantify the loss of individuals in the impoundment area. The loss of individuals and loss of limestone habitat (for Shasta and Wintu sideband snails) cannot be mitigated. This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-12 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-12 will mitigate for the loss of 1,195 acres of Church's sideband, Oregon shoulderband, and Shasta chaparral habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 4,860 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-12 will mitigate for the loss of 28 acres of Shasta hesperian habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 87 acres of mitigation lands containing comparable habitats. Under CP1, Wild-12 will mitigate for the loss of 5 acres of Shasta sideband habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 18 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-12 will mitigate for the loss of 1.5 acres of Wintu sideband habitat in the inundation area by acquiring a minimum of 4.5 acres of mitigation lands containing comparable habitats. *Vegetation Removal and Construction Activities* • When feasible, use of heavy equipment and excavation in limestone substrates and riparian or mesic habitats will be avoided. • Guidelines provided in Management Recommendations for Survey and Manage Terrestrial Mollusks (Burke et al. 1999) will be applied. The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the loss of some individuals from inundation cannot be mitigated. Also, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-12: Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat	Mitigation Measure Wild-12: Avoid Suitable Habitat; Acquire and Preserve Mitigation Lands for Special-Status Terrestrial Mollusks	CP2	This mitigation measure is identical to Mitigation Measure Wild-12 (CP1). Under CP2, Wild-12 will mitigate for the loss of 1,697 acres of Church's sideband, Oregon shoulderband, and Shasta chaparral habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 6,366 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-12 will mitigate for the loss of 37 acres of Shasta hesperian habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 114 acres of mitigation lands containing comparable habitats. Under CP2, Wild-12 will mitigate for the loss of 7 acres of Shasta sideband habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 24 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-12 will mitigate for the loss of 2 acres of Wintu sideband habitat in the inundation area by acquiring a minimum of 6 acres of mitigation lands containing comparable habitats.	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-12 (CP1). Under CP2, Wild-12 will mitigate for the loss of 2,415 acres of Church's sideband, Oregon shoulderband, and Shasta chaparral habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 8,520 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-12 will mitigate for the loss of 58 acres of Shasta hesperian habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 177 acres of mitigation lands containing comparable habitats. Under CP2, Wild-12 will mitigate for the loss of 11 acres of Shasta sideband habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 36 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-12 will mitigate for the loss of 3 acres of Wintu sideband habitat in the inundation area by acquiring a minimum of 9 acres of mitigation lands containing comparable habitats.	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-12 (CP3).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-12 (CP3).	S	SU
Impact Wild-13: Permanent Loss of General Wildlife Habitat	Mitigation Measure Wild-13: Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat.	CP1	Mitigation measure Wild-13 consists of a program to acquire nearby private lands with similar habitat attributes and species composition as those impacted by the SLWRI project. Reclamation has identified several willing private landowners and specific parcels for purchase in the SLWRI project area vicinity. Preliminary investigations of these lands have shown they contain similar and/or additional habitats and special-status species as those impacted by SLWRI. Additionally, the interagency working group identified other private parcels with similar biological resources in the vicinity of the SLWRI project area, some of which have owners willing to discuss purchase agreements. As discussed during the interagency working group meetings, mitigation measure Wild-13 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. The interagency working group also agreed that additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. Under CP1, Wild-13 will mitigate for the loss of 1,227 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 5,775 acres of mitigation lands containing comparable habitats. The effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Under CP2, Wild-13 will mitigate for the loss of 1,725 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 7,269 acres of mitigation lands containing comparable habitats.	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Under CP3, Wild-13 will mitigate for the loss of 2,492 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 9,570 acres of mitigation lands containing comparable habitats.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-13 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-13 (CP3).	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-14: Impacts on Other Birds of Prey (i.e., Red-Tailed Hawk and Red-Shouldered Hawk) and Migratory Bird Species (i.e., American Robin, Anna's Hummingbird) and Their Foraging and Nesting Habitat	Mitigation Measure Wild-14: Acquire and Preserve Mitigation Lands and Conduct Preconstruction Surveys for Other Nesting Raptors and Migratory Birds and Establish Buffers.	CP1	To avoid or minimize impacts on nesting raptors and migratory birds, the following measures will be implemented. *Inundation Area* Individuals actively nesting within the impoundment area could be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated. *Vegetation Removal and Construction Activities* • To the extent feasible, construction activities will be avoided within riparian habitat. • If vegetation removal or construction occurs outside of the breeding season (March 31 through September 1), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented. • If project-related vegetation removal or construction will occur during the breeding season (February 1 through August 31), a qualified biologist will conduct a preconstruction survey for nesting birds. For migratory birds (non-raptors), preconstruction surveys will occur within the construction footprint and 250 feet beyond the construction footprint boundary. Surveys will be conducted no more than 2 weeks before construction. For raptors, preconstruction surveys will occur in suitable raptor nesting habitat within 0.25 mile of the construction footprint boundary. If an active nest is found, a qualified biologist, in consultation with CDFW, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged. The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the loss of some individuals from inundation cannot be mitigated. Also, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-14 (CP1). Under CP2, Wild-14 will mitigate for the loss of 1,725 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 7,239 acres of mitigation lands containing comparable habitats.	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-14 (CP1). Under CP3, Wild-14 will mitigate for the loss of 2,492 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 9,570 acres of mitigation lands containing comparable habitats.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-14 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-14 (CP3).	PS	SU
Impact Wild-15: Loss of Critical Deer Winter and Fawning Range	Mitigation Measure Wild-15: Acquire and Preserve Mitigation Lands for Permanent Loss of Critical Deer Wintering and Fawning Range.	CP1	*Inundation Area* Habitats providing deer wintering and fawning range within the impoundment area would be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure Wild-15 (CP1). Under CP2, Wild-15 will mitigate for the loss of 1,725 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 7,239 acres of mitigation lands containing comparable habitats.	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure Wild-15 (CP1). Under CP3, Wild-15 will mitigate for the loss of 2,492 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 9,570 acres of mitigation lands containing comparable habitats.	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Wild-15 (CP3).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure Wild-15 (CP3).	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-17: Impacts on Riparian-Associated Special-Status Wildlife Resulting from Modifications to the Existing Flow Regime in the Primary Study Area	Mitigation Measure Wild-17: Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1).	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Bot-7 (CP2).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-7 (CP4 and CP4A).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-7 (CP5).	PS	LTS
