

Appendix E Mitigation Measures

This appendix documents the mitigation measures outlined in the EIS. References for citations appearing in mitigation measure text can be found in the technical appendix for each resource.

E.1 Water Quality

Mitigation Measure WQ-1: Implement a Spill Prevention, Control, and Countermeasure Plan

Reclamation or their construction contractor will develop and implement a spill prevention, control, and countermeasure plan (SPCCP) to minimize the potential for, and effects from, spills of hazardous, toxic, and petroleum substances during construction and maintenance. The SPCCP will be completed before construction activities begin. Implementation of this measure will comply with State and Federal water quality regulations. The SPCCP will describe spill sources and spill pathways in addition to the actions that will be taken in the event of a spill (e.g., an oil spill from engine refueling will be cleaned up immediately with oil absorbents) or the exposure of an undocumented hazard. The SPCCP will outline descriptions of containment facilities and practices such as double-walled tanks, containment berms, emergency shut-offs, drip pans, fueling procedures, and spill response kits. It will also describe how and when employees are trained in proper handling procedures and spill prevention and response procedures.

Reclamation will review and approve the SPCCP before the onset of construction activities and will routinely inspect the construction area to verify that the measures specified in the SPCCP are properly implemented and maintained. Reclamation will notify its contractors immediately if there is a noncompliance issue and will require compliance.

If a spill is reportable, the construction contractor's superintendent will notify Reclamation, and Reclamation will take action to contact the appropriate safety and cleanup crews to ensure the SPCCP is followed. A written description of reportable releases will be submitted to the Regional Water Quality Control Board (RWQCB) and the California Department of Toxic Substances Control. This submittal will contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases will be documented on a spill report form.

Mitigation Measure WQ-2: Implement a Stormwater Pollution Prevention Plan

Prior to initiating construction and applicable maintenance activities that may result in ground disturbance or include ground disturbance activities, the construction contractor will prepare a stormwater pollution prevention plan (SWPPP) that describes best management practices (BMPs) that will be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. Specific BMPs that will be incorporated into the SWPPP will be site-specific and will be prepared in accordance with the regional water board field manual. The SWPPP will include, but not be limited to, the following standard erosion- and sediment-control BMPs:

- **Timing of construction.** All construction activities that include ground disturbance activities greater than 1 acre in size will occur from April 15 through November 1 to avoid ground disturbance in the rainy season.
- **Stabilize grading spoils.** Grading spoils generated during construction may be temporarily stockpiled in staging areas. Such staging areas will not contain native or sensitive vegetation communities and will not support sensitive plant or animal species. Silt fences, non-monofilament fiber rolls, or similar devices will be installed around the base of the temporary stockpiles to intercept runoff and sediment during storm events. If necessary, temporary stockpiles may be covered with a geotextile material to increase protection from wind and water erosion. Materials used for stabilizing spoils will be selected to be non-injurious to wildlife
- **Permanent site stabilization.** The construction contractor will install structural or vegetative methods to permanently stabilize all graded or disturbed areas once construction is complete. Structural methods could include installing biodegradable fiber rolls or erosion-control blankets. Vegetative methods could include applying organic mulch and tackifiers, and/or an erosion-control native seed mix.
- **Staging of construction equipment and materials.** Equipment and materials will be staged in designated staging areas that meet the requirements identified above regarding stabilizing grading spoils.
- **Minimize soil and vegetation disturbance.** The construction contractor will minimize ground disturbance and the disturbance and/or destruction of existing vegetation. This will be accomplished, in part, through establishing designated equipment staging areas, ingress and egress corridors, equipment exclusion zones and protecting existing trees before beginning any grading operations.
- **Install sediment barriers.** The construction contractor will install silt fences, fiber rolls, or similar devices to prevent sediment-laden water from leaving the construction area to the extent feasible in areas where construction is occurring in saturated soils.

Mitigation Measure WQ-3: Develop a Turbidity Monitoring Program

The Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River basins (Fifth Edition) (Central Valley RWQCB 2018) contains turbidity objectives. Specifically, the plan states that where natural turbidity is between 5 and 50 Nephelometric Turbidity Units (NTUs), turbidity levels may not be elevated by 20% above ambient conditions; where ambient conditions are between 50 and 100 NTUs, conditions may not be increased by more than 10 NTUs; and where natural turbidity is greater than 100 NTUs, increases will not exceed 10%. A sampling plan will be developed and implemented based on specific site conditions and in consultation with the RWQCB. If turbidity limits exceed basin plan standards, construction-related earth-disturbing activities will slow to a point that would alleviate the problem.

Mitigation Measure WQ-4: Develop a Water Quality Mitigation and Monitoring Program

Reclamation will develop and implement a program to reduce, minimize, or eliminate increases in water quality constituents. The program will develop a monitoring plan, including frequent sampling and reporting, particularly for existing constituents of concern. Reclamation will coordinate with the implementation of the current Total Maximum Daily Loads to share monitoring information and

contribute to the efforts to reduce constituents of concern. Monitoring efforts could include collection of water quality (through the water column), soil, and fish and invertebrate tissue monitoring.

E.2 Water Supply

None proposed.

E.3 Groundwater

None proposed.

E.4 Indian Trust Assets

Mitigation Measure ITA-1: Consult with Tribal Entities Consistent with Secretarial Order 3175

For programmatic actions, when footprints are determined, and as early as possible in the environmental compliance process, Reclamation will consult with nearby federally recognized Indian tribes in the study area to request their input regarding the identification of any properties to which they might attach religious and cultural significance to within the area of potential effect.

Once these areas are determined, Reclamation will make a good faith effort to avoid land or sites of religious importance and will enter into government-to-government consultations with potentially affected tribes to identify and address concerns for ITAs.

Mitigation Measure WQ-1: Implement a Spill Prevention, Control, and Countermeasure Plan

Described under Section E.1, Water Quality.

Mitigation Measure WQ-2: Implement a Stormwater Pollution Prevention Plan

Described under Section E.1, Water Quality.

Mitigation Measure WQ-3: Develop a Turbidity Monitoring Program

Described under Section E.1, Water Quality.

Mitigation Measure WQ-4: Develop a Water Quality Mitigation and Monitoring Program

E.5 Described under Section E.1, Water Quality.

E.5.1 Cultural Resources and Indian Sacred Sites

Mitigation Measure CUL-1: Conduct Archaeological Surveys before the Beginning of Any Project- or Program-Related Action and Implement Further Mitigation as Necessary

Before the beginning of any project- or program-related action that could affect cultural resources, qualified archaeologists will survey all portions of the site. The survey is conducted during a time when vegetation can be reduced or cleared from the affected area, so the natural ground surface can be examined for traces of prehistoric and/or historic-era cultural resources. Surveys of these areas would not be necessary if it is determined that they would not be affected by any project or program construction-related activity, including equipment staging or material stockpiling. If the survey reveals the presence of cultural resources on the project site, the procedures outlined in Mitigation Measure CUL-2 will be followed.

Mitigation Measure CUL-2: Restrict Ground Disturbance and Implement Measures to Protect Archaeological Resources if Discovered during Surveys or Ground-Disturbing Activities

If unrecorded cultural resources (e.g., unusual amounts of shell, animal bone, bottle glass, ceramics, structure/building remains, etc.) are encountered during surveys where ground disturbance is planned or during project-related ground-disturbing activities, all ground-disturbing activities will cease within a 100-foot radius of the find. A qualified archaeologist will identify the materials, determine their possible significance according to National Register of Historic Places (NRHP) criteria, and formulate appropriate measures for their treatment, which will be implemented by the lead agency and its contractors. Potential treatment methods for important and potentially important resources may include, but would not be limited to, no action (i.e., resources determined not to be important), avoidance of the resource through changes in construction methods or project design, and implementation of a program of testing and data recovery, in accordance with all applicable federal and state requirements.

Mitigation Measure CUL-3: Stop Potentially Damaging Work if Human Remains Are Uncovered during Construction, Assess the Significance of the Find, and Pursue Appropriate Management

If Native American human remains are discovered on federal lands, the Native American Graves Protection and Repatriation Act (NAGPRA) requires that the individual who makes the discovery notify the federal land manager of the discovery in writing. All ground-disturbing activities within 100 feet of the find will cease, and the materials are to be protected until the land manager can assess the find. Upon receipt of written confirmation of the discovery, the manager is required to: (1) certify receipt of the notification; (2) take immediate steps, if necessary, to further protect the materials; (3) notify by telephone, with written confirmation, the tribes likely to be culturally affiliated with the materials; and (4) initiate consultation with such tribes. If, after consultation with tribes, the manager determines that the material will be protected adequately in situ, without the need to excavate or remove the material from the area of discovery, then the requirements under NAGPRA will have been completed. If, after consultation with the tribes, the manager determines that the circumstances warrant intentional excavation or removal of the materials from the area of discovery, then 43 CFR Section 10.3 applies, and the manager must complete steps outlined therein for intentional excavations.

If Native American human remains are discovered outside of federal lands, California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code (Public Res. Code) Section 5097 procedures are to be followed. In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, all such activities within a 100-foot radius of the find will be halted immediately and a Reclamation cultural resources specialist (CRS) will be contacted. The Reclamation CRS will immediately notify the county coroner. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on nonfederal lands (Health and Safety Code §7050.5[b]). If the coroner determines

that the remains are those of a Native American, he or she must contact the Native American Heritage Commission (NAHC) within 24 hours of making that determination (Health and Safety Code §7050[c]). The NAHC will immediately designate and contact the most likely descendent (MLD), who has 48 hours from completion of their examination of the find in which to make recommendations for treatment of the remains, as required by Public Res. Code 5097.98(a). Reclamation will then contact the landowner. Reclamation, the MLD, and the landowner will then devise a mitigation plan for treatment of the remains. Work in the area will continue only after the remains have been treated according to the above mitigation plan and Reclamation certifies that the mitigation plan was properly implemented.

If the remains are found not to be Native American in origin and do not appear to be in an archaeological context, construction will proceed at the direction of the coroner and Reclamation CRS. Once the remains have been appropriately and legally treated, construction may resume in the discovery area upon receipt of Reclamation's express authorization to proceed and under the direction of the CRS.

Mitigation Measure CUL-4: Complete Built-Environment Inventory and Evaluation prior to Construction and Implement Treatment Measures for Adverse Effects

Mitigation for program or project effects on historic built-environment resources consists of identification and evaluation of built-environment historic properties and assessing program or project effects. Reclamation will ensure that a qualified architectural historian meeting Secretary of Interior's Professional Qualifications Standards for work in history and/or architectural history per 36 CFR Part 61 conducts a historic built-environment inventory and evaluation of unsurveyed parcels that have potential to be affected by the proposed action. All historic built-environment resources located during the survey will be photographed, mapped, and recorded on applicable California Department of Parks and Recreation (DPR) 523 forms. For multifaceted resources such as cultural landscapes and historic districts, locational data will be collected with a global positioning system (GPS) receiver. The significance of any identified historic built-environment resource will be evaluated for NRHP eligibility. Reclamation will forward the resulting DPR 523 forms to the representative California Historical Resources Information System.

To mitigate for adverse effects on identified built-environment historic properties, a plan for detailed documentation of the historic property will be prepared prior to initiation of the project or program action; in cases when the action would prevent adequate completion of the documentation effort, documentation will be completed prior to initiating the program or project. This could include a range of specific mitigation measures to be determined in Section 106 consultation with the State Office of Historic Preservation. Documentation of identified built-environment historic properties could include a range of options, such as interpretive displays, online resources, archival quality photographic documentation, or historic contexts.

E.6 Air Quality

E.6.1 Measures to Minimize Generation of Fugitive Dust

Mitigation Measure AQ-1: Develop and Implement a Fugitive Dust Control Plan

Mitigation Measure AQ-2: Pave, Apply Gravel, or Otherwise Stabilize the Surfaces of Access Roads

Mitigation Measure AQ-3: Apply Water or Dust Palliatives to Access Roads as Necessary during High Wind Conditions.

Mitigation Measure AQ-4: Post and Enforce Speed Limits on Unpaved Access Roads

Mitigation Measure AQ-5: Stage Activities to Limit the Area of Disturbed Soils Exposed at Any One Time

Mitigation Measure AQ-6: Water, Stabilize, or Cover Disturbed or Exposed Earth Surfaces and Stockpiles of Dust-Producing Materials, as Necessary

Mitigation Measure AQ-7: Install Wind Fences around Disturbed Earth Areas if Windborne Dust Is Likely to Affect Sensitive Areas beyond the Site Boundaries (e.g., Nearby Residences)

Mitigation Measure AQ-8: Cover the Cargo Areas of Vehicles Transporting Loose Materials

Mitigation Measure AQ-9: Inspect and Clean Dirt from Vehicles, as Necessary, at Access Road Exits to Public Roadways

Mitigation Measure AQ-10: Remove from Public Roadways Visible Trackout or Runoff Dirt from the Activity Site (e.g., Using Street Vacuum Sweeping)

E.7 Greenhouse Gas Emissions

Mitigation Measure GHG-1: Minimize Potential Increases in GHG Emissions from Exhaust Associated with Construction Activities

BMPs are recommended to minimize potential increases in GHG emissions from exhaust associated with construction activities. The following are common BMPs that may be applicable depending on the activity and the equipment being used. These or similar practices are often required by air quality management districts and local jurisdictions to minimize construction impacts on GHG emissions:

- Ensure that all equipment and vehicles are maintained regularly to meet manufacturer specifications to achieve efficient combustion and minimum emissions.
- Ensure that all diesel engines are properly fueled (i.e., ultra-low sulfur diesel with a maximum 15 parts per million sulfur content).
- Limit idling of engines to no more than 5 minutes unless necessary for proper operation.
- Where feasible, use electric rather than engine-powered equipment. This may include using electric starting aids (such as block heaters) to warm engines.
- Develop and implement a traffic management plan.
- Where offsite traffic congestion is a concern, limit use of vehicles on public roads during peak traffic hours.
- Where offsite traffic congestion is a concern, or to limit vehicle volumes traveling to remote sites, require workers to park in designated areas and provide shuttle buses to work sites.

E.8 Visual Resources

None proposed.

E.9 Aquatic Resources

Mitigation Measure AQUA-1: Worker Awareness Training

Reclamation or its designees will provide training to field management and construction personnel on the importance of protecting sensitive natural resources (i.e., listed species and designated critical and/or suitable habitat for listed species). Training will be conducted during preconstruction meetings so that construction personnel are aware of their responsibilities and the importance of compliance. All trainees will be required to sign a sheet indicating their attendance and completion of environmental training. The training sheets will be provided to the fish and wildlife agencies if requested. These requirements also pertain to operations and maintenance personnel working in and adjacent to suitable habitat for listed species.

Construction personnel will be educated on the types of sensitive resources located in the project area and the measures required to avoid and minimize effects on these resources. Materials covered in the training program will include environmental rules and regulations for the specific project, requirements for limiting activities to approved work areas, timing restrictions, and avoidance of sensitive resource areas. In general, trainings will include the following components.

- Important timing windows for listed species (i.e., timing of fish migration, spawning, and rearing; and wildlife mating, nesting, and fledging).
- Specific training related to the relevant mitigation measures that will be implemented during construction for the protection of listed species and their habitat.
- The legal requirements for resource avoidance and protection.
- Identification of listed species potentially affected at the worksite, which will depend upon the work to be performed and the location of the work.
- Protocol for identifying the proper mitigation measures to implement for the protection of listed species based upon the nature, timing, and location of construction activities to be performed.
- Brief discussions of listed species of concern.
- Boundaries of the work area.
- Avoidance and minimization commitments.
- Exclusion and construction fencing methods.
- Roles and responsibilities.
- What to do when listed species are encountered (dead, injured, stressed, or entrapped) in work areas.
- Penalties for noncompliance.

A fact sheet or other supporting materials containing this information will be prepared and will be distributed along with a list of contacts (names, numbers, and affiliations) prior to initiating construction activities. A representative will be appointed by the project proponent to be the primary

point of contact for any employee or contractor who might inadvertently take a listed species, or a representative will be identified during the employee education program and the representative's name and telephone number provided to the fish and wildlife agencies.

If new construction personnel are added to the project, the contractor will ensure that the personnel receive the mandatory training and sign a sheet indicating their attendance and completion of the environmental training before starting work. The training sheets for new construction personnel will be provided to the fish and wildlife agencies, if requested.

Mitigation Measure AQUA-2 Construction Best Management Practices and Monitoring

All construction and operation and maintenance activities in and adjacent to suitable habitat for listed species will implement BMPs and have construction monitored by a qualified technical specialist(s). Depending on the resource of concern and construction timing, construction activities and areas will be monitored for compliance with water quality regulations (SWPPP monitoring) and with Mitigation Measures developed for sensitive biological resources (biological monitoring).

Before initiating construction, Reclamation or its designee will prepare a construction monitoring plan for the protection of listed species. The plan will include, but not be limited to, the following elements.

- Reference to or inclusion of the SWPPP prepared under the Construction General Permit (CGP), where one is needed.
- Summaries or copies of planning and preconstruction surveys (if applicable) for listed species.
- Description of Mitigation Measures to be implemented.
- Descriptions of monitoring parameters (e.g., turbidity), including the specific activities to be monitored (e.g., dredging, grading activities) and monitoring frequency and duration (e.g., once per hour during all in-water construction activities), as well as parameters and reporting criteria.
- Description of the onsite authority of the monitors to modify construction activity and protocols for notifying CDFW, NMFS, and USFWS, if needed.
- A daily monitoring log prepared by the construction monitor, which documents the day's construction activities, notes any problems identified and solutions implemented to rectify those problems, and notifies the construction superintendent and/or the fish and wildlife agencies of any exceedances of specific parameters (e.g., turbidity) or observations of listed species. The monitoring log will also document construction start/end times, weather and general site conditions, and any other relevant information.

The following measures will be implemented prior to and during performance of the proposed action, for the protection of listed species and their habitat.

- All in-water construction activities within jurisdictional waters will be conducted during the following in-water work windows:
 - Within the legal Delta and Suisun Bay/Suisun Marsh: August 1 to October 31;
 - Sacramento River upstream of the Delta:
 - Keswick Dam (RM 302) to approximately 1.5 miles downstream (Zone 1): year-round (any time flows are less than 15,000 cfs);

- Approximately 1.5 miles downstream of Keswick Dam (RM 300.5) to Cow Creek (RM 280) (Zone 2): October 1 to May 15 (any time flows are less than 10,000 cfs; pre-construction salmonid redd surveys conducted);
- Cow Creek (RM 280) to Red Bluff Diversion Dam (RM 243): October 1 to March 1 (any time flows are less than 10,000 cfs; pre-construction salmonid redd surveys conducted);
- Downstream of Red Bluff Diversion Dam (RM 243) to the boundary with the legal Delta: June 1 to October 1.
- American River:
 - July 1 to September 30.
- Feather River:
 - August 1 to October 31.
- Stanislaus River:
 - July 15 to October 15.
- Other locations proposed through programmatic actions (e.g., San Joaquin River, Battle Creek):
 - To be developed through coordination with NMFS, USFWS, and DFW.
- Note: Work windows will be refined as necessary through coordination with NMFS, USFWS, and DFW. Work windows for some activities such as pile driving may be lengthened subject to agency approval based on demonstrated success of mitigation (e.g., bubble curtains) and real-time monitoring for fish presence. In-water activities associated with mobilization and demobilization are not subject to the work windows. Apart from impact pile driving, any other work may occur within a dewatered cofferdam regardless of the timing of in-water work windows. In-water impact pile installation may occur outside of the work windows if performed within a dewatered cofferdam and with in-channel acoustic monitoring to verify that generated sound thresholds do not exceed the 150-dB behavioral criterion. Any extension/reduction of work windows would focus on half-month increments.
- To the extent possible, in-water work will only occur for up to 12 hours per day, or from at least one hour after sunrise to at least one before sunset, in order to provide a crepuscular/nocturnal time window for fish migration without disturbance. Timing of this daily in-water work window will be refined as necessary through coordination with NMFS, USFWS, and DFW.
- Qualified biologists will monitor construction activities in areas identified as having listed species or their designated critical habitat. The intent of the biological monitoring is to ensure that specific Mitigation Measures that have been integrated into the project design and permit requirements are being implemented correctly during construction and are working appropriately and as intended for the protection of listed species.
- Biological monitors will be professional biologists selected for their knowledge of the listed species that may be affected by construction activities. The qualifications of the biologist(s) will be presented to the fish and wildlife agencies for review and written approval prior to initiating construction. The biological monitors will have the authority to temporarily stop work in any area where a listed species has been observed until that individual has passively or physically been moved outside of the work area, or when any Mitigation Measures are not functioning appropriately for the protection of listed species.

- Exclusionary fencing may be placed at the edge of active construction activities and staging areas (after having been cleared by biological surveys) to restrict wildlife access from the adjacent habitats. The need for exclusionary fencing will be determined during the preconstruction surveys and the construction planning phase and may vary depending on the species and habitats present. Exclusionary fencing will consist of taut silt fabric (non-monofilament), 24 inches high (36 inches high for California red-legged frog and giant garter snake), staked at 10-foot intervals, with the bottom buried 6 inches below grade. Fence stakes will face toward the work area (on the opposite side of adjacent habitat) to prevent wildlife from using stakes to climb over the exclusionary fencing. Exclusionary fencing will be maintained such that it is intact during rain events. Fencing will be checked by the biological monitor or construction foreman periodically throughout each work day. If fencing becomes damaged, it will be immediately repaired upon detection and the monitoring biologist will stop work in the vicinity of the fencing as needed to ensure that no sensitive wildlife species have entered. Active construction and staging areas will be delineated with high-visibility temporary fencing at least 4 feet in height, flagging, or other barrier to prevent encroachment of construction personnel and equipment outside the defined project footprint. Such fencing will be inspected and maintained daily by the construction foreman until completion of the project. Fencing will be removed from work areas only after all construction activities are completed and equipment is removed. No project-related construction activities will occur outside the delineated project construction areas.
- Project-related vehicles will observe a speed limit of 20 miles per hour in construction areas where it is safe and feasible to do so, except on county roads and state and federal highways. A vehicle speed limit of 20 miles per hour will be posted and enforced on all nonpublic access roads, particularly on rainy nights when California tiger salamanders and California red-legged frogs are most likely to be moving between breeding and upland habitats. Extra caution will be used on cool days when giant garter snakes may be basking on roads.
- All ingress/egress at the project site will be restricted to those routes identified in the project plans and description.
- All vehicle parking will be restricted to established areas, existing roads, or other suitable areas.
- To avoid attracting predators, all food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in enclosed containers and trash will be removed and disposed of at an appropriate facility at least once a week from the construction or project site.
- To avoid injury or death to wildlife, no firearms will be allowed on the project site except for those carried by authorized security personnel or local, state, or federal law enforcement officials.
- To prevent harassment, injury, or mortality of sensitive wildlife by dogs or cats, no canine or feline pets will be permitted in the construction area.
- To prevent inadvertent entrapment of wildlife during construction, all excavated, steep-walled holes or trenches more than 1 foot deep will be covered at the close of each working day with plywood or similar material, and/or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If a listed species is encountered during construction work, to the extent feasible, construction activities should be diverted away from the animal until it can be moved by a USFWS- or CDFW-approved biologist.

- Capture and relocation of trapped or injured wildlife will only be performed by personnel with appropriate USFWS and CDFW handling permits. Any sightings and any incidental take will be reported to CDFW and USFWS via email within 1 working day of the discovery. A follow-up report will be sent to these agencies, including dates, locations, habitat description, and any corrective measures taken to protect listed species encountered. For each listed species encountered, the biologist will submit a completed CNDDDB field survey form (or equivalent) to CDFW no more than 90 days after completing the last field visit to the project site.
- Plastic monofilament netting or similar material will not be used for erosion control, because smaller wildlife may become entangled or trapped in it. This includes products that use photodegradable or biodegradable synthetic netting, which can take several months to decompose. Acceptable materials include natural fibers such as jute, coconut, twine, or other similar fibers or tackified hydroseeding compounds. This limitation will be communicated to the contractor through specifications or special provisions included in the construction bid solicitation package.
- Listed species of wildlife can be attracted to den-like structures such as pipes and may enter stored pipes and become trapped or injured. All construction pipes, culverts, or similar structures, construction equipment, or construction debris left overnight in areas that may be occupied by wildlife will be inspected by the biological monitor or the contractor prior to being used for construction. Such inspections will occur at the beginning of each day's activities, for those materials to be used or moved that day. If necessary, and under the direct supervision of the biologist, the structure may be moved up to one time to isolate it from construction activities, until the listed species has moved from the structure of their own volition, been captured and relocated, or otherwise been removed from the structure.
- Rodenticides and herbicides will be used in accordance with the manufacturer-recommended uses and applications and in such a manner as to prevent primary or secondary poisoning of listed species and depletion of prey populations upon which they depend. All uses of such compounds will observe label and other restrictions mandated by the U.S. Environmental Protection Agency (EPA), the California Department of Pesticide Regulation, and other appropriate state and federal regulations, as well as additional project-related restrictions imposed by USFWS, NMFS and/or CDFW. If rodent control must be conducted in San Joaquin kit fox habitat, zinc phosphide should be used because of its proven lower risk to kit fox. In addition, the method of rodent control will comply with provisions of the 4(d) rule published in the final listing rule for California tiger salamander (69 *Federal Register* [FR] 47211–47248).
- Nets or bare hands may be used to capture and handle individuals of listed species. A professional biologist will be responsible for and direct any efforts to capture and handle listed species. Any person who captures and handles listed species will not use soaps, oils, creams, lotions, insect repellents, solvents, or other potentially harmful chemicals of any sort on their hands within 2 hours before handling listed species. Latex gloves will not be used either. To avoid transferring diseases or pathogens between aquatic habitats during the course of surveys or the capture and handling of listed species, all species captured and handled will be released in a safe, aquatic environment as close to the point of capture as possible, and not transported and released to a different water body. When capturing and handling listed species of amphibians, the biologists will follow the Declining Amphibian Task Force's *Code of Practice* (USFWS n.d.). While in captivity, individual amphibians will be kept in a cool, moist, aerated environment such as a dark

(i.e., green or brown) bucket containing a damp sponge. Containers used for holding or transporting these species will be sanitized and will not contain any standing water.

- CDFW, NMFS and/or USFWS will be notified within 1 working day of the discovery of, injury to, or mortality of a listed species that results from project-related construction activities or is observed at the project site. Notification will include the date, time, and location of the incident or of the discovery of an individual listed species that is dead or injured. For a listed species that is injured, general information on the type or extent of injury will be included. The location of the incident will be clearly indicated on a U.S. Geological Survey 7.5-minute quadrangle and/or similar map at a scale that will allow others to find the location in the field, or as requested by CDFW, NMFS and/or USFWS. The biologist is encouraged to include any other pertinent information in the notification.
- Permanent and temporary construction disturbances and other types of ongoing project-related disturbance activities in suitable habitat for listed species will be minimized by adhering to the following activities.
 - Project designs will limit or cluster permanent project features to the smallest area possible while still permitting achievement of project goals.
 - To minimize temporary disturbances, all project-related vehicle traffic and material storage will be restricted to established and/or designated ingress/egress points, construction areas, and other designated staging/storage areas. These areas will be included in preconstruction surveys and, to the extent possible, will be established in locations disturbed by previous activities to prevent further effects.
 - To the extent possible, minimize effects to sensitive habitats outside of construction footprints. For example, in upstream areas, conduct aerial or boat pre-construction redd surveys downstream of construction areas and implement avoidance and minimization measures to limit potential effects, e.g., modification of work area, turbidity management (such as a sediment curtain), or placement of a gravel berm to redirect flow away from sensitive areas.
 - Upon completion of the project, all areas subject to temporary ground disturbance will be recontoured to preproject elevations, as appropriate and necessary, and revegetated with native vegetation to promote restoration of the area to preproject conditions. An area subject to “temporary” disturbance is any area that is disturbed to allow for construction of the project, but is not required for operation or maintenance of any project-related infrastructure, will not be subject to further disturbance after project completion, and has the potential to be revegetated. Appropriate methods and native plant species used to revegetate such areas will be determined on a site-specific basis in consultation with USFWS, NMFS, and/or CDFW, and biologists.
- Equipment will be inspected prior to arrival at the construction area, including the physical removal of plant seed and parts from equipment, and freezing equipment and saturation of equipment in chemical solution(s) to avoid the spread of invasive species such as zebra and quagga mussels, New Zealand mudsnails and Chytrid Fungus.

Mitigation Measure AQUA-3: Develop and Implement Program to Expand Adult Holding, Spawning, Egg Incubation, and Fry/Juvenile Rearing Habitat.

Reclamation will develop and implement a program to expand suitable adult holding, spawning, egg incubation, and fry/juvenile rearing habitat for Central Valley Spring-Run Chinook Salmon, Fall-/Late Fall-Run Chinook Salmon, and Central Valley Steelhead elsewhere in the Northwestern California Diversity Group. The program will be designed to prevent hybridization and improve genetic integrity of Spring-Run Chinook Salmon, and to improve spawning success, fry/juvenile survival, and production of all three species, thereby contributing to their recovery. Increases in Salmon and Steelhead production potential created by the program will equal or exceed the reduced production potential in Clear Creek that would result from cessation of the Clear Creek Restoration Program and reduced flows below Whiskeytown Dam. The program will be developed in coordination with and subject to approval by NMFS and CDFW.

Mitigation Measure AQUA-4: Erosion and Sediment Control Plan

An erosion and sediment control plan is typically required for ground-disturbing projects as part of the NPDES permitting process (U.S. Environmental Protection Agency 2007), depending on the size of the disturbed area. The proposed Phase II EPA rules would cover projects with greater than 1 acre of ground disturbance. Reclamation commits to implementing measures as described below as part of the construction activities and in advance of any necessary permit. In accordance with these environmental commitments, Reclamation will ensure the preparation and implementation of erosion and sediment control plans to control short-term and long-term erosion and sedimentation effects and to restore soils and vegetation in areas affected by construction activities. It is anticipated that multiple erosion and sediment control plans will be prepared for the construction activities included in the proposed action, each taking into account site-specific conditions such as proximity to surface water, erosion potential, drainage, etc. The plans will include all the necessary state requirements regarding erosion control and will implement BMPs for erosion and sediment control that will be in place for the duration of construction activities. These BMPs will be incorporated into the SWPPP.

The following erosion control measures will be included in the SWPPP.

- Install physical erosion control stabilization BMPs (hydroseeding with native seed mix, mulch, silt fencing, fiber rolls, sand bags, and erosion control blankets) to capture sediment and control both wind and water erosion. Erosion control may not utilize plastic monofilament netting or similar materials.
- Maintain emergency erosion control supplies onsite at all times during construction and direct contractor(s) to use these emergency stockpiles as needed. Ensure that supplies used from the emergency stockpiles are replaced within 48 hours. Remove materials used in construction of erosion control measures from the work site when no longer needed (property of the contractor).
- Design grading to be compatible with adjacent areas and result in minimal disturbance of the terrain and natural land features and minimize erosion in disturbed areas to the extent practicable.
- Divert runoff away from steep, denuded slopes, or other critical areas with barriers, berms, ditches, or other facilities.
- Retain native trees and vegetation to the extent feasible to stabilize hillsides, retain moisture, and reduce erosion.
- Limit construction, clearing of native vegetation, and disturbance of soils to areas of proven stability.

- Implement construction management and scheduling measures to avoid exposure to rainfall events, runoff, or flooding at construction sites to the extent feasible.
- Conduct frequent site inspections (before and after significant storm events) to ensure that control measures are intact and working properly and to correct problems as needed.
- Install drainage control features (e.g., berms and swales, slope drains) as necessary to avoid and minimize erosion.
- Install wind erosion control features (e.g., application of hydraulic mulch or bonded fiber matrix).

The following sediment control measures will be included in the SWPPP.

- Use sediment ponds, silt traps, wattles, straw bale barriers, or similar measures to retain sediment transported by onsite runoff.
- Collect and direct surface runoff at non-erosive velocities to the common drainage courses.
- When ground-disturbing activities are required adjacent to surface water, wetlands, or aquatic habitat, use of sediment and turbidity barriers, and implement measures for soil stabilization and revegetation of disturbed surfaces.
- Prevent mud from being tracked onto public roadways by installing gravel on primary construction ingress/egress points, and/or truck tire washing.
- Deposit or store excavated materials away from drainage courses and cover if left in place for more than 5 days or if storm events are forecast within 48 hours.

After construction is complete, site-specific restoration efforts will include grading, erosion control, and revegetation. Self-sustaining, local native plants that require little or no maintenance and do not create an extreme fire hazard will be used. All disturbed areas will be recontoured to preproject contours as feasible, and seeded with a native seed mix. Consideration will also be given to additional replacement of or upgrades to drainage facilities to avoid and minimize erosion. Paved areas damaged from use over and above ordinary wear-and-tear from lawful use by construction activities will be repaved to avoid erosion due to pavement damage.

Mitigation Measure AQUA-5: Spill Prevention, Containment, and Countermeasure Plan

As required by local, state, or federal regulations, Reclamation will require that construction contractors develop an SPCC plan for implementation at each site where ground-disturbing activities occur. Each SPCC plan will comply with the regulatory requirements of the Spill Prevention, Control, and Countermeasure Rule (40 Code of Federal Regulations [CFR] 112) under the Oil Pollution Act of 1990. This rule regulates non-transportation-related onshore and offshore facilities that could reasonably be expected to discharge oil into navigable waters of the United States or adjoining shorelines. The rule requires the preparation and implementation of site-specific SPCC plans to prevent and respond to oil discharges that could affect navigable waters. Each SPCC plan will address actions used to prevent spills in addition to specifying actions that will be taken should any spills occur, including emergency notification procedures. The SPCC plans will include the following measures and practices.

- Discharge prevention measures will include procedures for routine handling of products (e.g., loading, unloading, and facility transfers) (40 CFR 112.7(a)(3)(i)).

- Discharge or drainage controls will be implemented such as secondary containment around containers and other structures and equipment, and procedures for the control of a discharge (40 CFR 112.7(a)(3)(ii)).
- Countermeasures will be implemented for discharge discovery, response, and cleanup (both the facility's capability and those that might be required of a contractor) (40 CFR 112.7(a)(3)(iii)).
- Methods of disposal of recovered materials will comply with applicable legal requirements (40 CFR 112.7(a)(3)(iv)).
- Personnel will be trained in emergency response and spill containment techniques, and will also be made aware of the pollution control laws, rules, and regulations applicable to their work.
- Petroleum products will be stored in nonleaking containers at impervious storage sites from which an accidental spill cannot escape.
- Absorbent pads, pillows, socks, booms, and other spill containment materials will be stored and maintained at the hazardous materials storage sites for use in the event of an accidental spill.
- Watertight forms and other containment structures will be used to prevent spills or discharge of raw concrete, wash water, and other contaminants from entering surface waters and other sensitive habitats during overwater activities (e.g., casting of barge decks).
- Contaminated absorbent pads, pillows, socks, booms, and other spill containment materials will be placed in nonleaking sealed containers until transported to an appropriate disposal facility.
- When transferring oil or other hazardous materials from trucks to storage containers, absorbent pads, pillows, socks, booms, or other spill containment material will be placed under the transfer area.
- Refueling of construction equipment will occur only in designated areas that will be a minimum of 150 feet from surface waters and other sensitive habitats, such as wetlands.
- Equipment used in direct contact with water will be inspected daily for oil, grease, and other petroleum products. All equipment will be cleaned of external petroleum products prior to beginning work where contact with water may occur in order to prevent the release of such products to surface waters.
- Oil-absorbent booms will be used when equipment is used in or immediately adjacent to waters.
- All reserve fuel supplies will be stored only within the confines of a designated staging area, to be located a minimum of 150 feet from surface waters and other sensitive habitats, such as wetlands.
- Fuel transfers will take place a minimum of 150 feet from surface waters and other sensitive habitats, such as wetlands, and absorbent pads will be placed under the fuel transfer operation.
- Staging areas will be designed to contain contaminants such as oil, grease, fuel, and other petroleum products so that should an accidental spill occur they do not drain toward receiving waters or storm drain inlets.
- All stationary equipment will be staged in appropriate staging areas and positioned over drip pans.

- In the event of an accidental spill, personnel will identify and secure the source of the discharge and contain the discharge with sorbents, sandbags, or other material from spill kits and will contact appropriate regulatory authorities (e.g., National Response Center will be contacted if the spill threatens navigable waters of the United States or adjoining shorelines, as well as other appropriate response personnel).

Methods of cleanup may include the following.

- Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
- Mechanical methods could include the use of vacuum cleaning systems and pumps.
- Chemical methods include the use of appropriate chemical agents such as sorbents, gels, and foams.

Mitigation Measure AQUA-6: Disposal of Spoils and Dredged Material

In the course of constructing or operating project facilities, substantial quantities of material are likely to be removed from their existing locations based upon their properties or the need for excavation of particular features. Spoils refer to excavated native soils and are associated with construction of proposed new facilities. Dredged material refers to sediment removed from the bottom of a body of water for the purposes of in-water construction. The quantities of these materials generated by construction or operation of proposed facilities will vary based on various factors, such as location, topography, and structure being constructed. These materials will require handling, storage, and disposal, as well as chemical characterization. Storage areas are designated for these materials. Many of these materials will be suitable for reuse (e.g., as engineered fill or for purposes of habitat restoration), but such use is not part of the PA and projects using this material have not been identified.

Storage Area Determination

Spoils and dredged material will be stored in designated storage areas, with these locations to be provided by Reclamation during consultation with NMFS and USFWS.

The designated storage areas are sized to accommodate all material expected to be generated by the proposed action, i.e., it is assumed that none of that material will be reused, sold, or otherwise relocated under the proposed action. In practice, the area that will be needed for material storage will depend on several factors.

- The speed with which material is brought to the surface, stored, dried, tested, and moved to storage locations will be important in determining the final size of storage areas. If alternative end uses for the material can be identified and if those uses can be permitted within the timeframe of the proposed action (such permitting is not included in the proposed action, so separate authorizations would have to be obtained), then a smaller area may be needed for material storage.
- The depth to which the material is stacked. Material that is stored in deeper piles will require less area but may dry more slowly. Calculation of needed materials storage areas has assumed that materials would be placed in piles with a depth of six feet.

Storage Site Preparation

A portion of the storage sites selected for storage of spoils and dredged material will be set aside for topsoil storage. The topsoil will be saved for reapplication to disturbed areas postconstruction. Vegetative material from work site clearing will be chipped, stockpiled, and spread over the topsoil after earthwork is completed, when practicable and appropriate to do so and where such material does not contain seeds of undesirable nonnative species (i.e., nonnative species that are highly invasive and threaten the ecological function of the vegetation community to be restored in that location). Cleared areas will be grubbed as necessary to prepare them for grading or other construction activities. Rocks and other inorganic grubbed materials will be used to backfill borrow areas. The contractor will remove from the work site all debris, rubbish, and other materials not directed to be salvaged, and will dispose of them in an approved disposal site after obtaining all permits required.

Draining, Chemical Characterization, and Treatment

In instances of spoils and dredged material being deemed unsuitable for reuse, the material will be disposed of at a site for which disposal of such material is approved.

Hazardous materials excavated during construction will be segregated from other construction spoils and properly handled in accordance with applicable federal, state, and local regulations. Riverine or in-Delta sediment dredging and dredged material disposal activities may involve potential contaminant discharges not addressed through typical NPDES or SWRCB CGP processes. Construction of dredge material disposal sites will likely be subject to the SWRCB General Permit (Order No. 2009-0009-DWQ).

To better define potential effects to listed species or aquatic habitat, and to streamline the collection and incorporation of newer information (i.e., monitoring data or site-specific baseline information), the following protocol will be followed. Reclamation will work with State and Federal resource agencies with authorization and jurisdiction to identify the timeline for information gathering in relation to initiation of the specific action, but it is anticipated to be at least several months prior to the initiation of the action. At that time, Reclamation will follow the protocol below.

- Reclamation will ensure the preparation and implementation of a pre-dredge sampling and analysis plan (SAP). The SAP will be developed and submitted by the contractor(s) as part of the water plan required per standard DWR contract specifications (Section 01570). Prior to initiating any dredging activity, the SAP will evaluate the presence of contaminants that may affect water quality from the following discharge routes.
 - Instream discharges during dredging.
 - Direct exposure to contaminants in the material through ingestion, inhalation, or dermal exposure.
 - Effluent (return flow) discharge from an upland disposal site.
 - Leachate from upland dredge material disposal that may affect groundwater or surface water.
- Concentrations of the identified chemical constituents in the core samples will be screened through appropriate contaminant screening tables to ensure compliance with applicable agency guidelines.
- Results of the sediment analyses and the quality guidelines screening will determine the risk associated with the disturbance of the sediment horizons by identifying specific pathways of exposure to adverse effects.