Impact Wild-20: Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area	Mitigation Measure Wild-20: Implement Mitigation Measure Bot-7: Implement a Rivierine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1).	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Bot-7 (CP2).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-7 (CP4 and CP4A).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-7 (CP5).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
		CP1	No mitigation is needed.	NI	NI
		CP2	No mitigation is needed.	NI	NI
		CP3	No mitigation is needed.	NI	NI
Impact Wild-21: Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program	Mitigation Measure Wild-21: Conduct Preconstruction Surveys for Elderberry Shrubs, Northwestern Pond Turtle, and Nesting Riparian Raptors and Other Nesting Birds. Avoid Removal or Degradation of Elderberry Shrubs and Avoid Vegetation Removal near Active Nest Sites.	CP4/CP4A	To avoid impacts on valley elderberry longhorn beetle, western pond turtle, and nesting raptors, and other nesting birds, Reclamation will implement the following measures at gravel augmentation sites with the potential to affect these species: *Valley Elderberry Longhorn Beetle* • A worker awareness training program for construction personnel will be conducted by a qualified biologist/restoration ecologist before gravel augmentation activities begin. The program will inform all construction personnel about the life history and status of the beetle, the need to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training will be submitted to USFWS within 30 days of the completion of training. • Elderberry shrubs shall be protected through establishment of a fenced avoidance area. Fencing will be placed at least 20 feet from the dripline of the shrubs where they occur along any access routes. Signs will be posted along the avoidance area. The signs will state: "This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." Signs will be readable from a distance of 20 feet. Fencing and signs will be maintained at gravel recruitment sites during construction activities. • If removal of elderberry shrubs during construction of access routes is unavoidable, Reclamation will consult with USFWS as required under Section 7 of the ESA as appropriate. No project construction will proceed in areas potentially containing valley elderberry longhorn beetle until a BO has been issued by USFWS, and Reclamation has abided by all pertinent conditions in the BO relating to the proposed construction. • Elderberry shrubs will be mitigated for according to the transplantation guidelines outlined in the Beetle Conservation Guidelines (USFWS 1999). These transplantation guidelines dictate the necessary timing and details of the transplanting. At the discretion of USFWS, shrubs that are unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible, compensation ratios would be increased to offset the additional habitat loss. • Relocation of existing elderberry shrubs and planting of new elderberry seedlings will be implemented on a no-net-loss basis. Compensatory mitigation for elderberry shrubs that would be removed from their current locations will be developed in consultation with USFWS during the Section 7 consultation process. Compensatory mitigation may include planting replacement elderberry seedlings or cuttings and associated native plants or purchasing credits at an approved mitigation bank, or a combination thereof. Relocated and replacement shrubs and associated native plantings will be placed in conservation areas providing a minimum of 1,800 square feet per transplanted shrub. • No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of elderberry shrubs. Roadways and disturbed areas within 100 feet of elderberry shrubs will be watered at least twice a day and as needed to minimize dust emissions. *Western Pond Turtle* • When construction activities are to occur within suitable western pond turtle habitat as defined in Impact Wild-3 (CP1), a qualified biologist will conduct a minimum of one preconstruction survey for western pond turtles and their nests. The survey will be conducted no more than 1 week before construction. If a pond turtle nest is found, the biologist will flag the site and determine whether construction activities can avoid impacting the nest. If the nest cannot be avoided, CDFW will be contacted for further direction and construction activities in that location will be halted. • In the event that a pond turtle is observed within the construction limits, the contractor will temporarily halt construction activities until a qualified biologist has moved the turtle to a safe location within suitable habitat outside of the construction limits. • When feasible, work areas will be surrounded by exclusion fencing consisting of silt fence securely staked into the ground, with the bottom edge buried at least 6 inches to prevent turtles from accessing the work sites from upland locations. *Birds* • For each year of vegetation removal for gravel augmentation activity, all active bald eagle nests will be located and mapped using the National Bald Eagle Management Guidelines (USFWS 2007). • In consultation with CDFW and USFS, a 660-foot to 0.5-mile buffer will be established around active nests. Vegetation will be retained and no construction activities will occur within this buffer. • If proposed vegetation removal would occur between April 1 and August 31, a qualified biologist will conduct a preconstruction survey for nesting special-status birds no more than 2 weeks before construction activities begin. If an active nest is found, a qualified biologist, in consultation with CDFW, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged. Implementation of this mitigation measure would reduce Impact Wild-21 (CP4 and CP4A) to a less-than-significant level.	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-21: Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program (contd.)	Mitigation Measure Wild-21: Conduct Preconstruction Surveys for Elderberry Shrubs, Northwestern Pond Turtle, and Nesting Riparian Raptors and Other Nesting Birds. Avoid Removal or Degradation of Elderberry Shrubs and Avoid Vegetation Removal near Active Nest Sites. (contd.)	CP5	This mitigation measure is identical to Mitigation Measure Wild-21 (CP4 and CP4A).	PS	LTS
Impact Wild-22: Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration at Reading Island	Mitigation Measure Wild-22: Implement Mitigation Measure Wild-21: Conduct Preconstruction Surveys for Elderberry Shrubs, Northwestern Pond Turtle, and Nesting Riparian Raptors and Other Nesting Birds. Avoid Removal or Degradation of Elderberry Shrubs and Avoid Vegetation Removal near Active Nest Sites.	CP1	No mitigation is needed.	NI	NI
		CP2	No mitigation is needed.	NI	NI
		CP3	No mitigation is needed.	NI	NI
		CP4/CP4A	To avoid impacts on valley elderberry longhorn beetle, western pond turtle, nesting raptors, and other nesting birds, Reclamation will implement the following measures as part of the gravel augmentation activities project at augmentation sites with the potential to affect these species: *Valley Elderberry Longhorn Beetle* This mitigation measure is identical to Mitigation Measure Wild-21 (CP4 and CP4A) for valley elderberry longhorn beetle, except that the following additional measures will be implemented: • Before implementation of any vegetation improvements or other activities associated with gravel augmentation, including constructing access routes, a survey will be conducted to identify and map all elderberry shrubs. • New roads, trails, and staging areas will be constructed a minimum of 100 feet from elderberry shrubs. • Removal and disturbance of elderberry shrubs will be avoided, to the extent feasible. *Western Pond Turtle* This mitigation measure is identical to Mitigation Measure Wild-21 (CP4 and CP4A) for western pond turtles. *Birds* This mitigation measure is identical to Mitigation Measure Wild-21 (CP4 and CP4A) for birds.	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Wild-22 (CP4 and CP4A).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Wild-23: Impacts on Riparian-Associated and Aquatic Special-Status Wildlife Resulting from Modifications to Existing Flow Regimes in the Lower Sacramento River and Delta	Mitigation Measure Wild-23: Implement Mitigation Measure Bot-7: Implement a Rivierine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1).	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Bot-7 (CP2).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-7 (CP4 and CP4A).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-7 (CP5).	PS	LTS
Impact Wild-26: Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta	Mitigation Measure Wild-26: Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.	CP1	This mitigation measure is identical to Mitigation Measure Bot-7 (CP1).	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Bot-7 (CP2).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Bot-7 (CP3).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Bot-7 (CP4 and CP4A).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Bot-7 (CP5).	PS	LTS
Chapter 14, “Cultural Resources”					
Impact Culture-1: Disturbance or Destruction of Archaeological and Historical Resources Due to Construction or Inundation	Mitigation Measure Culture-1: Develop and Implement measures identified in an NHPA Section 106 MOA or PA	CP1	Avoid, minimize, or mitigate adverse effects through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	LTS
		CP2	Avoid, minimize, or mitigate adverse effects through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	LTS
		CP3	Avoid, minimize, or mitigate adverse effects through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	LTS
		CP4/CP4A	Avoid, minimize, or mitigate adverse effects through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	LTS
		CP5	Avoid, minimize, or mitigate adverse effects through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Culture-2: Inundation of Traditional Cultural Properties	Mitigation Measure Culture-2:Adverse effects will be avoided, minimized, or mitigated through project redesign, when warranted, or through the development and implementation of an MOA or PA	CP1	Avoid, minimize, or mitigate adverse effects to Traditional Cultural Properties through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	SU
		CP2	Avoid, minimize, or mitigate adverse effects to Traditional Cultural Properties through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	SU
		CP3	Avoid, minimize, or mitigate adverse effects to Traditional Cultural Properties through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	SU
		CP4/CP4A	Avoid, minimize, or mitigate adverse effects to Traditional Cultural Properties through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	SU
		CP5	Avoid, minimize, or mitigate adverse effects to Traditional Cultural Properties through project redesign, when warranted, or through the development and implementation of an MOA or PA.	S	SU
Impact Culture-3: Disturbance or Destruction of Archaeological and Historical Resources near the Upper Sacramento River Due to Construction	Mitigation Measure Culture-3: Implement Mitigation Measure Culture-1: Develop and Implement measures identified in an NHPA Section 106 MOA or PA	CP1	No mitigation is needed.	NI	NI
		CP2	No mitigation is needed.	NI	NI
		CP3	No mitigation is needed.	NI	NI
		CP4/CP4A	This mitigation measure is the same as Mitigation Measure Culture-1 (CP4 and CP4A).	S	LTS
		CP5	This mitigation measure is the same as Mitigation Measure Culture-1 (CP5).	S	LTS
Chapter 16, “Socioeconomics, Population, and Housing”					
Impact Socio-14: Potential Temporary Reduction in Shasta Project Water or Hydropower Supplied to the CVP and SWP Service Areas during Construction	Mitigation Measure Socio-14: Secure Replacement Water or Hydropower During Project Construction.	CP1	To address potential temporary shortages in water or hydropower caused by reduced availability at Shasta Dam during construction, replacement water or hydropower supplies would need to be sourced elsewhere to maintain current service needs. Depending on the conditions of the water or energy markets at the time of need, these replacement resources could be more expensive than water or hydropower obtained from Shasta Dam. The additional expense of obtaining water or hydropower resources could potentially produce a minor negative effect on water and power customers, if replacement of these resources is substantially more expensive. To eliminate the potential impact of project construction on water and/or hydropower purchases, Reclamation will identify the need for replacement water or hydropower early in project implementation and will secure such resources at the lowest cost possible. Replacement water or hydropower would be available from a number of sources within or external to the CVP. Reclamation will provide these replacement resources to business and industry in the CVP and SWP service areas at costs comparable to water or hydropower obtained from Shasta Dam. Reclamation will provide replacement water or hydropower at levels equal to the loss of water or hydropower caused by project construction.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Socio-14 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Socio-14 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Socio-14 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Socio-14 (CP1).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Chapter 17, "Land Use and Planning"					
Impact LU-1: Disruption of Existing Land Uses (Shasta Lake and Vicinity and Upper Sacramento River)	LU-1: Minimize and/or Avoid Temporary Disruptions to Local Communities.	CP1	To minimize and/or avoid temporary disruption to local communities, the following measures will be implemented during project construction: • Prior to construction, Reclamation and its contractor will develop a construction plan for each affected community (i.e., Lakeshore, Sugarloaf), consisting of the following: – Alternate access routes will be identified for local residences and businesses affected by project construction activities. – Construction and staging areas will be fenced, secured, and clearly marked. Security will be provided to ensure public safety. – Public parking areas outside of the construction staging areas will be kept clear of construction-related equipment of materials at all times. – Any open trenches will be covered or secured after daily activities to protect worker and public safety. – Construction activities near noise-sensitive land uses (e.g., near residences, campgrounds) or land uses that experience high levels of public activity (e.g., boat ramps, marinas) will be restricted to days and hours that minimize land use conflicts to the extent feasible. • The contractor will provide advance notice of the construction activities schedule to the affected community members (e.g., residences, property owners, business owners, and public facilities operators), including posting of signs in the project area. • The contractor will provide a phone number and community contact for inquiries about the project throughout the construction period. • Reclamation and its contractor will coordinate with local jurisdictions and obtain all necessary permits (e.g., encroachment permit, utility excavation permit), will comply with permit conditions established to minimize construction impacts, and will assign an inspector to the project to oversee construction activities.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure LU-1 (CP1).	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure LU-1 (CP1).	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure LU-1 (CP1).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure LU-1 (CP1).	PS	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact LU-2: Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions (Shasta Lake and Vicinity and Upper Sacramento River)	LU-2: Minimize and/or Avoid Conflicts with Land Use Goals and Policies.	CP1	To reduce conflicts with land use goals and policies of affected jurisdictions, Reclamation will implement the following measures: • Reclamation will coordinate with USFS to find the most suitable relocation sites for recreation facilities with respect to consistency with the STNF LRMP and the NRA Management Guide. • Reclamation will coordinate with USFS to identify measures to minimize the impacts of the loss of use of USFS lands around Shasta Lake (including open space and Riparian Reserve allocations) caused by inundation, and measures to offset inconsistencies with the STNF LRMP and NRA goals and policies related to the loss of use of NRA lands. • As utility and facility relocation sites are being refined, Reclamation will evaluate consistency of the relocated land uses with the STNF LRMP, the NRA Management Guide, the *Shasta County General Plan*, and the county zoning ordinance. To the degree possible, Reclamation will design the relocated utilities and facilities to comply with these plans and ordinances. If needed, Reclamation will seek permits, easements, and/or plan amendments. Implementation of this mitigation measure would substantially reduce land use plan consistency impacts, but might not reduce all impacts to a less-than-significant level.	PS	SU
		CP2	This mitigation measure is identical to Mitigation Measure LU-2 (CP1).	PS	SU
		CP3	This mitigation measure is identical to Mitigation Measure LU-2 (CP1).	PS	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure LU-2 (CP1).	PS	SU
		CP5	This mitigation measure is identical to Mitigation Measure LU-2 (CP1).	PS	SU
Chapter 18, “Recreation and Public Access”					