- Results of the testing will be provided to all relevant State and Federal agencies for their use in monitoring or regulating the activities under consideration.
- If the results of the chemical analyses of the sediment samples indicate that one or more chemical constituents are present at concentrations exceeding screening criteria, then additional alternative protocols to further minimize or eliminate the release of sediments into the surrounding water column must be implemented.
- The applicant must provide to CDFW, NMFS and USFWS a plan to reduce or eliminate the release of contaminated sediment prior to the start of any actions that will disturb the sediments in the proposed construction area. Plans using a shrouded hydraulic cutterhead, or an environmentally sealed clamshell bucket may be acceptable provided that adequate supporting information is provided with the proposed plan. Plans should also include descriptions of the methods employed to treat, transport, and dispose of the contaminated sediment, as well as any resulting decant waters.

The following list of BMPs will be implemented during handling and disposal of any potentially hazardous dredged material.

- Conduct dredging within the allowable in-water work windows specified in Mitigation Measure AQUA-2 *Construction Best Management Practices*.
- Conduct dredging activities in a manner that will not cause turbidity in the receiving water, as measured in surface waters 300 feet down-current from the construction site, to exceed the Basin Plan objectives beyond an approved averaging period by the Central Valley Regional Water Quality Control Board and CDFW. Existing threshold limits in the Basin Plan for turbidity generation are as follows.
 - Where natural turbidity is between 0 and 5 NTUs, increases will not exceed 1 NTU.
 - Where natural turbidity is between 5 and 50 NTUs, increases will not exceed 20%.
 - Where natural turbidity is between 50 and 100 NTUs, increases will not exceed 10 NTUs.
 - Where natural turbidity is greater than 100 NTUs, increases will not exceed 10%.
- If turbidity generated during dredging exceeds implementation requirements for compliance with the Basin Plan objectives, silt curtains will be used to control turbidity. Exceptions to turbidity limits set forth in the Basin Plan may be allowed for dredging operations; in this case, an allowable zone of dilution within which turbidity exceeds the limits will be defined and prescribed in a discharge permit.
- The dredged material disposal sites will be designed to contain all of the dredged material. All systems and equipment associated with necessary return flows from the dredged material disposal site to the receiving water will be operated to maximize treatment of return water and optimize the quality of the discharge.
- The dredged material disposal sites will be designed by a registered professional engineer.
- The dredged material disposal sites will be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

- Two feet of freeboard above the 100-year flood event elevation will be maintained in all dredged material disposal site settling ponds at all times when they may be subject to washout from a 100-year flood event.
- Dredging equipment will be kept out of riparian areas and dredged material will be disposed of outside of riparian corridors.

Temporary storage sites will be constructed using appropriate BMPs such as erosion and sediment control measures (Mitigation Measure AQUA-4 *Erosion and Sediment Control Plan*) to prevent discharges of contaminated stormwater to surface waters or groundwater.

Once the excavated spoils or dredged material have been suitably dewatered, and as the constituents of the material will allow, it will be placed in either a lined or unlined storage area suitable for long-term storage. These long-term storage areas may be the same areas in which the material was previously dewatered or it may be a new area adjacent to the dewatering site. The storage areas will be created by excavating and stockpiling the native topsoil for future reuse. Once the area has been suitably excavated, and if a lined storage area is required, an impervious liner will be placed on the invert of the material storage area and along the interior slopes of the berms surrounding the pond. Due to the expected high groundwater tables at some storage areas, it is anticipated that there will be minimal excavation for construction of the long-term material storage areas. Additional features of the long-term material storage areas will include berms and erosion protection measures to contain storm runoff as necessary and provisions to allow for truck traffic during construction.

Mitigation Measure AQUA-7: Fish Rescue and Salvage Plan

Fish rescue operations will occur at any in-water construction site where dewatering and resulting isolation of fish may occur, or where fish exclusion netting is placed to exclude fish. Fish rescue and salvage plans will be developed by Reclamation or its contractors and will include detailed procedures for fish rescue and salvage to minimize the number of individuals of listed fish species subject to stranding during placement and removal of cofferdams or enclosure by exclusion netting. The plans will identify the appropriate procedures for removing fish from construction zones and preventing fish from reentering construction zones prior to dewatering and other construction activities. A draft plan will be submitted to the fish and wildlife agencies for review and approval. An authorization letter from NMFS, USFWS, and CDFW will be required before in-water construction activities with the potential for stranding fish can proceed.

Some construction activities may involve placement of cofferdams to isolate construction areas and minimize adverse effects to aquatic species and habitat during construction activities. However, these species can become trapped within the cofferdam and will need to be rescued or salvaged prior to dewatering. Although the following discussion focuses primarily on the application of this plan to cofferdam construction, the plan will also need to describe potential fish protection methods that may be implemented during other in-water activities with the potential to trap fish. For example, potential measures to exclude fish from active dredging areas may include deployment of silt curtains in a manner that directs fish away from the silt curtains and prevents fish from re-entering these areas during dredging operations. To the extent possible, fish will be gently encouraged (e.g., swept with seine nets; see below) to leave any areas that are scheduled to be dewatered or otherwise disturbed.

All fish rescue and salvage operations will be conducted under the guidance of a qualified fish biologist and in accordance with required permits. Each fish rescue plan will identify the appropriate procedures for excluding fish from the construction zones, and procedures for removing fish, should they become trapped. The primary procedure will be to block off the construction area and use seines (nets) and/or dip nets to collect and remove fish, although electrofishing techniques may also be authorized under certain conditions. It is critical that fish rescue and salvage operations begin as soon

as possible and be completed within 48 hours after isolation of a construction area to minimize potential predation and adverse water quality impacts (high water temperature, low dissolved oxygen) associated with confinement. In the case of cofferdam construction, the cofferdam will be installed to block off the construction area before fish removal activities occur. For other in-water construction activities, block nets or other temporary exclusion methods (e.g., silt curtains) could be used to exclude fish or isolate the construction area prior to the fish removal process. The appropriate fish exclusion or collection method will be determined by a qualified fish biologist, in consultation with a designated fish and wildlife agency biologist, based on site-specific conditions and construction methods. Capture, release, and relocation measures will be consistent with the general guidelines and procedures set forth in Part IX of the most recent edition of the *California Salmonid Stream Habitat Restoration Manual* (currently, California Department of Fish and Game [CDFG] 2010) to minimize impacts on listed species of fish and their habitat.

All fish rescue and salvage operations will be conducted under the guidance of a fish biologist meeting the qualification requirements discussed below in the section titled *Qualifications of Fish Rescue Personnel*. The following description includes detailed fish collection, holding, handling, and release procedures of the plan. Unless otherwise required by project permits, the construction contractor will provide the following:

- A minimum 7-day notice to the appropriate fish and wildlife agencies, prior to an anticipated activity that could result in isolating fish, such as installation of a cofferdam.
- A minimum 48-hour notice to the appropriate fish and wildlife agencies of dewatering activities that are expected to require fish rescue.
- Unrestricted access for the appropriate fish and wildlife agency personnel to the construction site for the duration of implementation of the fish rescue plan.
- Temporary cessation of dewatering if fish rescue workers determine that water levels may drop too quickly to allow successful rescue of fish.
- A work site that is accessible and safe for fish rescue workers.

Qualifications of Fish Rescue Personnel

Personnel active in fish rescue efforts will include at least one person with a 4-year college degree in fisheries or biology, or a related degree. This person also must have at least 2 years of professional experience in fisheries field surveys and fish capture and handling procedures. The person will have completed an electrofishing training course such as Principles and Techniques of Electrofishing (USFWS, National Conservation Training Center), or similar course, if electrofishing is used. In order to avoid and minimize the risk of injury to fish, attempts to seine and/or net fish will always precede the use of electrofishing equipment.

Seining and Dipnetting

Fish rescue and salvage operations will begin prior to or immediately after completing the cofferdam. For example, it may be necessary to herd fish from the construction area before installing the last sections of the cofferdam. Where larger areas are being enclosed by cofferdams, fish exclusion and/or rescue activities may need to be conducted incrementally in coordination with cofferdam placement to minimize the number of fish subjected to prolonged confinement and stressful conditions associated with crowding, capture, and handling. If the enclosed area is wadable (less than 3 feet deep), fish can be herded out of the cofferdam enclosure by dragging a seine (net) through the enclosure, starting from the enclosed end and continuing to the cofferdam opening. Depending on

conditions, this process may need to be conducted several times. After completing this fish herding process, the net or an exclusion screen will be positioned at the cofferdam opening to prevent fish from reentering the enclosure while the final section of the cofferdam is installed. The net or screen mesh will be no greater than 0.125 inch, with the bottom edge of the net (lead line) securely weighted down to prevent fish from entering the area by moving under the net. Screens will be checked periodically and cleaned of debris to permit free flow of water.

After installing the last sections of the cofferdam, remaining fish in the enclosed area will be removed using seines, dip nets, electrofishing techniques, or a combination of these depending on site conditions. If the water depth within the cofferdam is too deep to effectively remove fish using these methods, dewatering activities may be used to reduce the water level to an appropriate and safe depth (see *Contingency Plans*). Dewatering activities will also conform to the guidelines specified below (see *Dewatering*).

Following each sweep of a seine through the enclosure, the fish rescue team will do the following.

- Carefully bring the ends of the net together and pull in the wings, ensuring the lead line is kept as close to the substrate as possible.
- Slowly turn the seine bag inside out to reveal captured fish, ensuring fish remain in the water as long as possible before transfer to an aerated container.
- Follow the procedures outlined in the section titled *Electrofishing*, and relocate fish to a predetermined release site.

Dipnetting is best suited for very small, shallow pools in which fish are concentrated and easily collected. Dip nets will be made of soft (nonabrasive) nylon material and small mesh size (0.125 inch) to collect small fish.

Electrofishing

After conducting the herding and netting operations described above, electrofishing may be necessary to remove as many fish as possible from the enclosure. Electrofishing will be conducted in accordance with NMFS electrofishing guidelines (NMFS 2000) and other appropriate fish and wildlife agency guidelines. Electrofishing will be conducted by one or two 3- to 4-person teams, with each team having an electrofishing unit operator and two or three netters. At least three passes will be made through the enclosed cofferdam areas to remove as many fish as possible. Fish initially will be placed in 5-gallon buckets filled with river water. Following completion of each pass, the electrofishing team will do the following.

- Transfer fish into 5-gallon buckets filled with clean river water at ambient temperature.
- Hold fish in 5-gallon buckets equipped with a lid and an aerator, and add fresh river water or small amounts of ice to the fish buckets if the water temperature in the buckets becomes more than 2°F warmer than ambient river waters.
- Maintain a healthy environment for captured fish, including low densities in holding containers to avoid effects of overcrowding.
- Use water-to-water transfers whenever possible.
- Release fish at predetermined locations.
- Segregate larger fish from smaller fish to minimize the risk of predation and physical damage to smaller fish from larger fish.

- Limit holding time to about 10 minutes, if possible.
- Avoid handling fish during processing unless absolutely necessary. Use wet hands or dip nets if handling is needed.
- Handle fish with hands that are free of potentially harmful products, including but not limited to sunscreen, lotion, and insect repellent.
- Avoid anesthetizing or measuring fish.
- Note the date, time, and location of collection; species; number of fish; approximate age (e.g., young-of-the-year, yearling, adult); fish condition (dead, visibly injured, healthy); and water temperature.
- If positive identification of fish cannot be made without handling the fish, note this and release fish without handling.
- In notes, indicate the level of accuracy of visual estimates to allow appropriate reporting to the appropriate fish and wildlife agencies (e.g., “Approx. 10–20 young-of-the-year steelhead”).
- Release fish in appropriate habitat either upstream or downstream of the enclosure, noting release date, time, and location.
- Stop efforts and immediately contact the appropriate fish and wildlife agencies if mortality during relocation or the limits on take (harm or harassment) of federally listed species exceeds 5%.
- Place dead fish of listed species in sealed plastic bags with labels indicating species, location, date, and time of collection, and store them on ice.
- Freeze collected dead fish of listed species as soon as possible and provide the frozen specimens to the appropriate fish and wildlife agencies, as specified in the permits.
- Sites selected for release of rescued fish either upstream or downstream of the construction area will be similar in temperature to the area from which fish were rescued, contain ample habitat, and have a low likelihood of fish reentering the construction area or being impinged on exclusion nets/screens.

Dewatering

Dewatering will be performed in coordination with fish rescue operations as described above. A dewatering plan will be submitted as part of the SWPPP/Water Pollution Control Program detailing the location of dewatering activities, equipment, and discharge point. Dewatering pump intakes will be screened to prevent entrainment of fish in accordance with NMFS screening criteria for salmonid fry (NMFS 1997), including the following.

- Perforated plate: screen openings shall not exceed 3/32 inch (2.38 mm), measured in diameter.
- Profile bar: screen openings shall not exceed 0.0689 inch (1.75 mm) in width.
- Woven wire: screen openings shall not exceed 3/32 inch (2.38 mm), measured diagonally (e.g., 6–14 mesh).
- Screen material shall provide a minimum of 27% open area.

During the dewatering process, a qualified biologist or fish rescue team will remain onsite to observe the process and remove additional fish using the rescue procedures described above.

Contingency Plans

Where fish rescue and salvage operations cannot be conducted effectively or safely by fish rescue workers, it may be necessary to begin the dewatering process prior to fish rescue. During the dewatering process, a qualified biologist or fish rescue team will be onsite with the aim of minimizing the number of fish that become trapped in isolated areas or impinged on pump screen(s) or isolation nets, based on the professional judgment of the onsite fish biologist and the terms and conditions of the incidental take permit. In the event that the proposed methods are found to be insufficient to avoid undue losses of fish, the qualified biologist will modify these methods or implement alternative methods to minimize subsequent losses.

Final Inspections and Reporting

Upon dewatering to water depths at which neither electrofishing nor seining can effectively occur (e.g., less than 3 inches [0.1 meter]), the fish rescue team will inspect the dewatered areas to locate any remaining fish. Collection by dip net, data recording, and relocation will be performed as necessary according to the procedures outlined in the section titled, *Electrofishing*. The fish rescue team will notify the contractor when the fish rescue has been completed and construction can recommence. The results of the fish rescue and salvage operations (including date, time, location, comments, method of capture, fish species, number of fish, approximate age, condition, release location, and release time) will be reported to the appropriate fish and wildlife agencies, as specified in the pertinent permits.

Mitigation Measure AQUA-8: Underwater Sound Control and Abatement Plan

Reclamation will develop and implement an underwater sound control and abatement plan outlining specific measures that will be implemented to avoid and minimize the effects of underwater construction noise on listed species of fish, particularly the underwater noise effects associated with impact pile driving activities. Potential underwater noise effects on listed species from impact pile driving will be avoided and minimized by regulating the period during which impact pile driving is permitted and by controlling and/or abating underwater noise generated during impact pile driving.

The underwater sound control and abatement plan will be provided to the appropriate fish and wildlife agencies for their review and approval prior to implementation of any in-water impact pile driving activities. The plan will evaluate the potential effects of underwater noise on listed species of fish in the context of applicable and interim underwater noise thresholds established for disturbance and injury of fish (California Department of Transportation 2009). The thresholds include the following.

- Injury threshold for fish of all sizes includes a peak sound pressure level of 206 decibels (dB) relative to 1 micropascal.
- Injury threshold for fish less than 2 grams is 183 dB relative to 1 micropascal cumulative sound exposure level, and 187 dB relative to 1 micropascal cumulative sound exposure level for fish greater than or equal to 2 grams.
- Disturbance threshold for fish of all sizes is 150 dB root mean square relative to 1 micropascal.

The specific number of pilings that will be driven per day with an impact pile driver, and thus the number of pile strikes per day, will be defined as part of the design of project elements that require pilings.

The sound control and abatement plan will restrict in-water work to the in-water work windows specified in specified in Mitigation Measure AQUA-2 *Construction Best Management Practices*.

The underwater noise generated by impact pile driving will be abated using the best available and practicable technologies. Examples of such technologies include, but are not limited to, the use of cast-in-drilled-hole rather than driven piles; use of vibratory rather than impact pile driving equipment; using an impact pile driver to proof piles initially placed with a vibratory pile driver; noise attenuation using pile caps (e.g., wood or micarta), bubble curtains, air-filled fabric barriers, or isolation piles; or installation of piling-specific cofferdams. Specific techniques to be used will be selected based on site-specific conditions.

In addition to primarily using vibratory pile driving methods and establishing protocols for attenuating underwater noise levels produced during in-water construction activities, Reclamation will develop and implement operational protocols for when impact pile driving is necessary. These operational protocols will be used to minimize the effects of impact pile driving on listed species of fish. These protocols may include, but not be limited to, the following: monitoring the in-water work area for fish that may be showing signs of distress or injury as a result of pile driving activities and stopping work when distressed or injured fish are observed; initiating impact pile driving with a “soft-start,” such that pile strikes are initiated at reduced impact and increase to full impact over several strikes to provide fish an opportunity to move out of the area; restricting impact pile driving activities to specific times of the day and for a specific duration to be determined through coordination with the fish and wildlife agencies; and, when more than one pile driving rig is employed, ensure pile driving activities are initiated in a way that provides an escape route and avoids “trapping” fish between pile drivers in waters exposed to underwater noise levels that could potentially cause injury. These protocols are expected to avoid and minimize the overall extent, intensity, and duration of potential underwater noise effects associated with impact pile driving activities.

Mitigation Measure AQUA-9: Methylmercury Management

Tidal and other habitat restoration under the proposed action has the potential to result in increased availability of mercury, and specifically the bioavailable form methylmercury, to the foodweb in the Delta and river systems where restoration would occur. Due to the complex and very site-specific factors that will determine if mercury becomes mobilized into the foodweb, Mitigation Measure *AQUA-9 Methylmercury Management* is included to provide for site-specific evaluation for each restoration project. Mitigation Measure AQUA-9 will be implemented in coordination with other similar efforts to address mercury in the Delta and other waterways, and specifically with the DWR Mercury Monitoring and Analysis Section, as further described below.

This Mitigation Measure will promote the following actions.

- Assessment of pre-restoration conditions to determine the risk that the project could result in increased mercury methylation and bioavailability
- Definition of design elements that minimize conditions conducive to generation of methylmercury in restored areas
- Definition of strategies that can be implemented to monitor and minimize actual postrestoration creation and mobilization of methylmercury into environmental media and biota

The restoration design will always focus on the ecosystem restoration objectives and design elements to mitigate mercury methylation that will not interfere with restoration objectives. Design elements that help to mitigate mercury methylation will be integrated into site-specific restoration designs based on site conditions, community type (tidal marsh, nontidal marsh, floodplain, riverine habitats), and potential concentrations of mercury in pre-restoration sediments. Strategies to minimize postrestoration creation and mobilization of methylmercury can be applied where site conditions indicate a high probability of methylmercury generation and effects on listed species.

Implementation

Mitigation Measure AQUA-9 will be developed and implemented in coordination with the Sacramento-San Joaquin Delta Methylmercury Total Maximum Daily Load (Methylmercury TMDL) (Central Valley Regional Water Quality Control Board 2011a) and Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Methylmercury and Total Mercury in the Sacramento-San Joaquin Delta Estuary (Mercury Basin Plan Amendments)(Central Valley Regional Water Quality Control Board 2010 and 2011b). Mitigation Measure AQUA-9 will also be implemented to meet requirements of the U.S. Environmental Protection Agency (EPA) or the California Department of Toxic Substances Control actions.

The DWR Mercury Monitoring and Evaluation Section is currently working on DWR's compliance with the Methylmercury TMDL and Mercury Basin Plan Amendments. The Methylmercury TMDL programs are responsible for developing measures to control methylmercury generation and loading into the Delta in accordance with Methylmercury TMDL goals. Phase I emphasizes studies and pilot projects to develop and evaluate management practices to control methylmercury. Phase I (effective October 2011) will be underway for the next 7 years, with an additional 2 years to evaluate Phase I results and plan for Phase II. Phase II involves implementation of mercury control measures.

The DWR Mercury Monitoring and Evaluation Section is required as part of Phase I to submit final reports that present the results and descriptions of methylmercury control options, their preferred methylmercury controls, and proposed methylmercury management plan(s) (including implementation schedules) for achieving methylmercury allocations. Results will be integrated into Project-Specific Mercury Management Plans, which will be developed for each tidal wetland restoration project. The Plans will include the components listed below.