Impact Rec-2: Temporary Construction-Related Disruption of Recreation Access and Activities at and near Shasta Dam	Mitigation Measure Rec-2: Provide Information About and Improve Alternate Recreation Access and Opportunities to Mitigate the Temporary Loss of Recreation Access and Opportunities During Construction at Shasta Dam.	CP1	Reclamation will inform recreation users of the Chappie-Shasta OHV Area about an alternate access route. This route will use existing river crossings either immediately downstream from Shasta Dam or further south. The route will be improved to provide adequate access, security features, and road improvements (e.g., by grading unpaved portions), as necessary, and made sufficient so that vehicles can safely use the route. To mitigate the temporary disruption in public tours of Shasta Dam during construction, Reclamation will develop and provide enhanced information about the dam and its operation at the Reclamation Visitor Center at the dam, which would remain open. Mitigation for temporary loss of access to the trailhead at the west end of Shasta Dam is not necessary because the trailhead itself would be affected by construction.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Rec-2 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Rec-2 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Rec-2 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Rec-2 (CP1).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Rec-4: Increased Hazards to Boaters and Other Recreationists at Shasta Lake from Standing Timber and Stumps Remaining in Untreated Areas of the Inundation Zone	Mitigation Measure Rec-4: Provide Information to Shasta Lake Visitors About Potential Safety Hazards in Newly Inundated Areas from Standing Timber and Stumps.	CP1	To mitigate impacts on visitor safety from remaining trees and stumps in untreated areas of the newly inundated zone, Reclamation will work with USFS to provide maps, bulletins, informational postings, and other media as deemed appropriate by USFS at boat ramps, marinas, and other developed Shasta Lake recreation sites. Similar information could be provided at public meetings and events and at USFS and other Web sites used by Shasta Lake visitors to learn about conditions at the lake. The information provided will identify the general areas of the shoreline where the hazard exists. It will also inform boaters or the nature of the hazard, the periods of time when the hazard is of concern (i.e., when the reservoir elevation is above the current full pool elevation), and best practices to avoid the hazard while recreating on the lake.	S	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Rec-4 (CP1).	S	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Rec-4 (CP1).	S	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Rec-4 (CP1).	S	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Rec-4 (CP1).	S	LTS
Impact Rec-15: Increased Difficulty for Boaters and Anglers in Using the Sacramento River and Rivers Below CVP and SWP Reservoirs as a Result of Decreased River Flows	Mitigation Measure Rec-15: Implement Mitigation Measure Aqua-15: Maintain Flows in the Feather River, American River, and Trinity River Consistent with Existing Regulatory and Operational Requirements and Agreements.	CP1	This measure is identical to Mitigation Measure Aqua-15 (CP1). This measure would also protect recreation uses on these rivers by ensuring that any potential changes in flow would be within the current range of variability.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Rec-15 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Rec-15 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Rec-15 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Rec-15 (CP1).	PS	LTS
Chapter 19, “Aesthetics and Visual Resources”					
Impact Vis-1: Consistency with Guidelines for Visual Resources in the STNF LRMP (Shasta Lake and Vicinity and Upper Sacramento River)	Vis-1: Amend the STNF LRMP to Include Revised VQOs for developments at Turntable Bay area.	CP1	STNF could prepare an amendment to the STNF LRMP that would modify the management prescription for the area in which newly constructed developed recreation sites are located from Roaded Recreation to Roaded, High-Density Recreation. The new prescription would allow the newly constructed areas to be characterized as a substantially modified natural environment in support of various recreational activities. In those locations, this amendment would serve to modify the VQOs from Retention to Modification. Implementation of this mitigation measure would ensure that the SLWRI will be consistent with the STNF LRMP, as amended. Impacts on visual resources at areas outside of the newly constructed recreation developments may be significant and unavoidable, depending on the designated VQO.	S	SU
		CP2	This mitigation measure is identical to Mitigation Measure Vis-1 (CP1).	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure Vis-1 (CP1).	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Vis-1 (CP1).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure Vis-1 (CP1).	S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Vis-2: Degradation and/or Obstruction of a Scenic View from Key Observation Points (Shasta Lake and Vicinity and Upper Sacramento River)	Vis-2: Minimize Construction-Related Visual Impacts on Scenic Views From Key Observation Points.	CP1	Reclamation will do the following to minimize potential impacts on visual resources during project construction: • When not in use (e.g., after hours or when not required for the day's construction activities), construction equipment will remain in the designated contractor staging area. • When practicable, construction materials that will remain permanently onsite should be consistent in color, texture, and pattern with the surrounding environment.	S	SU
		CP2	This mitigation measure is identical to Mitigation Measure Vis-1 (CP1).	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure Vis-1 (CP1).	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Vis-1 (CP1).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure Vis-1 (CP1).	S	SU
Impact Vis-3: Generation of Increased Daytime Glare and/or Nighttime Lighting (Shasta Lake and Vicinity and Upper Sacramento River)	Vis-3: Minimize or Avoid Visual Impacts of Daytime Glare and Nighttime Lighting.	CP1	Reclamation will do the following to minimize or avoid potential impacts on visual resources and aesthetics from daytime glare and nighttime lighting: • Avoid constant nighttime lighting and overly bright lighting to the extent possible. The location of lighting will respond to the anticipated use and should not exceed the amount of light actually required by users. • Lights will be screened and directed away from residences to the highest degree possible, and the amount of nighttime light used will be minimized to the highest degree possible. Lighting will include shielding to minimize offsite light spill and glare. In addition, the following measures will apply: – The spacing of luminaire lamps (or comparable vandal-resistant lighting) should be the maximum allowable for traffic safety. – Luminaires (or comparable vandal-resistant lighting) should be cutoff-type fixtures that cast low-angle illumination to minimize incidental spillover of light onto adjacent private properties and undeveloped open space. Fixtures that project upward or horizontally will not be used. – Luminaire lamps (or comparable vandal-resistant lighting) will be directed toward the roadway or lighted feature (e.g., campground restrooms, sidewalks) and away from adjacent residences and open space areas. – Luminaire lamps (or comparable vandal-resistant lighting) will provide good color rendering and natural light qualities. Low-pressure and high-pressure sodium fixtures that are not color corrected will not be used. – Luminaire lamps (or comparable vandal-resistant lighting) intensity will be the minimum allowable for traffic safety. – Luminaire lamp (or comparable vandal-resistant lighting) mountings will be downcast and the height of the poles will be minimized to reduce potential for backscatter into the nighttime sky and incidental spillover of light into adjacent private properties and open space. – Luminaire lamp (or comparable vandal-resistant lighting) mountings will have nonglare finishes. • Guardrails and other roadway fixtures, including retaining walls, safety barriers, light standards, and other structures, will be limited to the minimum length, height, and bulk necessary to adequately provide for the safety of the roadway user. Earth tone colors in dark shades and flat finishes will be used on all roadway fixtures. New and replacement guardrails will not have a shiny, reflective finish. (These features are typically galvanized steel, which weathers naturally to a nonglare finish, typically within a year or so.) Retaining walls and other erosion control devices or structures will be constructed of natural materials whenever possible and will, to the maximum extent possible, be designed and sited to avoid detracting from the scenic quality of the corridor. Such structures will incorporate heavy texture or articulated plane surfaces that create heavy shadow patterns. Implementation of this mitigation measure would reduce the impacts of the project related to daytime glare and nighttime lighting, but would not reduce them to a less-than-significant level.	S	SU

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Vis-3: Generation of Increased Daytime Glare and/or Nighttime Lighting (Shasta Lake and Vicinity and Upper Sacramento River)	Vis-3: Minimize or Avoid Visual Impacts of Daytime Glare and Nighttime Lighting.	CP2	This mitigation measure is identical to Mitigation Measure Vis-3 (CP1).	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure Vis-3 (CP1).	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Vis-3 (CP1).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure Vis-3 (CP1).	S	SU
Chapter 20, “Transportation and Traffic”					
Impact Trans-1: Short-Term and Long-Term Increases in Traffic in the Primary Study Area in Relation to the Existing Traffic Load and Capacity of the Street System	Mitigation Measure Trans-1: Prepare and Implement a Traffic Control and Safety Assurance Plan	CP1	Before construction starts, Reclamation and its primary contractors for engineering and construction will develop a coordinated construction traffic control plan to minimize the simultaneous use of roadways by different construction contractors for worker commute trips, material hauling, and equipment delivery to the extent feasible. The plan will outline phasing of activities and the use of multiple routes to and from off-site locations to minimize the daily amount of traffic on individual roadways. Reclamation will require that the construction contractors implement and enforce the plans throughout the construction periods. In addition, the plan will include the following elements: • To the extent feasible, require construction contractors to limit truck trips to less than 50 trips per hour on any affected roadway during the morning and afternoon or evening peak-hour periods. • To the extent feasible, limit the construction work zone to a width that, at a minimum, maintains alternate one-way traffic flow past the construction zone. • Provide flagger control at construction zones to manage traffic control and flows as necessary. • Install temporary steel-plate trench crossings, as needed, to maintain reasonable traffic, bicycle, and pedestrian access to homes, businesses, and streets. • Maintain access for emergency vehicles at all times. Provide advance notification to local law enforcement, fire, and emergency service providers of the timing, location, and duration of construction activities that could affect the movement of emergency vehicles on local roadways. • Post advance warning of construction activities (for any affected roadways that would be closed or major roadways where lane closures would occur) in the local newspaper(s) and/or coordinate with the local jurisdictions to post such warnings in highly visible locations near the affected roadways. • Post advance warnings about the potential presence of slow-moving vehicles in construction zones, where needed to reduce potential traffic hazards. • Place and maintain barriers and install traffic control devices necessary for safety, as specified in Caltrans’s *Manual of Traffic Controls for Construction and Maintenance Work Zones* and in accordance with the guidance provided by the affected local jurisdictions. • Limit the accumulation of project-generated mud or dirt on roadways adjacent to construction areas. The construction contractor will sweep the affected paved roadways (water sweeper with reclaimed water recommended) at the end of each day if substantial volumes of soil material have been carried onto adjacent paved, public roads from construction sites. • Train construction personnel in appropriate safety measures as described in the plan. Reclamation will also inform the community at a public hearing about the potential traffic delays and the preparation of the traffic control plan.	PS (short term) LTS (long term)	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Trans-1: Short-Term and Long-Term Increases in Traffic in the Primary Study Area in Relation to the Existing Traffic Load and Capacity of the Street System	Mitigation Measure Trans-1: Prepare and Implement a Traffic Control and Safety Assurance Plan	CP2	This mitigation measure is identical to Mitigation Measure Trans-1 (CP1).	PS (short term) LTS (long term)	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Trans-1 (CP1).	PS (short term) LTS (long term)	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Trans-1 (CP1).	PS (short term) LTS (long term)	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Trans-1 (CP1).	PS (short term) LTS (long term)	LTS
Impact Trans-2: Adverse Effects on Access to Local Streets or Adjacent Uses in the Primary Study Area	Mitigation Measure Trans-2: To Reduce Effects on Local Access, Implement Mitigation Measure Trans-1: Prepare and Implement a Traffic Control and Safety Assurance Plan	CP1	Reclamation will implement Mitigation Measure Trans-1 (CP1) to reduce adverse effects of road closures and detours or partial road closures on access to local streets and adjacent uses.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Trans-2 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Trans-2 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Trans-2 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Trans-2 (CP1).	PS	LTS
Impact Trans-4: Adverse Effects on Emergency Access in the Primary Study Area	Mitigation Measure Trans-4: To Reduce Effects on Emergency Access, Implement Mitigation Measure Trans-1: Prepare and Implement a Traffic Control and Safety Assurance Plan	CP1	Reclamation will implement Mitigation Measure Trans-1 (CP1) to reduce adverse effects of road closures on access by emergency vehicles.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Trans-4 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Trans-4 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Trans-4 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Trans-4 (CP1).	PS	LTS
Impact Trans-5: Accelerated Degradation of Surface Transportation Facilities in the Primary Study Area	Mitigation Measure Trans-5: Identify and Repair Roadway Segments Damaged by the Project.	CP1	The performance standard is to return roadway segments damaged by the project to pre-project conditions. The following measures will be implemented to require that Reclamation provides compensation for the repair of roadways that are degraded as a result of hauling: • The contractor(s) responsible to Reclamation for delivery of borrow material shall identify all proposed haul routes on a map. The map will identify the owner of the ROW that are proposed for use as haul routes. <u>The contractor(s) will also prepare a pre-project condition report of the roadway segments to document the roadway conditions before construction.</u> • The contractor(s) shall notify the owner of the ROW in writing and request conditional approval to use the ROW as a haul route. The contractor(s) shall submit a copy of the written request to Reclamation for Reclamation's file. • The contractor(s) shall implement the conditions of approval for use of the haul route ROW. Conditions may include constructing repairs to damaged lengths of roadway or the payment of fees to compensate for roadway wear resulting from truck trips. Before commencement of hauling activities, the contractor(s) shall submit a copy of the ROW owner's conditional approval to Reclamation for Reclamation's file. • Within 90 days after hauling activities are completed (that is the haul route is no longer in use for the project term), the contractor(s) shall submit a project close-out report to Reclamation to document compliance with the conditions of approval. Reclamation will keep the project close-out report on file.	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Trans-5: Accelerated Degradation of Surface Transportation Facilities in the Primary Study Area	Mitigation Measure Trans-5: Identify and Repair Roadway Segments Damaged by the Project.	CP2	This mitigation measure is identical to Mitigation Measure Trans-5 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Trans-5 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Trans-5 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Trans-5 (CP1).	PS	LTS
Chapter 21, "Utilities and Service Systems"					
Impact Util-1: Damage to or Disruption of Public Utility and Service Systems Infrastructure (Shasta Lake and Vicinity and Upper Sacramento River)	Mitigation Measure Util-1: Implement Procedures to Avoid Damage to or Temporary Disruption of Service.	CP1	To avoid temporary disruption of service, the following measures will be implemented during project construction to ensure that existing utilities infrastructure is not damaged: • **Permits** – Reclamation will obtain utilities excavation or encroachment permits as necessary before initiating any work with potential to affect utility lines and will include all necessary permit terms in construction contract specifications. • **Locating Line** – Utility locations will be identified through field surveys and the use of the Underground Service Alert services. Any buried utility lines will be clearly marked before initiation of any ground-disturbing construction activity. • **Clearing Right-of-Way and Road Access** – If necessary, infrastructure will be removed or reinforced in coordination with all potential service providers known to have, or potentially having, utilities infrastructure in the project area. • **Response Plan** – The construction contractor will prepare a response plan to address potential accidental damage to utility lines prior to the start of construction. The plan will identify chain of command rules for notification of authorities and affected businesses and will identify appropriate actions and responsibilities to ensure the safety of the public and workers. The response plan will be circulated to the potentially affected service system providers for review and approval prior to the start of construction activities. Worker education training in response to such situations will be conducted by the contractor.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Util-1 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Util-1 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Util-1 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Util-1 (CP1).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact Util-2: Utility Infrastructure Relocation or Modification (Shasta Lake and Vicinity and Upper Sacramento River)	Mitigation Measure Util-2: Adopt Measures to Minimize Infrastructure Relocation Impacts.	