- A brief review of available information on levels of mercury expected in site sediments/soils based on proximity to sources and existing analytical data.
- A determination if sampling for characterization of mercury concentrations
- A plan for conducting the sampling, if characterization sampling is recommended.
- A determination of the potential for the restoration action to result in increased mercury methylation
- If a potential for increased mercury methylation under the restoration action is identified, the following will also be included:
 - Identification of any restoration design elements, mitigation measures, adaptive management measures that could be used to mitigate mercury methylation, and the probability of success of those measures, including uncertainties
 - Conclusion on the resultant risk of increased mercury methylation, and if appropriate, consideration of alternative restoration areas

Because methylmercury is an area of active research in the Delta and elsewhere in the Central Valley, each new project-specific methylmercury management plan will be updated based on the latest information about the role of mercury in Delta and other ecosystems or methods for its characterization or management. Results from monitoring of methylmercury in previous restoration projects will also be incorporated into subsequent project-specific methylmercury management plans.

In each of the project-specific methylmercury management plans developed under Mitigation Measure AQUA-9, relevant findings and mercury control measures identified as part of TMDL Phase I control studies will be considered and integrated into restoration design and management plans.

Mitigation Measure AQUA-10: Noise Abatement

In addition to the underwater sound control and abatement plan (Mitigation Measure AQUA-8), Reclamation and contractors hired to construct any components of proposed facilities will implement a noise abatement plan to avoid or reduce potential in-air noise impacts related to construction, maintenance, and operations. As applicable, the following components will be included in the plan.

Construction and Maintenance Noise

- To the extent feasible, the contractor will employ best practices to reduce construction noise during daytime and evening hours (7:00 a.m. to 10:00 p.m.) such that construction noise levels do not exceed 60 dBA (A-weighted decibel) L_{eq} (1 hour) at the nearest residential land uses.
- Limit construction during nighttime hours (10:00 p.m. to 7:00 a.m.) such that construction noise levels do not exceed 50 dBA L_{max} ¹ at the nearest residential land uses. Limit pile driving to daytime hours (7 a.m. to 7 p.m.).
- In the event of complaints by nearby residents due to construction noise generated during nighttime hours, the contractor will monitor noise levels intermittently between 10:00 p.m. to 7:00 a.m. at the property line of the nearest residential use. In the event that construction noise during nighttime hours exceeds 50 dBA L_{max} , the construction contractor will cease nighttime construction activity in the area until sound-attenuating mitigation measures, such as temporary sound walls, are implemented, and nighttime construction noise at the nearest residential use is reduced to a level of 50 dBA L_{max} or lower.
- Locate, store, and maintain portable and stationary equipment as far as possible from nearby residents.
- Employ preventive maintenance including practicable methods and devices to control, prevent, and minimize noise.
- Route truck traffic in order to reduce construction noise impacts and traffic noise levels at noise-sensitive land uses (i.e., places where people reside, schools, libraries, and places of worship).
- To the extent feasible, schedule construction activities so that the loudest noise events, such as blasting, occur during peak traffic commute hours.
- Limit offsite trucking activities (e.g., deliveries, export of materials) to the hours of 7:00 a.m. to 10:00 p.m. to minimize impacts on nearby residences.

Operation Noise

Facilities will be designed and constructed such that facility operation noise levels at nearby residential land uses do not exceed 50 dBA L_{eq} during daytime hours (7:00 a.m. to 10:00 p.m.) and 45 dBA L_{eq} during nighttime hours (10 p.m. to 7 a.m.). Acoustical measures such as terrain shielding,

¹ L_{max} is the maximum sound level measured for a given interval of time.

enclosures, and acoustical building treatments will be incorporated into the facility design to meet this performance standard.

Mitigation Measure AQUA-11: Hazardous Materials Management

Reclamation will ensure that each contractor responsible for site work under the proposed action will develop and implement a hazardous materials management plan (HMMP) before beginning construction. It is anticipated that multiple HMMPs will be prepared for the various construction sites, each taking into account site-specific conditions such as hazardous materials present onsite and known historical site contamination. A database on historical instances of contamination and results of any field inspections regarding the presence of hazardous chemicals will be maintained. The HMMPs will provide detailed information on the types of hazardous materials used or stored at all sites associated with the water conveyance facilities (e.g., intake pumping plants, maintenance facilities); phone numbers of applicable city, county, state, and federal emergency response agencies; primary, secondary, and final cleanup procedures; emergency-response procedures in case of a spill; and other applicable information. The HMMPs will include appropriate practices to reduce the likelihood of a spill of toxic chemicals and other hazardous materials during construction and facilities operation and maintenance. A specific protocol for the proper handling and disposal of hazardous materials will be established before construction activities begin and will be enforced by Reclamation.

The HMMPs will include, but not be limited to, the following measures or practices.

- Fuel, oil, and other petroleum products will be stored only at designated sites.
- Hazardous materials containment containers will be clearly labeled with the identity of the hazardous materials contained therein, handling and safety instructions, and emergency contact.
- Storage, use, or transfer of hazardous materials in or near wet or dry streams will be consistent with California Fish and Game Code (Section 5650) and/or with the permission of CDFW.
- Material Safety Data Sheets will be made readily available to the contractor's employees and other personnel at the work site.
- The accumulation and temporary storage of hazardous wastes will not exceed 90 days.
- Soils contaminated by spills or cleaning wastes will be contained and removed to an approved disposal site.
- Hazardous waste generated at work sites, such as contaminated soil, will be segregated from other construction spoils and properly handled, hauled, and disposed of at an approved disposal facility by a licensed hazardous waste hauler in accordance with state and local regulations. The contractor will obtain permits required for such disposal.
- Emergency spill containment and cleanup kits will be located at the facility site. The contents of the kits will be appropriate to the type and quantities of chemical or goods stored at the facility.

Mitigation Measure AQUA-12: Construction Site Security

To ensure adequate construction site security, Reclamation or their contractors will arrange to provide for 24-hour onsite security personnel. Security personnel will monitor and patrol construction sites, including staging and equipment storage areas. Security personnel will serve as the first line of defense against criminal activities and nuisances at construction sites. Private patrol security operators hired to provide site security will have the appropriate licenses from the California Bureau of Security

and Investigative Services. Individual security personnel will have a minimum security guard registration license that meets the California Bureau of Security and Investigative Services requirements for training and continuation training as required for that license. All security personnel will also receive environmental training similar to that of onsite construction workers so that they understand the environmental conditions and issues associated with the various areas for which they are responsible at a given time.

Security operations and field personnel will be given the emergency contact phone numbers of environmental response personnel for rapid response to environmental issues resulting from vandalism or incidents that occur when construction personnel are not onsite. Security operations will also maintain a contact list of backup support from city police, county sheriffs, California Highway Patrol, water patrols (such as the Contra Costa County Marine Patrol), helicopter response, and emergency response (including fire departments, ambulances/emergency medical technicians). The appropriate local and regional contact list will be made available to security personnel by Reclamation or their contractors, as will the means to make that contact via landline phones, mobile phones, or radios. When on patrol, security personnel will always have the ability to contact backup using mobile phones or two way radios. Security personnel who are on patrol will have the appropriate geographic contact list for their location and the ability to summon appropriate backup or response via the security patrol local dispatch site or outside authorities.

Mitigation Measure AQUA-13: Notification of Activities in Waterways

Similar to the requirements specified in the fish rescue and salvage plan (Mitigation Measure AQUA-7), and underwater sound control and abatement plan (Mitigation Measure AQUA-8), before in-water construction or maintenance activities begin, Reclamation will ensure notification of appropriate fish and wildlife agency representatives when these activities could affect water quality or aquatic species. The notification procedures will follow stipulations included in applicable permit documents for the construction operations. However, in general, the notification information will include site location(s), schedules, and work activities. Information on detours will include site-specific details regarding any temporary partial channel closures, including contacting the U.S. Coast Guard, boating organizations, marina operators, city or county parks departments, and the California Department of Pesticide Regulation, where applicable.

Mitigation Measure AQUA-14: Fugitive Dust Control

Reclamation or their contractors will implement basic and enhanced control measures at all construction and staging areas to reduce construction-related fugitive dust. Although the following measures are outlined in the Sacramento Metropolitan Air Quality Management District's (SMAQMD) CEQA guidelines, they are required for the entirety of the construction area, including areas within the Bay Area Air Quality Management District (BAAQMD), San Joaquin Valley Air Pollution Control District (SJVAPCD), and Yolo-Solano Air Quality Management District (YSAQMD), and are sufficient to address BAAQMD, SJVAPCD, and YSAQMD fugitive dust control requirements. Reclamation or their contractors will ensure the project commitments are appropriately implemented before and during construction, and that proper documentation procedure is followed.

Basic Fugitive Dust Control Measures

Reclamation or their contractors will take steps to ensure that the following measures will be implemented to the extent feasible to control dust during general construction activities.

- Water will be applied to all exposed surfaces as reasonably necessary to prevent visible dust from leaving work areas. Frequency will be increased during especially dry or windy periods or in

areas with a lot of construction activity. Exposed surfaces include (but are not limited to) soil piles, graded areas, unpaved parking areas, staging areas, and access roads.

- Cover or maintain at least 2 feet of freeboard space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that will be traveling along freeways or major roadways should be covered.
- Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeping is prohibited.
- Limit vehicle speeds on unpaved roads to 15 miles per hour.
- All roadway, driveway, sidewalk, and parking lot paving should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders, or other reasonable mitigation measures are used.

Enhanced Fugitive Dust Control Measures for Land Disturbance

Reclamation or their contractors will take steps to ensure that the following measures will be implemented to the extent feasible to control dust during soil disturbance activities.

- Water exposed soil with adequate frequency for continued moist soil. However, do not overwater to the extent that sediment flows off the site.
- Suspend excavation, grading, and/or demolition activity when wind speeds exceed 20 miles per hour.
- Install wind breaks (e.g., plant trees, solid fencing) on windward side(s) of construction areas.
- Plant vegetative ground cover (fast-germinating native grass seed) in disturbed areas as soon as possible after construction is completed. Water appropriately until vegetation is established.

Measures for Entrained Road Dust

Reclamation or their contractors will take steps to ensure that the following measures will be implemented to the extent feasible to control entrained road dust from unpaved roads.

- Install wheel washers for all exiting trucks, or wash off all trucks and equipment leaving the site.
- Treat site accesses to a distance of 100 feet from the paved road with a 6- to 12-inch layer of wood chips, mulch, or gravel to reduce generation of road dust and road dust carryout onto public roads.
- Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person will respond and take corrective action within 48 hours. The phone number of the air quality management district will also be visible to ensure compliance.

Measures for Concrete Batching

Reclamation or their contractors will take steps to ensure that the following measures will be implemented to the extent feasible to control dust during concrete batching activities.

- Implementation of fugitive dust control measures to achieve a 70% reduction in dust from concrete batching.

- Implementation of fugitive dust control measures to achieve an 80% reduction in dust from aggregate and sand pile erosion at the concrete batch plants.
Use of a hood system vented to a fabric filter/baghouse during cement delivery and hopper and central mix loading.

Mitigation Measure AQUA-15: Delta Smelt Monitoring

Reclamation will continue to monitor Delta Smelt as coordinated with the Interagency Ecological Program (IEP). This mitigation measure is applicable to Alternative 2 only.

Mitigation Measure AQUA-16: Longfin Smelt Monitoring

Reclamation will continue to monitor Longfin Smelt as coordinated with the Interagency Ecological Program (IEP).

E.10 Terrestrial Resources

Mitigation Measure BIO-1: Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp, Conservancy Fairy Shrimp, Longhorn Fairy Shrimp

Reclamation will avoid vernal pool crustacean habitat, including habitat for vernal pool fairy shrimp, vernal pool tadpole shrimp, conservancy fairy shrimp, and longhorn fairy shrimp with a minimum 250-foot nondisturbance buffer. Reclamation will either conduct protocol-level surveys to assess whether habitat is occupied or will assume presence of the species.

Reclamation will avoid affecting any of the primary constituent elements of critical habitat for vernal pool fairy shrimp or vernal pool tadpole shrimp within designated critical habitat units.

Mitigation Measure BIO-2: Valley Elderberry Longhorn Beetle**Suitable Habitat**

Valley elderberry longhorn beetle habitat is defined as elderberry shrubs within the study area. Elderberry shrubs in the study area could be found in riparian areas, along levee banks, grasslands, and in agricultural settings where vegetation is not being maintained (e.g., fence rows, fallow fields).

Avoidance and Minimization

Activities will be located to avoid or minimize disturbance of valley elderberry longhorn beetle suitable habitat within the species' range to the greatest extent practicable.

Reclamation will avoid valley elderberry longhorn beetle critical habitat during implementation of the project components.

Complete avoidance (i.e., no adverse effects) may be assumed when elderberry shrubs are not present or within a 165-foot buffer of the activity. USFWS will be consulted before any disturbances, including construction, within the 165-foot buffer area if it contains elderberry shrubs and/or riparian habitat.

Preconstruction surveys for elderberry shrubs will be conducted within all project construction footprints and areas within 165 feet by a biologist familiar with the appearance of valley elderberry longhorn beetle exit holes in elderberry shrubs. When possible, preconstruction surveys will be conducted in the calendar year prior to disturbance and will follow the guidance of USFWS's

Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (USFWS 2017), herein referred to as the 2017 VELB Framework.

For elderberry shrubs not directly affected by construction but that occur between 20 feet and 165 feet from ground-disturbing activities, the following measures will be implemented.

- All areas to be avoided during construction activities will be fenced and/or flagged as close to construction limits as feasible.
- Activities that may damage or kill an elderberry shrub (e.g., trenching, paving, etc.) may need an avoidance area of at least 20 feet (6 meters) from the drip-line, depending on the type of activity.
- A qualified biologist will provide training for all contractors, work crews, and any onsite personnel on the status of the valley elderberry longhorn beetle, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for noncompliance.
- A qualified biologist will monitor the work area at project-appropriate intervals to assure that all avoidance and minimization measures are implemented. The amount and duration of monitoring will depend on the project specifics and should be discussed with the USFWS biologist.
- As much as feasible, all activities that could occur within 165 feet (50 meters) of an elderberry shrub will be conducted outside of the flight season of the valley elderberry longhorn beetle (March to July).
- Trimming may remove or destroy valley elderberry longhorn beetle eggs and/or larvae and may reduce the health and vigor of the elderberry shrub. To avoid and minimize adverse effects to valley elderberry longhorn beetle, trimming will occur between November and February and will avoid the removal of any branches or stems that are greater than or equal to 1 inch in diameter. Measures to address regular and/or large-scale maintenance (trimming) should be established in consultation with the USFWS.
- Herbicides will not be used within the drip-line of the shrub. Insecticides will not be used within 98 feet (30 meters) of an elderberry shrub. All chemicals will be applied using a backpack sprayer or similar direct application method.
- Mechanical weed removal within the drip-line of the shrub will be limited to the season when adults are not active (August to February) and will avoid damaging the elderberry.
- Erosion control will be implemented, and the affected area will be revegetated with appropriate native plants.
- The potential effects of dust on valley elderberry longhorn beetle will be minimized by applying water during construction activities or by presoaking work areas that will occur within 100 feet of any potential elderberry shrub habitat. Elderberry shrubs with stems greater than 1 inch that are directly affected by construction should be transplanted under the following conditions:
 - If the elderberry shrub cannot be avoided.
 - If indirect effects will result in the death of stems or the entire shrub.

The removal of the elderberry shrub may either include the roots or just the removal of the aboveground portion of the plant. When possible, the entire root ball will be retained and the elderberry shrub will be transplanted as close as possible to its original location. Elderberry shrubs will be relocated adjacent to the project footprint if (1) the planting location is suitable for elderberry

growth and reproduction; and (2) the project proponent is able to protect the shrub and ensure that the shrub becomes reestablished. If these criteria cannot be met, the shrub may be transplanted to an appropriate USFWS-approved mitigation site. Any elderberry shrub that is unlikely to survive transplanting because of poor condition or location, or a shrub that would be extremely difficult to move because of access problems, may not be appropriate for transplanting. The following transplanting guidelines may be used by agencies/applicants in developing their valley elderberry longhorn beetle conservation measures:

- A qualified biologist will be onsite for the duration of transplanting activities to ensure compliance with avoidance and minimization measures and other conservation measures.
- Exit-hole surveys will be completed immediately before transplanting. The number of exit holes found, GPS location of the plant to be relocated, and the GPS location of where the plant is transplanted will be reported to the USFWS and to the CNDDDB.
- Elderberry shrubs will be transplanted when the shrubs are dormant (November through the first 2 weeks in February) and after they have lost their leaves. Transplanting during the nongrowing season will reduce shock to the shrub and increase transplantation success.
- Transplanting will follow the most current version of the ANSI A300 (Part 6) guidelines for transplanting (<http://www.tcia.org/>).
- Trimming will occur between November and February and should minimize the removal of branches or stems that exceed 1 inch in diameter.

Compensation for Unavoidable Effects

Reclamation will coordinate with the USFWS to offset unavoidable impacts on elderberry shrubs by either creating valley elderberry longhorn beetle habitat or by purchasing the equivalent credits at a USFWS-approved conservation bank with a service area that overlaps with the study area.

Compensatory mitigation will be coordinated with the USFWS to determine the appropriate type and amount of compensatory mitigation and follow criteria in the 2017 VELB Framework. These guidelines recommend that the permanent loss of valley elderberry longhorn beetle habitat be replaced with habitat that is commensurate with the type (riparian or nonriparian) and amount of habitat lost. For plants in riparian areas, compensation may be appropriate for any impacts to valley elderberry longhorn beetle habitat. In nonriparian areas, compensation may be appropriate for occupied shrubs. Suitable riparian habitat may be replaced at a minimum ratio of 3:1 for all acres that will be permanently affected by the project. Suitable nonriparian habitat may be replaced at a minimum ratio of 1:1 for all acres that will be permanently affected by the project. Impacts on individual shrubs in riparian areas may be replaced by the purchase of two credits (one credit = 1,800 square feet) at a USFWS-approved bank for each shrub that will be trimmed regardless of the presence of exit holes. If the shrub will be completely removed by the activity, the entire shrub may be transplanted to a USFWS-approved location in addition to the credit purchase. Impacts on individual shrubs in nonriparian areas be replaced through a purchase of 1 credit at a USFWS-approved bank for each shrub that will be trimmed if exit holes have been found in any shrub on or within 165 feet of the project. If the shrub will be completely removed by the activity, the entire shrub will be transplanted to a USFWS-approved location in addition to a credit purchase. These ratios may apply if compensation occurs prior to or concurrent with the impacts. If compensation occurs after the impacts, a higher ratio may be required by USFWS. Appropriate compensatory mitigation may include purchasing credits at a USFWS-approved conservation bank, providing onsite mitigation, or establishing and/or protecting habitat for valley elderberry longhorn beetle.

Mitigation Measure BIO-3: California Tiger Salamander and Western Spadefoot Toad

For restoration projects and construction of the Conservation Hatchery, Reclamation will avoid California tiger salamander and western spadefoot toad upland and aquatic habitat. Reclamation will avoid affecting any of the primary constituent elements of critical habitat for California tiger salamander within designated critical habitat units.

Mitigation Measure BIO-4: Foothill Yellow-Legged Frog

Species-specific mitigation for foothill yellow-legged frog will only be required for projects occurring within or adjacent to suitable habitat as identified by assessments conducted during the project component planning phase. A qualified biologist will conduct a field evaluation for foothill yellow-legged frog for all project activities that occur within suitable habitat.

Prior to any ground-disturbing activity scheduled to occur during the dry season (June 1–October 15), a qualified biologist will survey potential breeding habitat for the presence of foothill yellow-legged frogs using methods from the *Draft Visual Encounter Survey Protocol for Rana boylei in Lotic Environments* (Peek et al. 2017) or other more recent guidelines, if available. Surveys will be conducted no more than 30 days before the start of ground-disturbing activities and will be spatially phased to precede construction activities. Avoidance and minimization measures, including moving individuals to nearby ponds or other appropriate measures, will be implemented with authorizations issued under the California Endangered Species Act (CESA).

Compensation for Unavoidable Effects

Reclamation will provide compensatory mitigation for unavoidable permanent impacts on habitat for foothill yellow-legged frog. Impacts on occupied or presumed occupied aquatic habitat will be compensated for at a ratio of 3:1 for breeding and foraging habitat.

Mitigation Measure BIO-5: Giant Garter Snake**Avoidance and Minimization Measures**

Species-specific mitigation for giant garter snake will be required only for projects occurring within or adjacent to suitable habitat, as identified by assessments conducted during the project component planning phase. A qualified biologist will conduct a field evaluation of suitable upland or aquatic habitat for giant garter snake for all covered activities that occur within suitable giant garter snake habitat.