CP1	For each segment of a utility line that would need to be relocated or modified as a result of project construction and operations, the following measures will be implemented: • **Permits** – Reclamation will obtain utilities excavation or encroachment permits as necessary before initiating any work associated with modification or relocation of an existing utility line and will include all necessary permit terms in construction contract specifications. • **Locating and Staking Line** – Locations for relocated utility lines will be identified in coordination with affected service providers. Reclamation will consider co-locating and undergrounding relocated utility lines to the extent practicable. As part of this effort, field surveys will be conducted and the Underground Service Alert services will be used to ensure that there are no conflicts with other existing utility lines. After the alignment of the line has been finalized, a survey will be made to map the route of the line. The results of the survey will be plan and profile drawings, which will be used to spot the poles. After exact positions have been fixed, a stake will be driven to indicate the center of the structure or pole. • **Clearing Right-of-Way and Road Access** – The right-of-way will be cleared of all obstructions that will interfere with the operation of the power line. A strip of land will be cleared on each side of the centerline of the transmission line by cutting or trimming the trees and brush. All trees and brush should be cut 3 inches or less from the ground line so that the passage of trucks and tractors will not be hindered. The cut trees and brush will be disposed of by chipping or spreading, burning, or hauling away. Disposal of the debris by burning, or otherwise, will be accomplished in accordance with State and local laws and regulations without creating a hazard or nuisance. The right-of-way should be treated with chemical spray to retard the growth of brush or trees that could endanger the operation of the transmission line. • **Installing Pole Footings and Foundations** – Pole sites will be properly graded in accordance with the specifications. Usually the slope of the grade will not be more than 3:1. All topsoil should be removed prior to grading the pole location. • **Utilities Modification Plan** – The construction contractor will prepare a utilities modification and relocation plan prior to the start of construction. The plan will identify chain of command rules for notification of authorities and appropriate actions and responsibilities to ensure the safety of the public and workers and include a description of how utilities infrastructure will be modified or relocated and identification of precise alignment where utility lines will be relocated. The plan will be circulated to the potentially affected service system providers for review and approval prior to the start of construction activities. Worker education training in response to such situations will be conducted by the contractor. • The contractor will stage utility line modifications and relocations in a manner that minimizes interruption of service. • In accordance with the STNF LRMP, relocated power lines less than 35 kV and telephone lines on USFS land within the STNF will be buried unless the STNF VQO can be met without burying, geologic conditions make burying infeasible, or burying will produce greater long-term site disturbance. • **Traffic Control and Safety Assurance Plan** – Reclamation will implement Mitigation Measure Trans-1 as described in EIS Chapter 20, "Transportation and Traffic," to reduce adverse effects of road closures and detours or partial road closures on access to local streets and adjacent uses.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure Util-2 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure Util-2 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure Util-2 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure Util-2 (CP1).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Chapter 22, "Public Services"					
Impact PS-1: Disruption of Public Services (Shasta Lake and Vicinity and Upper Sacramento River)	Mitigation Measure PS-1: Coordinate and Assist Public Services Agencies.	CP1	Reclamation will coordinate all proposed road closures, detours, and traffic control measures with the (SCSO) and Tehama County Sheriff's Office, which are the designated Cal EMA (formerly OES) headquarters for the primary study area. Reclamation will appoint a public liaison to communicate construction schedules, road closures, and project activities to the public. The liaison will organize and conduct public meetings for the purpose of communicating project information. The liaison will meet with all affected public services agencies to coordinate public meetings and information exchanges. Reclamation will obtain all necessary permits and/or authorizations from public services agencies for matters requiring agency approval and/or cooperation. Reclamation will meet with public services agencies to determine traffic controls for infrastructure, utility, and structure relocation. Reclamation will develop and implement a monitoring plan to track the effectiveness of this mitigation measure, and will make adjustments, if necessary. *Traffic Control and Safety Assurance Plan* Reclamation will implement Mitigation Measure Trans-1 as described in Chapter 20, "Transportation and Traffic," to reduce adverse effects of road closures and detours or partial road closures on access to local streets and adjacent uses.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure PS-1 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure PS-1 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure PS-1 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure PS-1 (CP1).	PS	LTS
Impact PS-2: Degraded Level of Public Services (Shasta Lake and Vicinity and Upper Sacramento River)	Mitigation Measure PS-2: Provide Support to Public Services Agencies.	CP1	Reclamation will provide affected public services providers (e.g., law enforcement, fire protection, emergency services) with sufficient funding and support to ensure that levels of public services are not substantially degraded by construction activities. Reclamation will coordinate with affected providers to develop a mutual understanding of the amount and schedule of financial and administrative support required to reduce this impact to a less-than-significant level. Reclamation will develop and implement a monitoring plan to track the effectiveness of this mitigation measure, and will make adjustments, if necessary.	PS	LTS
		CP2	This mitigation measure is identical to Mitigation Measure PS-2 (CP1).	PS	LTS
		CP3	This mitigation measure is identical to Mitigation Measure PS-2 (CP1).	PS	LTS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure PS-2 (CP1).	PS	LTS
		CP5	This mitigation measure is identical to Mitigation Measure PS-2 (CP1).	PS	LTS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Chapter 25, "Wild and Scenic River Considerations for McCloud River"					
Impact WASR-3: Effects to McCloud River Wild Trout Fishery, as Identified in the California Public Resources Code, Section 5093.542	Mitigation Measure WASR-3: Develop and Implement a Comprehensive Multi-scale Fishery Protection, Restoration and Improvement Program for the Lower McCloud River Watershed.	CP1	The inundation of a portion of the lower McCloud River will affect the habitat available to wild trout and other aquatic organisms. The impacts are similar to, but more specific to the lower McCloud River watershed than those described under Impact Geo-2 in Chapter 4, "Geology, Geomorphology, Minerals and Soils"; Impact WQ-1 in Chapter 7, "Water Quality"; and Impacts Aqua-4 and Aqua-7 in Chapter 11, "Fisheries and Aquatic Ecosystems." This mitigation measure incorporates Mitigation Measures Geo-2, WQ-1, and Aqua 4. This mitigation measure also includes the commitment to identify suitable sections of the lower McCloud River protected under the State PRC that may be available for acquisition from willing sellers for purposes of protecting, restoring and improving the wild trout fishery. This element of the mitigation measures is intended to be consistent with CDFW's wild trout policy as defined in the Strategic Plan for Trout Management, Appendix E, Section C, emphasizing designation and management of the wild trout fishery available to the public. Watershed analysis and assessments prepared for the lower McCloud River watershed document that roads and modified fire regimes have increased sediment contributions to receiving waters, particularly in those watersheds that have been subjected to mining, forest management, and other types of large-scale developments and disturbances. Reclamation will apply this element of this mitigation measure to protect, restore, and improve the wild trout fishery in the lower McCloud River watershed. The STNF, through the efforts of the interagency mitigation working group described in Chapter 2, "Action Alternatives," identified that acquisition of lands along the lower McCloud River is a priority and is consistent with the LRMP to meet a number of resource goals and objectives (e.g., cultural resources, recreation, biological resources). Under Impacts WASR-3 and WASR-4, the wild trout fishery and free-flowing conditions in the main stem lower McCloud River that would be affected in the protected reach would be at most 3,550 feet. This element of Mitigation Measure WASR-3 would include acquisition of private lands along the river corridor commensurate with the selected action alternative, if authorized, and available from a willing seller. This mitigation measure requires that Reclamation work with the watershed stakeholders (e.g., CRMP members) to develop a basin plan that identifies deficient areas where riparian and watershed improvements can be made and work with landowners to improve those areas. Reclamation will commit to funding the planning effort, which will be completed within 10 years after construction has been initiated. This plan is intended to reduce the impacts of inundation on the wild trout fishery in the McCloud River and its tributaries. This program would be performed in conjunction with the efforts of the interagency work group described in Mitigation Measure Geo-2.	PS	PS
		CP2	This mitigation measure is identical to Mitigation Measure WASR-3 (CP1).	PS	PS
		CP3	This mitigation measure is identical to Mitigation Measure WASR-3 (CP1).	PS	PS
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure WASR-3 (CP1).	PS	PS
		CP5	This mitigation measure is identical to Mitigation Measure WASR-3 (CP1).	PS	PS