If the project does not fully avoid effects on suitable habitat, the following measures will be required:

- Initiate construction between May 1 and October 1 within suitable giant garter snake upland habitat, which corresponds with the snake's active period. Work in giant garter snake upland habitat may also occur between October 2 and November 1 or between April 1 and May 1 if ambient temperatures exceed 75 degrees Fahrenheit (°F) during construction activities and maximum daily temperatures have exceeded 75°F for a least 3 consecutive days immediately preceding work. During these periods, giant garter snakes are more likely to be active in aquatic habitats and less likely to be found in upland habitats. To the extent practicable, conduct all activities within paved roads, farm roads, road shoulders, and similarly disturbed and compacted areas; confine ground disturbance and habitat removal to the minimum area necessary to facilitate construction activities. For construction activities and any conveyance facility maintenance involving heavy equipment, giant garter snake aquatic and upland habitat that can be avoided will

be clearly delineated on the work site, with high-visibility fencing and signage identifying these areas as sensitive. The fencing will be installed before equipment is moved onsite and before any ground-disturbing activities begin. The purpose of the fencing is to prevent construction activities from encroaching into sensitive habitat areas and not intended to exclude animals. To minimize the potential for snakes and other ground-dwelling animals to be caught in the construction fencing, the fencing will be placed with at least a 6-inch gap between the ground and the bottom of the fencing to allow animals to pass under.

- All construction personnel and personnel involved in operations and maintenance in or near giant garter snake habitat will attend worker environmental awareness training (as described in Appendix O, *Aquatic Resources Technical Appendix*). This training will include instructions to workers on how to recognize giant garter snakes, their habitat(s), and the nature and purpose of protection measures.
- Within 24 hours prior to construction activities or maintenance activities requiring heavy equipment within giant garter snake habitat, a USFWS-approved biologist will survey all areas planned for disturbance and at least 50 feet outside the disturbance area where giant garter snake could be present. The surveyor will inspect all burrows, soil cracks, and crevices that could be used by giant garter snake. To the extent that these habitat features can be avoided within the work area, they will be flagged, and the locations will be provided to the biological monitor. This survey of the work area will be repeated if a lapse in construction activity of 2 weeks or greater occurs during the giant garter snake inactive period (October 1 to May 1) or if the lapse in construction activity is more than 12 hours during the active period (May 1 to October 1). If a giant garter snake is encountered during surveys or construction, activities will cease until appropriate corrective measures have been completed, it has been determined that the giant garter snake will not be harmed, or the giant garter snake has left the work area.
- For all construction activities that occur in giant garter snake habitat that could result in injury or mortality of snakes (e.g., movement of heavy equipment; excavation of soil, rock, or existing structures; grading; vegetation removal), a USFWS-approved biologist will be present to monitor these activities. As work is performed, the biologist will visually scan work areas, under equipment, and excavated materials for giant garter snakes. The biologist will also help guide access and construction work around wetlands, active rice fields, and other sensitive habitats capable of supporting giant garter snake to minimize habitat disturbance and risk of injuring or killing giant garter snakes.
- Report all observations of giant garter snakes to the USFWS-approved biological monitor. If a giant garter snake is observed in the work area, the monitor will have the authority to stop work in the immediate vicinity of the snake. If possible, the snake will be allowed to leave the work area on its own volition and the monitor will remain in the area until the snake is safely out of harm's way. A giant garter snake may be captured and relocated out of the work area with prior authorization from USFWS and by an individual with the appropriate handling permit. The snake will be relocated to suitable habitat at least 200 feet from the work area.
- Maintain all construction and operations and maintenance equipment to prevent leaks of fuel, lubricants, and other fluids and use extreme caution when handling and or storing chemicals (such as fuel and hydraulic fluid) near waterways, and abide by all applicable laws and

regulations. Follow all applicable hazardous waste BMPs and keep appropriate materials onsite to contain, manage, and clean up any spills.

- Conduct service and refueling procedures in uplands in staging areas and at least 200 feet away from waterways when practicable.
- During construction and operation and maintenance activities in and near giant garter snake habitat, employ erosion (non-monofilament silt fence), sediment, material stockpile, and dust control BMPs. Avoid using fill or allowing runoff into wetland areas or waterways to the extent practicable.
- Return temporary work areas to pre-existing contours and conditions upon completion of work. Where revegetation and soil stabilization are necessary in nonagricultural habitats, revegetate with appropriate noninvasive native plants at a density and structure similar to that of preconstruction conditions. Restoration of aquatic vegetation in giant garter snake aquatic habitat and annual grassland within giant garter snake upland habitat will be detailed in a mitigation and monitoring plan that will be reviewed and approved by USFWS prior to the start of construction. Habitat will be restored within one season (defined as May 1 to October 1).
- Properly contain and remove from the worksite all trash and waste items generated by construction and crew activities to prevent the encouragement of predators such as raccoons and coyotes from occupying the site.
- Permit no pets, campfires, or firearms at the worksite.
- Store equipment in designated staging area areas at least 200 feet away from giant garter snake aquatic habitat to the extent practicable.
- Confine any vegetation clearing to the minimum area necessary to facilitate construction activities.
- Limit vehicle speed to 10 miles per hour (mph) on access routes (except for public roads and highways) and within work areas that are within 200 feet of giant garter snake aquatic habitat but not protected by exclusion fencing to avoid running over giant garter snakes.
- Visually check for giant garter snake under vehicles and equipment prior to moving them. Cap all onsite materials (conduits, pipe, etc.), precluding wildlife from becoming entrapped. Check any crevices or cavities in the work area where individuals may be present including stockpiles that have been left for more than 24 hours where cracks or crevices may have formed.
- For proposed activities that will occur within suitable aquatic giant garter snake habitat during the active giant garter snake season (May 1 through October 1), prior to proposed construction activities that will commence during the inactive period, and when unavoidable, all aquatic giant garter snake habitat will be dewatered for at least 14 days prior to excavating or filling the dewatered habitat. Dewatering is necessary because aquatic habitat provides prey and cover for giant garter snake; dewatering serves to remove the attractant and increase the likelihood that giant garter snake will move to other available habitat. Any deviation from this measure will be done in coordination with, and with approval of, the USFWS.
- Following dewatering of aquatic habitat, all potential affected areas that provide suitable aquatic or upland giant garter snake habitat will be surveyed for giant garter snake by the USFWS-approved biologist. If giant garter snakes are observed, they will be passively allowed to leave the

area, or the USFWS will be consulted to determine the appropriate course of action for removing giant garter snake from the area.

Maintenance activities such as vegetation and rodent control, embankment repair, and channel maintenance will occur at conveyance facilities with permanent structures and at conveyance facility and restoration sites with flexible locations (e.g., transmission line right of ways, restoration locations, etc.). The following avoidance and minimization measures will be applied to maintenance activities in suitable aquatic habitat and uplands within 200 feet of suitable aquatic habitat, to minimize effects on the giant garter snake:

- Vegetation control will take place during the active period (May 1 through October 1) when snakes are able to move out of areas of activity.
- Trapping or hunting methods will be used for rodent control rather than poison bait. All rodent control methods will be approved by USFWS. If trapping or other nonpoison methods are ineffective, the USFWS will be consulted to determine the best course of action.
- Movement of heavy equipment will be confined to outside 200 feet of the banks of giant garter snake aquatic habitat to minimize habitat disturbance.
- All construction personnel and personnel involved in operations and maintenance in or near giant garter snake habitat will attend worker awareness training (as described in Appendix O). This training will include instructions to workers on how to recognize giant garter snakes, their habitat, and the nature and purpose of protection measures.

Compensation for Unavoidable Effects

Where giant garter snake habitat cannot be avoided, compensation for the permanent loss of the habitat will occur at a rate of 3:1 for aquatic and upland habitat.

Mitigation Measure BIO-6: Western Pond Turtle

Species-specific mitigation for western pond turtle will only be required for projects occurring within or adjacent to suitable habitat as identified by assessments conducted during the project component planning phase. A qualified biologist will conduct a field evaluation of suitable upland or aquatic habitat for western pond turtles for all covered activities that occur within suitable pond turtle habitat.

If the project does not fully avoid effects on suitable habitat, the following measures will be required.

- The project proponent will retain a qualified wildlife biologist to conduct a preconstruction survey within 48 hours of disturbance in aquatic and riparian habitats to determine presence or absence of pond turtles in the construction work area.
- If possible, the surveys will be timed to coincide with the time of day and year when turtles are most likely to be basking and visible (during the cooler part of the day, 8:00 a.m. to 12:00 p.m., during spring, summer, and late summer). Prior to conducting presence/absence surveys the biologist will locate the microhabitats for turtle basking (logs, rocks, brush thickets) and determine a location to quietly observe turtles.
- Each survey will include a 30-minute wait time after arriving at the site to allow startled turtles to return to open basking areas. The survey will consist of a minimum 15-minute observation time per area where turtles could be observed.

- If turtles are observed during a survey, they will be relocated outside of the construction area to appropriate aquatic habitat by a biologist.

Mitigation Measure BIO-7: California Black Rail

Preconstruction surveys for California black rail will be conducted where potentially suitable habitat for this species occurs within 500 feet of work areas where access is available. Potentially suitable habitat includes tidal and nontidal seasonal or perennial wetlands at least 2 acres in size with any kind of vegetation types consistent with black rail use in the Delta, as determined by field evaluations conducted by a qualified biologist with experience surveying for black rail, over 10 inches high, whether or not the patch in question was mapped as modeled habitat. Surveys will be initiated sometime between January 15 and February 1. A minimum of four surveys will be conducted. The survey dates will be spaced at least 2 to 3 weeks apart and will be scheduled so that the last survey is conducted no more than 2 weeks before April 15. This will allow the surveys to encompass the time period when the highest frequency of calls is likely to occur. These surveys will involve the following protocols (based on Evens et al. 1991), or other approved survey methodologies that may be developed using new information and best-available science, and will be conducted by biologists with the qualifications stipulated in the approved methodologies.

- Listening stations will be established at 300-foot intervals throughout potential black rail habitat that will be affected by covered activities. Listening stations will be placed along roads, trails, and levees to avoid trampling.
- California black rail vocalization recordings will be played at each station, and playing will cease immediately once a response is detected.
- Each listening station will be occupied for 6 minutes, including 1 minute of passive listening, 1 minute of “grr” calls followed by 30 seconds of “ki-ki-krrr” calls, then followed by another 3.5 minutes of passive listening.
- Each survey will include a survey at sunrise and a survey at sunset.
- Sunrise surveys will begin 60 minutes before sunrise and conclude 75 minutes after sunrise (or until presence is detected).
- Sunset surveys will begin 75 minutes before sunset and conclude 60 minutes after sunset (or until presence is detected).
- Surveys will not be conducted when tides are greater than National Geodetic Vertical Datum or when sloughs and marshes are more than bank-full.
- California black rail vocalizations will be recorded on a data sheet. A GPS receiver and compass will be used to identify surveys stations, angles to call locations, and call locations and distances. The call type, location, distance from listening station, and time will be recorded on a data sheet.

The project will be implemented in a manner that will not result in take of California black rail, as defined by Section 86 of the California Fish and Game Code. If California black rail is present in the immediate construction area, the following measures will apply during construction activities:

- To avoid the loss of individual California black rails, activities within 500 feet of potential habitat will not occur within 2 hours before or after extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge). During high tide, protective cover for California black rail is sometimes limited, and activities could prevent them from reaching available cover.

- To avoid the loss of individual California black rails, activities within 500 feet of tidal marsh areas and managed wetlands will be avoided during the rail breeding season (February 1 to August 31), unless surveys are conducted to determine that no rails are present within the 500-foot buffer.
- If breeding California black rail is determined to be present, activities will not occur within 500 feet of an identified calling center (unless a qualified biologist determines that a smaller distance will not result in the take of the state-listed species). If the intervening distance between the rail calling center and any activity area is greater than 200 feet and across a major slough channel or substantial barrier (e.g., constructed noise barrier) it may proceed at that location within the breeding season.
- If California black rail are determined to be present in habitat that must be disturbed, vegetation will be removed during the nonbreeding season (September 1 to January 31) to encourage them to leave the area. Vegetation removal will be completed carefully using hand tools or vegetation removal equipment that is approved by a biologist. The biologist will search vegetation immediately in front of the removal equipment, and will stop removal if rails are detected. Vegetation removal will resume when the black rail leaves the area.
- If construction activities require removal of potential California black rail habitat, whether or not black rails have been detected there, vegetation will be removed during the nonbreeding season (September 1 to January 31). Vegetation removal will be completed carefully using hand tools or vegetation removal equipment that is approved by a biologist. The biologist will search vegetation immediately in front of the removal equipment, and will stop removal if rails are detected. Vegetation removal will resume when the rail leaves the area.
- Exception: Inspection, maintenance, or nonconstruction monitoring activities may be performed during the California black rail breeding season (February 1 to August 31) in areas within or adjacent to breeding habitat (within 500 feet) with CDFW approval and under the supervision of a permitted, approved biologist.
- If the construction footprint is within 500 feet of a known calling center, noise reduction structures such as temporary noise reducing walls, will be installed at the edge of construction footprint, as determined by an onsite biologist. Noise-causing construction will begin during the nonbreeding season (September 1 to January 31) so that rails can acclimate to noise and activity prior to initiating nests.

Mitigation Measure BIO-8: California Ridgway's Rail

If construction or restoration activities are necessary during the breeding season, preconstruction surveys for California Ridgway's rail will be conducted where suitable habitat for these species occurs within or adjacent to work areas. Surveys will be initiated sometime between January 15 and February 1. A minimum of four surveys will be conducted. The survey dates will be spaced at least 2 to 3 weeks apart and will cover the time period from the date of the first survey through the end of March and mid-April. This will allow the surveys to encompass the time period when the highest frequency of calls is likely to occur. These surveys will involve the following protocols (based on USFWS 2015 and Evens et al. 1991), or other approved survey methodologies that may be developed based on new information and evolving science, and will be conducted by biologists with the qualifications stipulated in the approved methodologies.

- Listening stations will be established at 200-meter intervals along roads, trails, and levees that will be affected by covered activities.
- California Ridgway's rail vocalization recordings will be played at each station, and playing will cease immediately once a response is detected.
- For California Ridgway's rail, each listening station will be occupied for a period of 10 minutes, followed by 1 minute of playing California Ridgway's rail vocalization recordings, then followed by an additional minute of listening.
- Sunrise surveys will begin 60 minutes before sunrise and conclude 75 minutes after sunrise (or until presence is detected).
- Sunset surveys will begin 75 minutes before sunset and conclude 60 minutes after sunset (or until presence is detected).
- Surveys will not be conducted when tides are greater than 4.5 National Geodetic Vertical Datum or when sloughs and marshes are more than bank-full.
- California Ridgway's rail vocalizations will be recorded on a data sheet. A GPS receiver and compass will be used to identify surveys stations, angles to call locations, and call locations and distances. The call type, location, distance, and time will be recorded on a data sheet.

If California Ridgway's rail is present in the immediate construction area, the following measures will apply during construction activities.

- To avoid the loss of individual California Ridgway's rails, activities within or adjacent to the species' habitat will not occur within 2 hours before or after extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge), when the marsh plain is inundated. During high tide, protective cover for California Ridgway's rail is sometimes limited, and activities could prevent them from reaching available cover.
- To avoid the loss of individual California Ridgway's rails, activities within or adjacent to tidal marsh areas will be avoided during the rail breeding season (February 1 through August 31), unless surveys are conducted to determine rail locations and territories can be avoided.
- If breeding California Ridgway's rail are determined to be present, activities will not occur within 500 feet of an identified calling center (unless a qualified biologist determines that a smaller distance will not result in the take of the state-listed species). If the intervening distance is across a major slough channel or across a substantial barrier between the rail calling center and any activity area is greater than 200 feet, it may proceed at that location within the breeding season.
- Exception: Inspection, maintenance, or nonconstruction monitoring activities may be performed during the California Ridgway's breeding season in areas within or adjacent to breeding habitat (within 500 or 200 feet, as specified above) as long as a qualified biologist determines the action will not result in take. These activities will be conducted under the supervision of a qualified, permitted biologist.

Mitigation Measure BIO-9: Greater and Lesser Sandhill Crane

If construction and restoration activities are to occur during sandhill crane wintering season (September 15 through March 15) in a greater sandhill crane winter use area or within suitable lesser

sandhill crane wintering habitat, the following avoidance and minimization measures will be implemented.

- Construction will be minimized during the sandhill crane wintering season to the extent practicable in light of project schedule and cost and logistical considerations.
- To the extent feasible, construction that cannot be completed prior to commencement of the wintering season will be started before September 15 or after March 15, such that no new sources of noise or other major disturbance that could affect cranes will be introduced after the cranes arrive at their wintering grounds.
- Preconstruction surveys will be conducted for sandhill crane temporary and permanent roost sites within 0.75 mile of the construction area boundary where access is available. Surveys will be conducted during the winter prior to project implementation, over multiple days within the survey area by a qualified biologist with experience observing the species. Alternatively, roost sites within 0.75 mile of the construction area boundary can be identified by a qualified sandhill crane biologist familiar with roost sites. If a sandhill crane roost site is located within 0.75 mile of the construction area boundary, then to the extent practicable, nighttime (1 hour before sunset to 1 hour after sunrise) project activities will be relocated to maintain a 0.75-mile nondisturbance buffer.
- Route truck traffic to reduce headlight impacts in roosting habitat.
- Install light barriers to block the line-of-sight between the nearest roosting areas and the primary nighttime construction light source areas.
- Operate portable lights near roosting habitat at the lowest allowable wattage and height, while in accordance with the National Cooperative Highway Research Program's (NCHRP's) *Report 498: Illumination Guidelines for Nighttime Highway Work*.
- Screen all lights and direct them down toward work activities and away from the night sky and nearby roost sites. A biological construction monitor will ensure that lights are properly directed at all times.
- Limit the number of nighttime lights used to the greatest extent practicable in light of worker safety requirements.
- If restoration takes place near Stone Lake NWR, install a vegetation screen or other noise and visual barrier along the south side of Hood Franklin Road along the length of Stone Lake NWR's property to reduce disturbance to sandhill cranes. The noise and visual barrier will be a minimum of 5 feet high (above the adjacent elevated road, if applicable) and will provide a continuous surface impenetrable by light. This height may be obtained by installing a temporary structure, such as fencing (e.g., chain link with privacy slats) or a semipermanent structure, such as a concrete barrier (e.g., a roadway median barrier or architectural concrete wall system) retrofitted with an approved visual screen, if necessary, to meet the required height. This barrier will not be installed immediately adjacent to crane foraging habitat, and placement will be coordinated with a qualified crane biologist.

Mitigation Measure BIO-10: Least Bell's Vireo

Species-specific mitigation measures for least Bell's vireo will be required for activities occurring within suitable habitat within the species' range. Prior to disturbing an area potentially supporting habitat for the species, a USFWS approved biologist will evaluate the area to identify suitable habitat.

Activities will be located to avoid or minimize disturbance of least Bell's vireo suitable habitat within the species' range. The following measures will be required for project components unable to avoid least Bell's vireo habitat:

- Prior to construction, all suitable least Bell's vireo habitat within the species' range in the construction area will be surveyed.
- At least five surveys will be conducted in suitable habitats within 30 days of the onset of construction, with the last survey conducted within 3 days of the onset of construction, by a qualified biologist with experience surveying and observing these species and familiar with their vocalizations.
- If an active nest site is present, a 500-foot nondisturbance buffer will be established around nest sites during the breeding season (generally, late February through late August).
- Disturbance to previous least Bell's vireo nesting sites (for up to 3 years since known nest activity) will also be avoided during the breeding season unless the disturbance is to maintain public safety. Least Bell's vireo uses previous nesting sites, and disturbance during the breeding season may preclude birds from using existing unoccupied nest sites.
- The required buffer may be reduced in areas where barriers or topographic relief are sufficient to protect the nest from excessive noise or other disturbance, as determined by a the qualified biologist on a case-by-case basis.
- If occupied nests are identified, a qualified biologist will monitor construction activities in the vicinity of all active least Bell's vireo nests to ensure that covered activities do not affect nest success.
- If surveys find least Bell's vireos in the area where vegetation will be removed, vegetation removal will be done when the birds are not present.
- If an activity is to occur within 1,200 feet of least Bell's vireo habitat (or within 2,000 feet if pile driving will occur) during the breeding period for least Bell's vireos, the following measures will be implemented to avoid noise effects on least Bell's vireo.
 - Prior to the construction, a noise expert will create a noise contour map showing the 60 A-weighted decibel noise contour specific to the type and location of construction to occur in the area.
 - During the breeding period for least Bell's vireo, a USFWS-approved biologist will survey any suitable habitat for least Bell's vireo within the 60 dBA noise contour daily during a 2-week period prior to construction. While construction is occurring within this work window, the USFWS-approved biologist will conduct daily surveys in any suitable habitat where construction related noise levels could exceed 60 dBA L_{eq} (1 hour). If a least Bell's vireo is found, sound will be limited to 60 dBA in the habitat being used until the USFWS-approved biologist has confirmed that the bird has left the area.
 - Limit pile driving to daytime hours (7:00 a.m. to 7:00 p.m.).