This page left blank intentionally.

Table 3-2. Summary of Mitigation Measures (contd.)

Resource Topic/ Impact	Mitigation Measure Title	Alternative	Mitigation Measure	LOS Before Mitigation	LOS After Mitigation
Impact WASR-4: Effects to McCloud River Free-Flowing Conditions, as Identified in the California Public Resources Code, Section 5093.542	Mitigation Measure WASR-4: Implement Protection, Restoration, and Improvement Measures to Benefit Hydrologic Functions Within the Lower McCloud River Watershed	CP1	The inundation of a portion of the lower McCloud River will impede the free-flowing nature of as much as 3,550 feet of the river, thereby affecting the hydrologic and hydraulic characteristics of the affected reach. These impacts are similar to other inundated tributaries, but more specific to the lower McCloud River. These impacts are described in Chapter 4, "Geology, Geomorphology, Minerals and Soils" (Impact Geo-2); Chapter 7, "Water Quality" (Impact WQ-1); and Chapter 11, "Fisheries and Aquatic Ecosystems" (Impacts Aqua-4 and Aqua-7). This mitigation measure incorporates Mitigation Measures Geo-2, WQ-1, and Aqua 4, specifically in the context of increasing the overall hydrologic function of the lower McCloud River watershed in a variety of ways. Examples of the measures that may be implemented include the following: • Silviculture treatments that improve fuel conditions, reduce runoff from high intensity fires and enhance the functions and values of wetlands and riparian areas • Road decommissioning and drainage improvement projects that reduce concentrated road-related runoff and reestablish flows to tributaries to the lower McCloud River • Restoration/improvement of in-channel habitat to enhance potential for sustained flows from tributaries This measure also includes the mitigation measures described in Chapter 12, "Botanical Resources and Wetlands," intended to support land acquisition and wetland mitigation. Five mitigation measures would be applicable to WASR-4: Bot-2, Bot-3, Bot-4, Bot-5 and Bot-7. Land acquisition and wetland mitigation measures are intended to offer a certain level of protection from future development (e.g., diversions) as well as opportunities to improve the hydrologic function at multiple scales that could provide an overall benefit to the free-flowing conditions of the lower McCloud River.	S	SU
		CP2	This mitigation measure is identical to Mitigation Measure WASR-4 (CP1).	S	SU
		CP3	This mitigation measure is identical to Mitigation Measure WASR-4 (CP1).	S	SU
		CP4/CP4A	This mitigation measure is identical to Mitigation Measure WASR-4 (CP1).	S	SU
		CP5	This mitigation measure is identical to Mitigation Measure WASR-4 (CP1).	S	SU