- Locate, store, and maintain portable and stationary equipment as far as possible from suitable least Bell's vireo habitat.
- Employ preventive maintenance including practicable methods and devices to control, prevent, and minimize noise.
- Route truck traffic to reduce construction noise impacts and traffic noise levels within 1,200 feet of suitable least Bell's vireo habitat during migration periods.
- Limit trucking activities (e.g., deliveries, export of materials) to the hours of 7:00 a.m. to 10:00 p.m.
- Screen all lights and direct them down toward work activities away from migratory habitat. A biological construction monitor will ensure that lights are properly directed at all times.
- Operate portable lights at the lowest allowable wattage and height, while in accordance with NCHRP's *Report 498: Illumination Guidelines for Nighttime Highway Work* (Transportation Research Board 2003).

Compensation to Offset Effects

Reclamation will offset the loss of least Bell's vireo habitat through habitat creation or restoration at a 2:1 ratio. Reclamation will develop a riparian restoration plan that will identify the location and methods for riparian creation or restoration, and this plan will be subject to USFWS approval.

Mitigation Measure BIO-11: Suisun Song Sparrow, Saltmarsh Common Yellowthroat, Yellow-Breasted Chat, Yellow Warbler

Preconstruction surveys of potential breeding habitat for the Suisun song sparrow, saltmarsh common yellowthroat, yellow-breasted chat, and yellow warbler will be conducted within 500 feet project activities where access is available. At least five surveys will be conducted in suitable habitats within 30 days of the onset of construction, with the last survey conducted within 3 days of the onset of construction, by a qualified biologist with experience surveying and observing these species and familiar with their vocalizations.

If an active nest site is present, a 250-foot nondisturbance buffer will be established around nest sites during the breeding season (generally, late February through late August for yellow-breasted chat, early April through mid-July for saltmarsh common yellowthroat and yellow warbler, and early April through late August for Suisun song sparrow).

The required buffer may be reduced in areas where barriers or topographic relief are sufficient to protect the nest from excessive noise or other disturbance, as determined by a qualified biologist on a case-by-case basis.

If occupied nests are identified, a qualified biologist will monitor construction activities in the vicinity of all active nests to ensure that covered activities do not affect nest success.

To the extent feasible, the contractor will employ the following best practices to reduce construction noise during daytime and evening hours (7:00 a.m. to 10:00 p.m.) such that construction noise levels do not exceed 60 dBA Leq (1 hour) during migration periods:

- Limit construction during nighttime hours (10:00 p.m. to 7:00 a.m.) such that construction noise levels do not exceed 50 dBA L_{max} (1 hour) at the nearest residential land uses.
- Limit construction activities to daytime hours (7:00 a.m. to 7:00 p.m.), where feasible.

- Locate, store, and maintain portable and stationary equipment 300 feet away from suitable nesting habitat during migration periods, and 300 feet from active breeding sites.
- Employ preventive maintenance including practicable methods and devices to control, prevent, and minimize noise.
- Except where equipment must cross through riparian zones, route truck traffic to at least 300 feet from suitable avian migratory habitat during migration periods.
- Limit trucking activities (e.g., deliveries, export of materials) to the hours of 7:00 a.m. to 10:00 p.m. within 300 feet of migration habitat during migration periods.
- Screen all lights and direct them down toward work activities away from migratory habitat. A biological construction monitor will ensure that lights are properly directed at all times.
- Operate portable lights at the lowest allowable wattage and height, while in accordance with the NCHRP *Report 498: Illumination Guidelines for Nighttime Highway Work* (Transportation Research Board 2003).

Mitigation Measure BIO-12: Swainson's Hawk

Preconstruction surveys will be conducted to identify the presence of active nest sites of tree-nesting raptors within 0.25 mile of project sites, staging and storage areas, construction access roads, work areas, and soil stockpile areas where accessible by a qualified biologist with experience identifying Swainson's hawk. Transportation routes along public roads (roads leading to and from work areas) are considered disturbed, and no surveys or monitoring are required for nests along those roadways unless they are within 0.25 mile of work areas. Surveys for nesting Swainson's hawks will be conducted to ensure nesting activity is documented prior to the onset of construction activity. Swainson's hawks nest in the study area between approximately March 15 and September 15. While many nest sites are traditionally used for multiple years, new nest sites can be established in any year. Therefore, construction activity that is planned after March 15 of any year will require surveys during the year of the construction. If construction is planned before March 15 of any year, surveys will be conducted the year immediately prior to the year of construction. If construction is planned before March 15 of any year and subject to prior-year surveys, but is later postponed to after March 15, surveys will also be conducted during the year of construction.

The survey protocol shown in Appendix P, *Terrestrial Biological Resources*, Table P.2-2, Timing and Methodology for Swainson's Hawk Nesting Surveys, is modified from the recommended timing and methodology for Swainson's hawk nesting surveys in the Central Valley (Swainson's Hawk Technical Advisory Committee 2000). This protocol will be used to detect active nests for Swainson's hawk. If active nests are found, appropriate avoidance and minimization measures will be implemented as described. If no activity is found, then construction can proceed with no restrictions until the following breeding season. Survey results will be documented in a memo no less than 5 days prior to commencement of construction activities, and provided to the Program Environmental Manager and Construction Supervisor. The designated biologist will include the location of any known nest trees (occupied within 1 or more of the last 5 years) present within 0.25 mile of the construction footprint.

Removal of known nest trees (defined as a tree that has been used for nesting at least once in the last 3 years) will be avoided to the maximum extent feasible. No trees with occupied nests will be removed until the nest is vacated.

The designated biologist will survey potential Swainson's hawk nest trees and monitor occupied Swainson's hawk nests as described below. When proposed construction will occur within 0.25 mile of known nest trees, construction activities will be limited to outside the breeding season if feasible, or until the tree site is determined to be inactive.

Where construction activities cannot be restricted to more than 0.25 mile of an occupied nest site, activities will be restricted during the period of egg-laying to post-hatching to the extent feasible. If construction activities must occur in that time frame, construction will be initiated prior to egg-laying to the extent feasible. This will allow time for Swainson's hawks to acclimate to disturbance before eggs are laid, reducing the potential for abandonment. If construction activities must begin after egg-laying is initiated, a 650-foot-radius nondisturbance buffer will be established at least until eggs have hatched.

When construction activities will occur within 0.25 mile of an occupied Swainson's hawk nest, a 650-foot-radius nondisturbance buffer will be established around each occupied hawk nest tree. To the greatest extent feasible, no construction activity will be allowed to occur within the buffer while a Swainson's hawk nest is occupied. A nest is considered occupied from the time the nest is being constructed until the young leave the nest, or until the nesting attempt fails and the nest is abandoned. Occupied nests will be monitored to track progress of nesting activities. The buffer will be clearly delineated with fencing or other conspicuous marking.

Where construction will occur within 0.25 mile of an occupied Swainson's hawk nest tree, the following monitoring plan will be implemented. If a project nesting bird monitoring and management plan is prepared by a designated biologist, it will prevail where it differs from the measures below.

- A designated biologist will observe any nest site that is within 0.25 mile of construction activities for at least 1 hour and until normal nesting behavior can be determined 5 days and 3 days prior to the initiation of construction. The biologist will determine nest status and document normal nesting behaviors, which may be used to compare to the hawks' activities once construction begins. The results of preconstruction monitoring will be reported in a memo and provided to the Program Environmental Manager and Construction Supervisor.
- Where a Swainson's hawk occupied nest occurs less than 325 feet from construction activities, the designated biologist will observe the nest periodically throughout the day where covered activities occur to ensure the hawks are engaged in normal nesting behavior.
- Where a Swainson's hawk occupied nest occurs between 325 and 650 feet from construction, the designated biologist will observe the nest for at least 2 hours per construction day where covered activities occur to ensure the hawks are engaged in normal nesting behavior.
- Where a Swainson's hawk occupied nest occurs between 650 and 1,300 feet from construction, the designated biologist will observe the nest for at least 3 days per construction week to ensure the hawks are engaged in normal nesting behavior and to check the status of the nest.

Physical contact with an active nest tree will be prohibited from the time of egg laying to fledging. Construction personnel outside of vehicles must remain at least 650 feet, unless the biologist determines that a smaller buffer will not result in take of this state-listed species, from the nest tree unless construction activities require them to be closer.

All personnel will be out of the line of sight of an occupied nest during breaks if within 650 feet of the nest (as stated above, activities will only occur within 650 feet of a nest with approval by the designated biologist).

If during construction the designated biologist determines that a nesting Swainson's hawk within 0.25 mile of the project is disturbed by project activities, to the point where their reproductive failure could occur, the designated biologist will immediately notify the Construction Supervisor and Program Environmental Manager. The Program Environmental Manager will contact CDFW, and it will be determined by the parties whether additional protection measures can be implemented.

Potential nest abandonment and failure may be indicated if Swainson's hawk exhibits distress and/or abnormal nesting behavior such as swooping/stooping at construction equipment or personnel, excessive vocalization (distress calls) or agitation directed at construction equipment or personnel, failure to remain on nest, or failure to deliver prey items for an extended time period. Additional protection measures will remain in place until the Swainson's hawk behavior has normalized. The designated biologist will notify CDFW if nests or nestlings are abandoned and if the nestlings are still alive to determine appropriate actions for salvaging the eggs or returning nestlings to the wild.

In addition to the measures described above, the following measures will also be implemented for activities for which the extent and location of the activity have not yet been fully planned.

- Restoration exploration activities will fully avoid Swainson's hawk nesting habitat.
- Restoration exploration will not be conducted within 0.25 mile of an occupied Swainson's hawk nest.

Table P.2-2. Timing and Methodology for Swainson's Hawk Nesting Surveys

Survey Dates	Survey Time	Number of Surveys	Methodology
First week of April	Sunrise to 12:00 p.m.; 4:00 p.m. to sunset	1	Position the surveyor at 50 to 200 feet from suitable nesting habitat with a clear view of trees and surrounding area. Scan all trees for a minimum of 2 hours within 0.25 mile of the project boundary. Observe perching, nest building, mating, courtship, and other prenesting behaviors to identify a nest or nesting activity area.
Second week of April	Sunrise to 12:00 p.m.; 4:00 p.m. to sunset	1	Repeat the above survey in areas not determined to be occupied during the first survey. Attempt to confirm nest locations within nesting activity areas.
Third week of April	Sunrise to 12:00 p.m.; 4:00 p.m. to sunset	1	Repeat the above survey in areas not determined to be occupied during the first and second survey. In cases where a nest site was not identified within a nesting activity area during the first two surveys, approach the nesting activity area carefully to locate nests. If a nest is not found where there is reasonable certainty of nesting activity, rely on observations of courtship, mating, nest building, and other behaviors to define a nesting area and establish a buffer.
June 10 through July 15	Sunrise to 12:00 p.m.; 4:00 p.m. to sunset	3 surveys spaced at least 3 days apart	Inspect all previously identified nests for activity status. Walk and scan all other suitable nest trees within 0.25 mile of the project boundary for nests not found during the initial survey.

Mitigation Measure BIO-13: Tricolored Blackbird

Prior to implementation of project activities, a qualified biologist with experience surveying for and observing tricolored blackbird will conduct a preconstruction survey to establish use of suitable

habitat by tricolored blackbird colonies. Surveys will be conducted in suitable habitat within 1,300 feet of proposed construction areas, where access allows, during the nesting season (generally March 15 to July 31) 1 year prior to, and then again the year of, construction. During each year, surveys will be conducted monthly in March, April, May, June, and July. If construction is initiated at a site during the nesting season, three surveys will be conducted within 15 days of construction with one of the surveys within 5 days of the start of construction. The CDFW Suisun Marsh Unit tracks tricolored blackbird colonies yearly in Suisun Marsh as part of the University of California, Davis/USFWS tricolored blackbird portal project; these records will also be searched and staff at the portal project consulted for recent colony information. If active tricolored blackbird nesting colonies are identified, minimization requirements and construction monitoring will be required.

- Project activities will avoid active tricolored blackbird nesting colonies and associated habitat during the breeding season (generally March 15 to July 31). Avoidance measures will include relocating covered activities away from the nesting colonies and associated habitat to the maximum extent practicable.
- Projects (construction and restoration) will be designed to avoid construction activity to the maximum extent practicable up to 1,300 feet, but not less than a minimum of 300 feet, from an active tricolored blackbird nesting colony. This minimum buffer may be reduced in areas with dense forest, buildings, or other habitat features between the construction activities and the active nest colony, or where there is sufficient topographic relief to protect the colony from excessive noise or visual disturbance as determined by a biologist experienced with tricolored blackbird.
- Project activities potentially affecting a nesting colony will be monitored by a qualified biologist to verify that the activity is not disrupting the colony. If it is, the activity will be modified, as practicable, by either delaying construction until the colony abandons the site or until the end of the breeding season, whichever occurs first; temporarily relocating staging areas; or temporarily rerouting access to the construction site. Reclamation technical staff will consult with the fish and wildlife agencies and evaluate exceptions to the minimum nondisturbance buffer distance on a case-by-case basis.
- Prior to initiation of construction within 300 feet of suitable roosting habitat, a biologist with experience surveying for and observing tricolored blackbirds will conduct preconstruction surveys to establish use of roosting habitat by tricolored blackbird colonies. Surveys will be conducted in suitable habitat where access is available within 300 feet of proposed construction areas during the nonbreeding season (generally August 1 to March 14) 1 year prior to, and then again the year of, construction. If construction is initiated at a site during the nonbreeding season, three surveys will be conducted within 15 days prior to construction with one of the surveys within 5 days prior to the start of construction.
- Construction and restoration projects will also be designed to avoid construction activity within at least 300 feet from occupied active tricolored blackbird roosting habitat. This minimum buffer may be reduced in areas with dense forest, buildings, or other habitat features between the construction activities and the active roosting site, or where there is sufficient topographic relief to protect the roosting site from excessive noise or visual disturbance, or where sound curtains are used, as determined by a biologist experienced with tricolored blackbird.
- Construction activities that are within 300 feet of occupied roosting habitat will be monitored by a biologist familiar with tricolored blackbird behavior patterns to verify that the activity is not disrupting the roosting birds. If it is, the activity will be modified, as practicable, by delaying

construction until the blackbirds are no longer using the roosting site, temporarily relocating staging areas, temporarily rerouting access to the construction site, or use of sound curtains. The biologist will evaluate the nondisturbance buffer distance on a case-by-case basis.

Unavoidable loss of foraging habitat will be mitigated through foraging habitat protection at a 1:1 ratio, and unavoidable loss of nesting habitat through riparian restoration at a 2:1 ratio.

Mitigation Measure BIO-14: Western Burrowing Owl

Species-specific measures for western burrowing owl will only be required for water conveyance construction, restoration, and operations and maintenance activities occurring within suitable habitat as identified from habitat assessments conducted in advance of initiating ground-disturbing and staging activities. This measure incorporates survey, avoidance, and minimization guidelines taken primarily from the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012).

Preconstruction Surveys

Western burrowing owl surveys will be required within and adjacent to (within 500 feet) water conveyance work areas and restoration sites where suitable habitat has been identified during habitat assessment surveys where access is available. Surveys will be conducted during the breeding season that precedes construction.

Four survey visits will be conducted with at least one site visit between February 15 and April 15 and a minimum of three survey visits, at least 3 weeks apart, between April 15 and July 15, with at least one visit after June 15. Surveys will be conducted between 10:00 a.m. and 2 hours before sunset. A qualified biologist will survey the study area and record and map all burrowing owl observations and burrows that may be occupied (as indicated by tracks, feathers, egg shell fragments, pellets, prey remains, cast pellets, whitewash, or decoration) on the project site. The surveys will be conducted while walking transects throughout the entire project footprint, plus all accessible areas within a 500-foot radius of the project footprint. The centerlines of these transects will be spaced 15 to 60 feet apart and will vary in width to account for changes in terrain and vegetation that can preclude complete visual coverage of the area. For example, in hilly terrain with patches of tall grass, transects will be closer together, while in open areas with little vegetation they can be 60 feet apart. Surveyors will stop at least every 300 feet along each transect to scan the entire visible area for presence of burrowing owls. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas.

In addition, preconstruction surveys will be conducted with one occurring 14 days prior to ground breaking and/or staging activities and another within 24 hours of these activities. These surveys will confirm whether owls identified during the breeding season surveys are still present or whether the site has since become occupied by burrowing owls.

Avoidance and Minimization

To the extent feasible, burrowing owls will be avoided by relocating work areas with flexible locations, such as geotechnical exploration sites and restoration sites. Within the construction footprint where ground disturbance cannot avoid burrowing owls, owls will be relocated during the nonbreeding season and burrows will be excavated.

If an active burrow is identified near a work area and work cannot be conducted outside of the nesting season (February 1 to August 31), a qualified biologist will establish a nondisturbance buffer that extends a minimum of 250 feet around the burrow. If burrowing owls are present at the site during the

nonbreeding season (September 1 through January 31), a qualified biologist will establish a nondisturbance buffer that extends a minimum of 150 feet around the burrow.

If the appropriate nondisturbance buffer for breeding or nonbreeding burrowing owls cannot be established, a wildlife biologist experienced in burrowing owl behavior will evaluate site-specific conditions and recommend a smaller buffer that still minimizes the potential to disturb the owls (and still allows reproductive success during the breeding season), if possible. The site-specific buffer will be established by taking into consideration the type and extent of the proposed activity occurring near the occupied burrow, the duration and timing of the activity, the sensitivity and habituation of the owls to existing conditions, and the dissimilarity of the proposed activity to background activities. If an appropriate buffer cannot be established around the active owl burrows, actions will be taken to exclude the owls from the site per the requirements below.

A biological monitor will be present during all construction activities occurring within any reduced buffers. If during the breeding season there is any change in owl nesting and foraging behavior as a result of construction activities, the biological monitor will work with construction personnel and the Environmental Manager to provide additional protections to reduce disturbance, such as adding visual and sound curtains; any modifications to the standard protections will be approved by a qualified biologist.

If monitoring indicates that the nest is abandoned prior to the end of nesting season and the burrow is no longer in use by owls, the nondisturbance buffer may be removed. If necessary because the burrow cannot be avoided by construction activity, the biologist will excavate and collapse the burrow to prevent reoccupation.

Relocation

No exclusion of burrowing owls will occur during the breeding season. If burrowing owls are present within the construction footprint and cannot be avoided during the nonbreeding season (generally September 1 through January 31), they will be relocated through passive relocation, with or without burrow exclusion. Passive relocation will be used when (1) there is a sufficient amount of suitable habitat adjacent to the work area to support nesting and foraging, (2) there are compatible land use practices in the area and (3) the area is preferably currently under or proposed for conservation.

Passive relocation will be conducted during the nonbreeding season; however passive relocation techniques may be used during the breeding season (February 1 through August 30) if a qualified biologist determines through site surveillance that the burrow is not occupied by a breeding pair, young, or eggs. To the extent feasible, passive relocation will first be considered without the use of exclusion devices to avoid and minimize harassment of owls.

Passive Relocation without Exclusion

Prior to relocating owls, all potential burrowing owl burrows in suitable nesting habitat and within the project footprint and 75 feet around the footprint, will be surveyed for owl use, and excavated if no owls are found. If occupied burrows are found, two natural or artificial burrows will be provided for each occupied burrow in the above defined survey area, at least 250 feet from the construction footprint. Artificial burrows will be installed following the methods in Barclay (2008) and Johnson et al. (2010). Sites used for artificial burrows will either be properties currently used for or proposed for conservation. After constructing the artificial burrows, the owls will be given 60 days to relocate on their own. The study area will be monitored weekly for up to 60 days to determine whether the owls have left the burrow and to attempting to confirm occupancy at the artificial or other nearby burrows. The formerly occupied burrows will then be excavated. Whenever possible, burrows will be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe (at

least 3 inches in diameter) will be inserted into burrows during excavation to maintain an escape route for any animals inside the burrow.

Passive Relocation with Exclusion

If the burrowing owls found in the above survey area do not relocate on their own through the above methodology, passive relocation will be accomplished by installing one-way doors (e.g., modified dryer vents). The one-way doors will be left in place for a minimum of 48 hours and be monitored twice daily to ensure that the owls have left the burrow. The burrow will be excavated using hand tools, and a section of flexible plastic pipe (at least 3 inches in diameter) will be inserted into the burrow tunnel during excavation to maintain an escape route for any animals that may be inside the burrow.

Compensation for Unavoidable Effects

Mitigate unavoidable loss of nesting, wintering, and satellite burrows, and burrowing owl habitat in comparable habitat at an approved mitigation ratio in consultation with CDFW. The mitigation strategy will be consistent with the mitigation guidance in the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012).

Mitigation Measure BIO-15: Western Yellow-Billed Cuckoo

Preconstruction Surveys

This measure for western yellow-billed cuckoo will be required for activities occurring within suitable habitat, or in the vicinity of suitable habitat. Prior to disturbing an area potentially supporting habitat for the species, a USFWS-approved biologist will evaluate the area to identify suitable habitat.

Project activities will be located to avoid or minimize disturbance of western yellow-billed cuckoo suitable habitat within the species' range. The following measures will be required for project components unable to avoid western yellow-billed cuckoo habitat.

- Prior to construction, all suitable western yellow-billed cuckoo habitat in the construction area will be surveyed.
- At least five surveys will be conducted in suitable habitats within 30 days of the onset of construction, with the last within 3 days of the onset of construction, by a qualified biologist with experience surveying and observing this species and familiar with its vocalizations.
- If an active nest site is present, a 500-foot nondisturbance buffer will be established around nest sites during the breeding season (generally, late February through late August).
- The required buffer may be reduced in areas where barriers or topographic relief are sufficient protect the nest from excessive noise or other disturbance, as determined by a qualified biologist on a case-by-case basis.
- If occupied nests are identified, a qualified biologist will monitor construction activities in the vicinity of all active western yellow-billed cuckoo nests to ensure that covered activities do not affect nest success.
- If surveys find western yellow-billed cuckoos in the area where vegetation will be removed, vegetation removal will be done when cuckoos are not present.
- Permanent or temporary loss of all suitable migratory habitat will be minimized by all activities associated with the proposed action through project design.

- Avoidance and Minimization
- If an activity is to occur within 1,200 feet of western yellow-billed cuckoo habitat (or within 2,000 feet if pile driving will occur) during the period of from June 15 through September 1 (the period in which yellow-billed cuckoos have been observed in the legal Delta) the following measures will be implemented to avoid noise effects on migrating western yellow-billed cuckoos.
 - Prior to the construction, a noise expert will create a noise contour map showing the 60 dBA noise contour specific to the type and location of construction to occur in the area.
 - During the period between June 15 and September 1, a qualified biologist will survey any suitable migratory habitat for yellow-billed cuckoos within the 60 dBA noise contour on a daily basis during a two-week period prior to construction. While construction is occurring within this work window, the USFWS-approved biologist will conduct daily surveys in any suitable habitat where construction related noise levels could exceed 60 dBA L_{eq} (1 hour). If a yellow-billed cuckoo is found, sound will be limited to 60 dBA in the habitat being used until the USFWS-approved biologist has confirmed that the bird has left the area.
 - Locate, store, and maintain portable and stationary equipment as far as possible from suitable western yellow-billed cuckoo habitat.
 - Employ preventive maintenance including practicable methods and devices to control, prevent, and minimize noise.
 - Route truck traffic to reduce construction noise impacts and traffic noise levels within 1,200 feet of suitable western yellow-billed cuckoo migratory habitat during migration periods.
 - Limit trucking activities (e.g., deliveries, export of materials) to the hours of 7:00 a.m. to 10:00 p.m.
 - Screen all lights and direct them down toward work activities away from migratory habitat. A biological construction monitor will ensure that lights are properly directed at all times.
 - Operate portable lights at the lowest allowable wattage and height, while in accordance with the NCHRP *Report 498: Illumination Guidelines for Nighttime Highway Work* (Transportation Research Board 2003).

Compensation to Offset Effects

Reclamation will offset the loss of western yellow-billed cuckoo migratory habitat through the creation or restoration at a 3:1 ratio, for a total of [to be determined] acres of migratory riparian habitat creation or restoration in USFWS-approved location. For restoration, Reclamation will develop a riparian restoration plan that will identify the location and methods for riparian creation or restoration, and this plan will be subject to USFWS approval.

Mitigation Measure BIO-16: White-Tailed Kite

Preconstruction surveys will be conducted to identify the presence of active nest sites of tree nesting raptors within 0.25 mile of project sites, staging and storage areas, construction access roads, work areas, and soil stockpile areas where accessible, by a qualified biologist with experience identifying white-tailed kite nests. Transportation routes along public roads (roads leading to and from work areas) are considered disturbed, and no surveys or monitoring are required for nests along those roadways unless they are within ¼ mile of work areas. Surveys for nesting white-tailed kites will be conducted within 30 days prior to construction to ensure nesting activity is documented prior to the

onset of construction activity during the nesting season. White-tailed kites nest in the study area between approximately March 15 and September 15. While many nest sites are traditionally used for multiple years, new nest sites can be established in any year. Therefore, construction activity that is planned after March 15 of any year will require surveys during the year of the construction. If construction is planned before March 15 of any year, surveys will be conducted the year immediately prior to the year of construction. If construction is planned before March 15 of any year and subject to prior-year surveys, but is later postponed to after March 15, surveys will also be conducted during the year of construction.

Construction will be restricted to the greatest extent possible during the nesting season where nest sites occur within 0.25 mile of construction activities, unless an already existing suitable buffer between the construction activity and the nest site is identified by a biologist. Surveys for white-tailed kite nests and nesting activity will occur in conjunction with the surveys for bald eagles under MM BIO-17 and follow the same protocol. If active nests are found or nesting activity is identified within 0.25 mile of construction activities appropriate avoidance and minimization measures will be implemented as described. Results of the surveys will be summarized in a memo(s) and provided to the Program Environmental Manager and Construction Supervisor prior to the commencement of construction.

Removal of known nest trees will be avoided to the maximum extent feasible. No trees with occupied nests will be removed until the nest is vacated.

The biologist will conduct a second survey of potential nesting trees and active nests, and monitor white-tailed kite nests no more than 72 hours prior to construction. If no nesting activity is found, then construction can proceed with no restrictions.

Where construction activities within 0.25 mile of an active nest cannot feasibly be avoided, construction will be initiated prior to egg-laying to the extent possible. If eggs and or young are present in the nest, work will be restricted until a biologist determines that white-tailed kites have acclimated to disturbance and exhibit normal nesting behavior.

A 650-foot-radius nondisturbance buffer will be established around each active white-tailed kite nest site. No construction activity will be allowed to occur in the buffer while a nest site is occupied by white-tailed kite during the breeding season. The buffer size may be modified based on the field examination and determination by the biologist of conditions that may minimize disturbance effects, including line-of-sight, topography, land use, type of disturbance, existing ambient noise and disturbance levels, and other relevant factors. The buffer will be clearly delineated with fencing or other conspicuous marking. Active nests will be monitored to track progress of nesting activities. Entry into the buffer will be granted when the biologist determines that the young have fledged and are capable of independent survival or the nest has failed and the nest site is no longer active.

Where it is infeasible to avoid construction within 0.25 mile of an active white-tailed kite nest identified in preconstruction surveys, at a minimum the following measures will be implemented as part of a nesting bird monitoring and management plan. The final plan may include additional measures that are specific to site conditions.

- A designated biologist will observe any nest site that is within 0.25 mile of construction activities for at least 1 hour and until normal nesting behavior can be determined 5 days and 3 days prior to the initiation of construction. The biologist will determine nest status and observe normal nesting behaviors, which may be used to compare to the nesting activities once construction begins. The results of preconstruction monitoring will be reported in a memo and provided to the Program Environmental Manager and Construction Supervisor.

- Where pre-project surveys have identified an occupied white-tailed kite nest less than 325 feet from construction, the designated biologist will observe the nest periodically throughout the day where covered activities occur to ensure the white-tailed kites demonstrate normal nesting behavior.
- Where pre-project surveys have identified an occupied white-tailed kite nest between 325 to 650 feet from construction, the designated biologist will observe the nest for at least 2 hours per construction day where covered activities occur to ensure the white-tailed kites are engaged in normal nesting behavior.
- Where pre-project surveys have identified an occupied white-tailed kite nest between 650 to 1,300 feet from construction, the Biological Monitor will observe the nest for at least 3 days per construction week to ensure the white-tailed kites are engaged in normal nesting behavior and to check the status of the nest.

During construction or ongoing operation and maintenance activities, physical contact with an active nest tree is prohibited from the time of egg laying to fledging, unless approved by CDFW. Construction personnel outside of vehicles must remain at least 650 feet, or the length of a buffer approved by a qualified biologist which will not result in take, from the nest tree unless construction activities require them to be closer.

All personnel will remain out of the line of sight of an occupied white-tailed kite nest during breaks if within 650 feet of the nest (as stated above, activities will only occur within 650 feet of a nest with approval by the designated biologist).

The project will be implemented in a manner that will not result in take of white-tailed kite as defined by Section 86 of the California Fish and Game Code. If during construction monitoring, the designated biologist determines that a nesting white-tailed kite within 650 feet of construction is disturbed by construction activities, to the point where reproductive failure could occur, the designated biologist will immediately notify the Construction Supervisor and Program Environmental Manager. The Program Environmental Manager will contact CDFW, and it will be determined by the parties whether additional protection measures can be implemented.

Potential nest abandonment and failure may be indicated if white-tailed kite exhibits distress and/or abnormal nesting behavior such as swooping/stooping at construction equipment or personnel, excessive vocalization (distress calls) or agitation directed at construction equipment or personnel, failure to remain on nest or failure to deliver prey items for an extended time period. Additional protection measures will remain in place until the white-tailed kite behavior has normalized.

Mitigate unavoidable loss of foraging habitat through foraging habitat protection at a 1:1 ratio, and unavoidable loss of nesting habitat through riparian restoration at a 2:1 ratio.

Mitigation Measure BIO-17: Bald Eagle

The following measures will be implemented to avoid and minimize impacts on bald eagle during Reclamation project activities.

- If restoration activities, including helicopter flights, need to take place during the nesting season and within 0.5 mile of potential bald eagle nesting habitat, qualified agency-approved biologists will conduct a preconstruction survey for occupied bald eagle nest in and within 0.5 mile of the work areas. An occupied nest is a “nest used for breeding in the current year by a [bald or golden eagle] pair” (Pagel et al. 2010). Survey procedures, including required surveyor qualifications,

will follow the USFWS' Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations (Pagel et al. 2010) or other more recent guidelines, if available.

- Reclamation will implement, at a minimum, the following measures to avoid disturbance of active eagle nests (i.e., “a golden eagle [or bald eagle] nest characterized by the presence of any adult, egg, or dependent young at the nest in the past 10 consecutive days immediately prior to, and including, at present” [Pagel et al. 2010]):
 - No activities involving loud noise (>90 decibels) or helicopter flight paths will be permitted within 0.5 mile of any active eagle nest found during preconstruction surveys. This restriction will be in effect from January to August 31 unless nest monitoring by a qualified agency-approved biologist reveals that the nest is no longer active (e.g., adults did not nest that year, nest failure from natural causes, young fledged).
 - Activities that do not involve loud noise will maintain an exclusion zone of 0.25 mile around all active eagle nests found during preconstruction surveys. This restriction will be in effect from January to August 31 unless nest monitoring by a qualified agency-approved biologist reveals that the nest is no longer active.
- Eagle nest exclusion zones may be removed if monitoring reveals the nest to be inactive, and considered to be an “alternate nest” under current regulations under the Bald and Golden Eagle Protection Act. An alternate nest is “one of potentially several nests within a nesting territory that is not an in-use nest at the current time” (USFWS 2016). Monitoring to demonstrate that nests are not in-use will follow observational procedures described by Pagel et al. (2010).

Mitigation Measure BIO-18: Bank Swallow

The following measures will be implemented to avoid and minimize impacts on bank swallow individuals, colonies, current and potential habitat (i.e., natural banks), and, if feasible, to river processes. This applies to activities year-round, whether bank swallows are present or not.

Preconstruction Surveys

Prior to beginning project activities within 500 feet of the Sacramento River, Feather River, and lower American River during the bank swallow nesting season (April 1 through August 31), a preconstruction survey for bank swallow colonies will be conducted where bank swallow habitat is present within 500 feet of work areas. If no active nesting colonies are present, no further measures are required.

If an active colony is found and work must occur during the nesting season (April 1 through August 31), Reclamation will establish a nondisturbance buffer (in consultation with a biologist) around the colony during the breeding season. In addition, the biologist will monitor any active colony within 500 feet of work areas to ensure that activities do not affect nest success. No project activities will take place within the disturbance buffer.

Avoidance and Minimization

Prevent Impacts on Individuals, Colonies, and Habitat

To the extent feasible, where proposed water management or land-use projects (i.e., restoration activities) projects would impact bank swallows or river processes, alternatives such as setback levees can be used to avoid those impacts.

Consult with a biologist when planning projects within the floodplain of the Sacramento River and its tributaries to ensure projects do not affect colonies or current or potential habitat.

Develop flow criteria that avoid impacts of high water flows by limiting frequency and duration of peak flows over 14,000 cfs (Sacramento River) or rapid draw-downs to nesting bank swallow habitat during the breeding season (April 1 through August 31); this includes downstream tributary flows when timing water releases (Bank Swallow Technical Advisory Committee 2013).

Prevent Impacts on River Processes

To the extent feasible, where restoration activities would impact river processes, alternatives to bank stabilization, such as setback and adjacent levees, should be used to preserve dynamic river processes.

Maintain flow regimes during the nonbreeding season (September 1 through March 31) that promote natural river processes and create bank swallow habitat by providing annual flows that cause local bank erosion and a minimum of one bankfull flood event every 3 years to promote bank erosion, meander migration, and channel cutoff. (Bank Swallow Technical Advisory Committee 2013).

Mitigation Measure BIO-19: California Least Tern

For restoration projects, Reclamation will avoid California least tern nesting colony sites.

Mitigation Measure BIO-20: Migratory Birds (Osprey, Short-Eared Owl, Tule Greater White-fronted Goose, Black Tern, Least Bittern, White-Faced Ibis)

The following measures will be implemented to avoid and minimize impacts on nesting migratory birds, including special-status birds, during Reclamation restoration activities.

- A qualified wildlife biologist with experience with nesting birds will conduct nesting surveys before the start of restoration activities. A minimum of three separate surveys will be conducted within 30 days prior to the initiation of work, with the last survey within 3 days prior to work beginning in a given work area. Surveys will include a search of all suitable nesting habitat in the work area. In addition, a 500-foot radius around the work area, where accessible, will be surveyed for nesting raptors, and an area within 50 feet of the work area will be surveyed for other nesting birds protected by the MBTA. If no active nests are detected during these surveys, no additional measures are required.

If active nests are found in the survey area, nondisturbance buffers will be established around the nest sites to avoid disturbance or destruction of the nest site until the end of the breeding season (approximately September 1) or until a qualified wildlife biologist determines that the young have fledged and moved out of the study area. The end of the breeding season varies by species and the stage of the nesting effort (i.e., nest building, egg laying, incubation, feeding nestling, feathered young, fledged young, etc.) as determined by the qualified wildlife biologist. A qualified wildlife biologist will monitor activities in the vicinity of the nests to ensure that activities do not affect nest success. The extent of the buffers will be determined by the biologist and will depend on the level of noise or disturbance, line-of-sight between the nest and the disturbance, ambient levels of noise and other disturbances, and other topographical or artificial barriers. Suitable buffer distances may vary between species.

Mitigation Measure BIO-21: Riparian Woodrat and Riparian Brush Rabbit

The measures for riparian woodrat and riparian brush rabbit will be implemented for projects occurring within suitable habitat. Within the study area, based on the known distribution of the

species, suitable habitat is defined to include the areas within the legal Delta along San Joaquin and Stanislaus Rivers south of State Route 4 and Old River Pipeline. Within this area, suitable riparian habitat includes the vegetation types that make up a dense, brushy understory shrub layer with a minimum patch size of 0.05 acres. Riparian brush rabbit grassland habitat includes grasslands with a minimum patch size of 0.05 acres that are adjacent to riparian brush rabbit riparian habitat.

A qualified biologist will conduct a field evaluation of suitable habitat for both species for all covered activities that occur within the defined area for these species' habitat as described above. If the project cannot fully avoid effects on suitable habitat, the following measures will be required.

- A qualified biologist will assess habitat suitability for both species. If the qualified biologist determines the habitat to be suitable for the species, then Reclamation will avoid disturbing suitable habitat while accessing restoration sites (i.e., access to enhancement sites for in-stream activities such as gravel placement).
- If a habitat or floodplain restoration component would disturb suitable habitat, Reclamation will assume presence or conduct protocol-level surveys according to the USFWS *Draft Habitat Assessment Guidelines and Survey Protocol for the Riparian Brush Rabbit and the Riparian Woodrat* (USFWS n.d.).
- If occupied riparian woodrat or riparian brush rabbit habitat is present, or the habitat is assumed to be occupied, Reclamation will redesign the project to avoid occupied habitat. Avoidance requires the following buffers and avoidance measures:
 - Establish minimum 250-foot nondisturbance buffers between project activities and suitable riparian habitat that is occupied or assumed to be occupied. The nondisturbance buffer is not necessary for access to restoration sites provided existing access roads are used.
 - Establish a 1,400-foot buffer between any lighting and suitable riparian habitat that is occupied or assumed to be occupied.
 - Screen all lights and direct them down toward work activities away from riparian habitat that is occupied or assumed to be occupied. A biological construction monitor will ensure that lights are properly directed at all times.
 - Operate portable lights at the lowest allowable wattage and height, while in accordance with the NCHRP *Report 498: Illumination Guidelines for Nighttime Highway Work* (Transportation Research Board 2003).
- If the suitable habitat is determined through surveys to be unoccupied, Reclamation will implement the following measures to minimize long-term effects on the habitat so that it may provide for the recovery of the species. No more than 45 acres of suitable, unoccupied riparian habitat and 30 acres of adjacent grasslands may be permanently removed by levee construction in the San Joaquin River watershed. No more than 35 acres of suitable riparian habitat and 20 acres of adjacent grassland habitat may be temporarily removed for levee construction in the San Joaquin watershed. No more than 10 acres of suitable, unoccupied riparian habitat may be affected in the Stanislaus River watershed.
 - Floodplain restoration projects will be designed to minimize the removal of mature oaks in areas providing suitable habitat for the riparian woodrat.
 - Include refugia within the restored floodplains to provide shelter from flood events for any individuals of these species that may come to occupy the area.

- Reclamation will additionally implement the following measures to avoid and minimize noise and lighting-related effects on riparian brush rabbit:
 - Establish a 1,200-foot nondisturbance buffer between any project activities and suitable riparian habitat.
- Offset any unavoidable loss of suitable riparian habitat through restoration at a 3:1 ratio, using the following restoration design measures:
- Restoration must meet specific ecological requirements for the species.
- Restoration is adjacent to, or facilitates connectivity with, existing occupied or potentially occupied habitat.

Mitigation Measure BIO-22: Salt Marsh Harvest Mouse and Suisun Shrew

Where suitable salt marsh harvest mouse and Suisun shrew habitat has been identified within a tidal restoration work area or within 100 feet of a tidal restoration work area where ground-disturbing activities will occur (e.g., at a levee breach or grading location) a biologist will conduct preconstruction surveys for the mouse or shrew prior to ground disturbance. If a mouse or shrew is discovered, tidal restoration activities near the mouse or shrew will cease until wildlife staff can be contacted and a relocation plan can be developed. Prior to tidal restoration ground-disturbing activities, vegetation will first be removed with nonmechanized hand tools (e.g., goat or sheep grazing, or, in limited cases where the biological monitor can confirm that there is no risk of harming salt marsh harvest mouse or Suisun shrew, hoes, rakes, and shovels may be used) to allow salt marsh harvest mouse and Suisun shrew to passively move out of the location. Vegetation must be cleared to bare ground and removed from the work area, including roads. The upper 6 inches of soil excavated within salt marsh harvest mouse and Suisun shrew habitat will be stockpiled and replaced on top of backfilled material. Vegetation will be removed under supervision of a biological monitor familiar with salt marsh harvest mouse and Suisun shrew. Vegetation removal will start at the edge farthest from the salt marsh and work its way toward the salt marsh. This method of removal provides cover for salt marsh harvest mouse and Suisun shrew and allows them to move toward the salt marsh as vegetation is being removed.