Key:
B = Beneficial
CP = Comprehensive Plan
CVP = Central Valley Project
LOS = level of significance
LTS = less than significant
NA = not applicable
NI = no impact
PS = potentially significant
S = significant
SU = significant and unavoidable
SWP = State Water Project

This page left blank intentionally.

Monitoring of the SLWRI

Monitoring is an essential element of project implementation (CEQ 2011). If an action alternative is authorized, the authorization would specify the terms and conditions for construction, operation, and maintenance of the facilities and features of the preferred alternative, including environmental commitments and mitigation measures. Agencies may provide for monitoring to ensure that their decisions are carried out, and should do so in important cases (40 CFR 1505.3). This includes monitoring to demonstrate consistency with decisions to implement and or amend land management plans (LMPs).

The environmental commitments and mitigation measures described in Chapter 2 and above, respectively, are intended to reduce the environmental consequences of the project. Reclamation has also proposed an off-site mitigation program. CEQ Regulations for NEPA (40 CFR 1505.2(c)) requires that a monitoring and enforcement program be adopted for any mitigation measures included in the decision to implement the project. Reclamation and other consenting agencies are responsible for monitoring mitigation actions, whether for the on-site construction and operation activities or for the off-site mitigation program.

Most monitoring on federal lands would be accomplished by the agency having jurisdiction over the land being monitored. Because a large proportion of the federal lands that would be impacted by any action alternative is managed by the STNF, most of the off-site mitigation would occur on STNF lands. Lands managed by BLM would also be available for off-site mitigation. In either case, these mitigation efforts would be subject to some degree of monitoring.

Types of Monitoring

There are two types of monitoring that would be associated with implementation of any of the action alternatives, implementation monitoring and effectiveness monitoring.

Implementation Monitoring

Implementation monitoring seeks to verify that the project was implemented consistent with authorizing language. Implementation monitoring is typically a checklist exercise to verify that a project is implemented as planned and that requirements, terms, and conditions associated with the project have been completed. Many of these elements would be addressed by Reclamation in its construction inspection process. As needed, representatives of other consenting agencies would participate in this process to ensure that agency priorities are accomplished and agency obligations are fulfilled.

A number of the environmental commitments and mitigation measures were developed, in part to ensure that the standards and guidelines of the STNF and BLM LMPs are met. Implementation monitoring of the SLWRI actions and

operations would provide evidence of compliance with these LMPs. For example, implementation monitoring would show that:

- Measures for reestablishing effective ground cover and restoring native vegetation were accomplished and that additional steps would be taken if the agencies' standards were not met.

- Measures to protect, maintain, and enhance wetlands and other waters were done in a manner to reduce impacts to riparian and aquatic habitat and associated species.

- Reclamation's offsite mitigation programs, including land acquisition and associated mitigation actions (e.g., fuel reduction, habitat improvement projects), were accomplished as planned.

Effectiveness Monitoring

Effectiveness monitoring seeks to verify that the environmental commitments and mitigation measures accomplish the desired objective. While all or nearly all important aspects of the project would be subject to implementation monitoring, effectiveness monitoring typically applies to a smaller subset of actions. Implicit in effectiveness monitoring is a framework of adaptive management to ensure that objectives are achieved.

If the outcomes of an action are well known and likely to be accomplished, effectiveness monitoring may not be needed or may be done only on a sample basis. For example, the effects of road sediment reduction projects are well known and not in question, so little if any effectiveness monitoring would be required for this activity.

Some mitigation projects may have less certain outcomes or may be associated with thresholds such as successful revegetation of native species. In these cases, effectiveness monitoring would be used to ensure that the desired outcome is achieved. The mitigation measures related to Shasta snow wreath, for example, are unique and would be subject to various adaptive management actions. Protection and propagation of this species may require establishment of specific metrics to demonstrate success both spatially and temporally.

Effectiveness monitoring also provides a trigger for adaptive management if the proposed mitigation is not entirely effective. Effectiveness monitoring requires interpretation of land management plan direction and objectives. Therefore, most effectiveness monitoring on federal lands would be accomplished by the agency having jurisdiction over the land being monitored.

Reporting

Reporting results is a key element of a monitoring plan. The monitoring plan developed by Reclamation and the consenting agencies will include a reporting schedule and detailed criteria for judging completion and success of the actions

being monitored. Implementation monitoring would typically be deemed complete when the action being monitored has been fully implemented. Effectiveness monitoring would not be complete until the objectives have been accomplished.

This page left blank intentionally.

Chapter 4
References

Council on Environmental Quality. 2011 (January). Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findngs of No Significant Impact. Memorandum for Heads of Federal Departments and Agencies. Executive Office of the President. Washington, D.C.

This page left blank intentionally.