Temporary exclusion fencing will be placed around a defined tidal restoration work area before construction activities start and immediately after vegetation removal. The fence should be made of material that does not allow a salt marsh harvest mouse or Suisun shrew to pass through and should be buried to a depth of 2 inches so that mice cannot crawl under the fence. Supports for the fence must be placed on the inside of the exclusion area. Prior to the start of daily activities during initial ground disturbance, the biologist will inspect the salt marsh harvest mouse-proof boundary for holes or rips. The work area will also be inspected to ensure no mice are trapped inside. Any mice or shrews found along or outside the fence will be closely monitored until they move away from the construction site. Tidal restoration work will be scheduled to avoid extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge) to allow for salt marsh harvest mouse to more easily move to higher grounds.

The biologist with previous salt marsh harvest mouse and Suisun shrew experience will be onsite during construction activities related to tidal restoration in suitable habitat. The biologist will document compliance with the project permit conditions and avoidance and conservation measures. The approved biologist will have the authority to stop tidal restoration activities if any of the requirements associated with these measures are not being fulfilled. If the biologist requests work stoppage because of take of any listed species, CDFW and USFWS staff will be notified within 1 day by email or telephone.

Mitigation Measure BIO-23: Ring-Tailed Cat

Because ring-tailed cats maintain multiple dens, the loss of one den would be a negligible impact. However, the loss of a natal or maternity den would be significant. Reclamation will implement the following measure for ring-tailed cat:

- A qualified biologist familiar with ring-tailed cat biology will conduct a habitat assessment of the proposed construction area. If highly suitable denning habitat is present, the area will be designated as an Environmental Sensitive Area and marked on project maps.
- When possible, the removal of vegetation and construction activities will be conducted outside of the breeding season for ring-tailed cat (February 1 through May 1).
- If the denning season cannot be completely avoided, a qualified biologist will conduct a preconstruction survey within 2 weeks prior to commencement of construction for potential natal or maternity den trees. If an active den is found, a qualified biologist, will determine a construction-free buffer zone to be establish around the den until the young have left the den.
- A biological monitor will be present when construction activities take place when active ring-tailed cat dens are identified within the construction work area and work takes place within 150 feet of the den.

Mitigation Measure BIO-24: Special-Status Bats

The following measure was designed to avoid and minimize adverse direct and indirect effects on special-status bats. Baseline data are not available or are limited on how bats use the study area and on individual numbers of bats and how they vary seasonally. Accordingly, it is difficult to determine if there would be a substantial reduction in species numbers. Bat species with potential to occur in the study area employ varied roost strategies, from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as buildings and bridges. Daily and seasonal variations in habitat use are common. To obtain the highest likelihood of detection, preconstruction bat surveys will be conducted by Reclamation and will include these components:

- Identification of potential roosting habitat within project footprint.
- Daytime search for bats and bat sign in and around identified habitat.
- Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or active full-spectrum acoustic monitoring where species identification is sought.
- Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from dusk to dawn over multiple nights.
- Additional onsite night surveys as needed following passive acoustic detection of special-status bats to determine nature of bat use of the structure in question (e.g., use of structure as night roost between foraging bouts).
- Qualified biologists will have knowledge of the natural history of the species that could occur in the study area and experience using full-spectrum acoustic equipment. During surveys, biologists will avoid unnecessary disturbance of occupied roosts.

Preconstruction Bridge and Other Structure Surveys

Before work begins on the bridge/structure, qualified biologists will conduct a daytime search for bat sign and evening emergence surveys to determine if the bridge/structure is being used as a roost. Biologists conducting daytime surveys would listen for audible bat calls and would use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes, and other bridge features that could house bats. Bridge surfaces and the ground around the bridge/structure would be surveyed for bat sign, such as guano, staining, and prey remains.

Evening emergence surveys will consist of at least one biologist stationed on each side of the bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after sunset for a minimum of 2 nights within the season that construction would be taking place. Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence surveys to assist in species identification. All emergence surveys would be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted).

Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in determining species present. A minimum of 4 nights of acoustic monitoring surveys will be conducted within the season that the construction would be taking place. If site security allows, detectors should be set to record bat calls for the duration of each night. To the extent possible, all monitoring will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted). The biologists will analyze the bat call data using appropriate software and prepare a report with the results of the surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost, biologists will conduct a night survey from 1 to 2 hours past sunset up to 6 hours past sunset to determine if the bridge is serving as a colonial night roost.

If suitable roost structures will be removed, additional surveys may be required to determine how the structure is used by bats, whether it is as a night roost, maternity roosts, migration stopover, or for hibernation.

Preconstruction Tree Surveys

If tree removal or trimming is necessary, qualified biologists will examine trees to be removed or trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities, basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be identified and the area around these features searched for bats and bat sign (guano, culled insect parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should be considered potential habitat for solitary foliage roosting bat species.

If bat sign is detected, biologists will conduct evening visual emergence surveys of the source habitat feature from a half hour before sunset to 1–2 hours after sunset for a minimum of 2 nights within the season that construction would be taking place. Methodology should follow that described above for the bridge emergence survey.

Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector will be used to assist in determining species present. These surveys would be conducted in coordination with the acoustic monitoring conducted for the bridge structure.

Protective Measures for Bats using Bridges/Structures and Trees

Avoidance and minimization measures shall be necessary if it is determined that bats are using the bridge/structure or trees as roost sites and/or sensitive bats species are detected during acoustic monitoring. Appropriate measures shall include, as applicable, the measures listed below.

- Ensure that bats are protected from noise, vibrations, and light that result from construction activities associated with water conveyance facilities, conservation components, and ongoing habitat enhancement, as well as operations and maintenance of above-ground water conveyance facilities, including the transmission facilities. This would be accomplished by either directing noise barriers and lights inward from the disturbance or ensuring that the disturbances do not extend more than 300 feet from the point source.
- Disturbance of the bridge will be avoided between March 1 and October 31 (the maternity period) to avoid impacts on reproductively active females and dependent young.
- Installation of exclusion devices from March 1 through October 31 to preclude bats from occupying the bridge during construction. Exclusionary devices will only be installed by or under the supervision of an experienced bat biologist.
- Tree removal will be avoided between April 15 and September 15 (the maternity period for bat species that use trees) to avoid impacts on pregnant females and active maternity roosts (whether colonial or solitary).
- Tree removal will be conducted between September 15 and October 31 to the maximum extent feasible, which corresponds to a time period when bats would not likely have entered winter hibernation and would not be caring for flightless young.
- Trees will be removed in pieces, rather than felling the entire tree.
- If a maternity roost is located, whether solitary or colonial, that roost will remain undisturbed with a buffer as determined in by a qualified biologist until September 15 or until the qualified biologist has determined the roost is no longer active.
- If a non-maternity roost is found, that roost will be avoided to the maximum extent feasible and an appropriate buffer established in consultation with a qualified biologist. Every effort would be made to avoid the roost to the maximum extent feasible, as methods to evict bats from trees are largely untested. However, if the roost cannot be avoided, eviction will be attempted and procedures designed in consultation with the qualified biologist will be employed to reduce the likelihood of mortality of evicted bats. In all cases:
 - Eviction would not occur before September 15.
 - Qualified biologists would carry out or oversee the eviction tasks and would monitor the tree trimming/removal.
 - Eviction would take place late in the day or in the evening to reduce the likelihood of evicted bats falling prey to diurnal predators.
 - Eviction would take place during weather and temperature conditions conducive to bat activity.
 - Special-status bat roosts would not be disturbed.
- Eviction procedures shall include but are not limited to the following:
 - Pre-eviction surveys to obtain data to inform the eviction approach and subsequent mitigation requirements. Relevant data may include the species, sex, reproductive status and/or number of bats using the roost, and roost conditions themselves such as temperature and dimensions. Surveys may include visual emergence, night vision, acoustic, and/or capture.

- If needed, structural changes to the roost, performed without harming bats, such that the conditions in the roost are undesirable to roosting bats and the bats leave on their own (e.g., open additional portals so that temperature, wind, light and precipitation regime in the roost change).
- Non-injurious harassment at the roost site to encourage bats to leave on their own, such as ultrasound deterrents or other sensory irritants.
- Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and several minutes should pass before felling trees or trimming limbs to allow bats time to arouse and leave the tree. The biologists should search downed vegetation for dead and injured bats. The presence of dead or injured bats would be reported to CDFW.

Compensatory mitigation for the loss of roosting habitat will include the construction and installation of suitable replacement habitat onsite. Depending on the species and type of roost lost, various roost replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting cottonwood trees, leaving palm thatch in place rather than trimming). Creating natural habitat onsite is generally preferable to artificial habitat.

Artificial roosts are often unsuccessful, and care must be taken to determine as closely as possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat when incorporated into new bridge designs. “Bat bark” has been successfully used by the Arizona Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine trees (Mering and Chambers 2012:765). Bat houses have at best an inconsistent track record but information is mounting on how to create successful houses. There is no single protocol or recipe for bat-house success. Careful study of the roost requirements of the species in question; the particular conditions at the lost roost site including temperature, orientation of the openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase the chances of designing a successful replacement.

Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat activity has been positively correlated with increased vegetation and tree growth, canopy complexity and restoration acreage at cottonwood-willow restoration sites along the Lower Colorado River (Broderick 2010). These complex woodland areas would ultimately provide a wider range of bat species with preferred roost types, including both foliage-roosting and crevice-/cavity-roosting bats.

Mitigation Measure BIO-25: Suisun Thistle and Soft Bird’s-Beak

A complete botanical survey of project sites will be completed using *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 1996) and *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018). The surveys will be floristic in nature and conducted in a manner that maximizes the likelihood of locating Suisun thistle and soft bird’s-beak (i.e., during the appropriate season and at an appropriate level of ground coverage).

Special-status plant surveys required for project-specific permit compliance will be conducted early in the planning process to allow design of the individual restoration projects to avoid adverse modification of habitat for specified covered plants. The purpose of these surveys will be to verify that the locations of Suisun thistle and soft bird’s-beak identified in previous record searches or surveys are extant, identify any new occurrences, and cover any portions of the study area not previously identified. The extent of compensation for direct loss of or indirect effects on Suisun

thistle and soft bird's-beak will be based on these survey results. Locations of the plants in proposed construction areas will be recorded using a GPS unit and flagged.

The following measures will be implemented:

- Design restoration projects to avoid the direct, temporary loss of occupied habitat from construction activities for Suisun thistle. In tidal restoration areas, Suisun thistle occurrences may experience the indirect effect of tidal damping. This effect will be monitored and adaptively managed to ensure the occurrence is protected from loss.
- If a soft bird's-beak occurrence has more than 10 individuals, no more than 5% of the total number of individuals in the occurrence will be removed. If an occurrence has 10 or fewer individuals, all individuals may be removed. Loss of individuals for all occurrences will be offset through replacement of occupied habitat at a ratio of at least 1:1, to achieve no net loss of occupied habitat.
- To minimize the spread of nonnative, invasive plant species from restoration sites, Reclamation will retain a qualified botanist or weed scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas to be cleared contain invasive plants, then chipped vegetation material from those areas will not be used for erosion control; in these cases, the material will be disposed of to minimize the spread of invasive plant propagules (e.g., by burning, composting). All revegetation materials (such as mulches and seed mixtures used during restoration) shall be certified weed-free and come from locally adapted native plant materials.
- To minimize the introduction of invasive plant species, construction vehicles and construction machinery will be cleaned prior to entering construction sites that are in or adjacent to natural communities other than cultivated lands and prior to entering any restoration sites or conservation lands other than cultivated lands. Vehicles travelling off paved roads in areas with infestations of invasive plant species will be cleaned before travelling to other parts of the study area. Cleaning stations will be established at the perimeter of covered activities along construction routes as well as at the entrance to reserve system lands. Biological monitoring will include locating and mapping locations of invasive plant species within the construction areas during the construction phase and the restoration phase. Infestations of invasive plant species will be targeted for control or eradication as part of the restoration and revegetation of temporarily disturbed construction areas.
- Reclamation will ensure that covered activities in designated critical habitat areas for Suisun thistle or soft bird's-beak, if any, will not result in the adverse modification of any of the primary constituent elements for Suisun thistle or soft bird's-beak critical habitat. The CDFW Suisun Marsh Unit tracks both of these species (GIS-mapped) in Suisun Marsh. No covered activities will take place within designated Suisun thistle or soft bird's-beak critical habitat areas without prior written concurrence from USFWS that such activities will not adversely modify any primary constituent elements of Suisun thistle or soft bird's-beak critical habitat. Primary constituent elements for Suisun thistle are defined as follows.
 - Persistent emergent, intertidal, estuarine wetland at or above the mean high water mark as extended directly across any intersecting channels).
 - Open channels that periodically contain moving water with ocean-derived salts in excess of 0.5%.

- Gaps in surrounding vegetation to allow for seed germination and growth.
- Primary constituent elements for soft bird's-beak are defined as follows.
 - Persistent emergent, intertidal, estuarine wetland at or above the mean high water mark (as extended directly across any intersecting channels).
 - Rarity or absence of plants that naturally die in late spring (winter annuals).
 - Partially open spring canopy cover at ground level, with many small openings to facilitate seedling germination.

Mitigation Measure BIO-26: Other Special-Status Plant Species (Contra Costa Goldfields, Delta Button-Celery, Delta Tule Pea, Mason's Lilaeopsis, Suisun Marsh Aster, Bolander's Water Hemlock, Sanford's Arrowhead)

A complete botanical survey of project sites in areas of suitable habitat for special-status plants will be completed using *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018). The surveys will be floristic in nature and conducted in a manner that maximizes the likelihood of locating special-status plant species or special-status natural communities that may be present (i.e., during the appropriate season and at an appropriate level of ground coverage).

Special-status plant surveys required for project-specific permit compliance will be conducted during the planning phase to allow design of the individual project activities to avoid or minimize adverse impacts to habitat for specified covered plants. The purpose of these surveys will be to verify that the locations of special-status plants identified in previous record searches or surveys are extant, identify any new special-status plant occurrences, and cover any portions of the study area not previously identified. The extent of mitigation of direct loss of or indirect effects on special-status plants will be based on these survey results. Locations of special-status plants in proposed construction areas will be recorded using a GPS unit and flagged.

The following measures will be implemented.

- Design restoration projects to avoid the direct, temporary loss of occupied habitat from construction activities for other special-status plant species. If other special-status plant species occur in a floodplain restoration area, restoration projects may be designed to include occupied habitat in the restored floodplain provided ground disturbance is avoided in the occupied habitat and the restoration is designed such that the anticipated level of flooding and scouring is compatible with the life-history needs of the covered plant species. In tidal restoration areas, occurrences may experience the indirect effect of tidal damping. This effect will be monitored and adaptively managed to ensure the occurrence is protected from loss.
- Avoid modeled habitat for vernal pool plants to the maximum extent practicable. Where practicable, no ground-disturbing activities or alterations to hydrology will occur within 250 feet of vernal pools. Reclamation will ensure that there will be no adverse modification of critical habitat for vernal pool plants.
- Avoid the loss of extant occurrences of all other special-status plant species.
- If an occurrence has more than 10 individuals, no more than 5% of the total number of individuals in the occurrence will be removed. If an occurrence has 10 or fewer individuals, all individuals may be removed. Loss of individuals for all occurrences will be offset through

replacement of occupied habitat at a ratio of at least 1:1, to achieve no net loss of occupied habitat.

- To minimize the spread of nonnative, invasive plant species from restoration sites, Reclamation will retain a qualified botanist or weed scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas to be cleared contain invasive plants, then chipped vegetation material from those areas will not be used for erosion control; in these cases, the material will be disposed of to minimize the spread of invasive plant propagules (e.g., by burning, composting). All revegetation materials (such as mulches and seed mixtures used during restoration) shall be certified weed-free and come from locally adapted native plant materials.
- To minimize the introduction of invasive plant species, construction vehicles and construction machinery will be cleaned prior to entering construction sites that are in or adjacent to natural communities other than cultivated lands, and prior to entering any project restoration sites or conservation lands other than cultivated lands. Vehicles travelling off paved roads in areas with infestations of invasive plant species will be cleaned before travelling to other parts of the project. Cleaning stations will be established at the perimeter of covered activities along construction routes as well as at the entrance to conservation lands. Biological monitoring will include locating and mapping locations of invasive plant species within the construction areas during the construction phase and the restoration phase. Infestations of invasive plant species will be targeted for control or eradication as part of the restoration and revegetation of temporarily disturbed construction areas.
- This mitigation measure does not apply to the routine management and maintenance activities of Reclamation. Reclamation will determine during implementation the most effective and cost-efficient means to minimize the unintentional spread of invasive plants through vehicle travel.

E.10.1.1 *Mitigation Measures for Wetlands and Waters of the United States*

Mitigation Measure BIO-27: Wetlands and Waters of the United States

Reclamation will avoid fill of wetlands and waters of the United States to the extent feasible, and will offset unavoidable effects through wetland creation, restoration, or enhancement with the goal of achieving no net loss of wetland acres and functions.

E.11 Regional Economics

None proposed.

E.12 Land Use and Agricultural Resources

Mitigation Measure AG-1: Diversify Water Portfolios

Water users should diversify their water portfolios. Diversification could include the sustainable conjunctive use of groundwater and surface water, water transfers, water conservation and efficiency upgrades, and increased use of recycled water where available.

Mitigation Measure AG-2: Impose Conditions on Discretionary Land Use Approvals

Agencies that approve changes in land use that involve conversion of agricultural land to nonagricultural use should impose conditions on such approvals. Conditions should provide for the protection of an equal area of agricultural land to the agricultural land that would be converted and could include the following methods:

- Provide for a new conservation easement through grant or purchase to protect agricultural land that is not protected at the time of approval.
- Pay in-lieu fees sufficient to purchase easement or land into a fund specified for such purposes.

E.13 Recreation

None proposed.

E.14 Environmental Justice

None proposed.

E.15 Power

None proposed.

E.16 Noise

Mitigation Measure NOI-1. Employ Standard Measures to Reduce Noise Levels from Heavy Equipment

Where applicable, Reclamation and DWR will implement best practices to reduce construction noise levels at noise-sensitive land uses to reduce the potential for negative community reaction. These methods would be implemented to limit construction noise levels to 70 dBA L_{eq} (1 hour) during daytime hours (7:00 a.m. to 7:00 p.m.) and 60 dBA L_{eq} (1 hour) during evening/nighttime hours (7:00 p.m. to 7:00 a.m.) wherever possible.

Potential measures identified to limit construction noise include the following:

- Limiting noise-generating construction operations to daytime hours.
- Locating stationary equipment (e.g., generators, compressors, rock crushers, cement mixers, idling trucks) as far as possible from noise-sensitive land uses.
- Prohibiting gasoline or diesel engines from having unmuffled exhaust.
- Requiring that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer and that all equipment be operated and maintained to minimize noise generation.
- Preventing excessive noise by shutting down idle vehicles or equipment.
- Using noise-reducing enclosures around noise-generating equipment.

- Selecting haul routes that affect the fewest number of people.
- Constructing barriers between noise sources and noise-sensitive land uses, or taking advantage of existing barrier features (e.g., terrain, structures) to block sound transmission to noise-sensitive land uses. Barriers would be designed to obstruct the line of sight between the noise-sensitive land use and on-site construction equipment.
- Notifying adjacent residents in advance of construction work.

E.17 Hazards and Hazardous Materials

Mitigation Measure HAZ-1: Prepare and Implement Site-Specific Mosquito Management Plans

Reclamation will consult/coordinate with appropriate Mosquito and Vector Control Districts (MVCDs) in the study area prior to implementing tidal and floodplain habitat restoration to develop and implement site-specific mosquito management plans to aid in mosquito management. The mosquito management plans, which will include applicable BMPs from *Best Management Practices for Mosquito Control in California* (CDPH and MVCAC 2012), will address habitat design considerations, water management practices, vegetation management, biological controls, and restored habitat maintenance.

Mitigation Measure HAZ-2: Comply with FAA Safety Guidelines on Wetlands and Wildlife Attractants as Identified in the FAA Draft Advisory Circular 150/5200-33C

For habitat restoration in the study area that is within 5 miles of a public use airport and has the potential to attract waterfowl and other birds, Reclamation will comply with FAA safety guidelines on wetlands and wildlife attractants, as identified in the FAA Draft Advisory Circular 150/5200-33C Sections 1 and 2.4 (FAA 2019), to avoid or minimize the potential for bird-aircraft strikes resulting from habitat restoration.

Mitigation Measure HAZ-3: Prepare and Implement a Hazardous Materials Management Plan for Actions That Will Require Handling Hazardous Materials in Reportable Quantities (CCR, Title 19, Division 2)

For actions that will require handling hazardous materials in quantities equal to or greater than 55 gallons of a liquid, 500 pounds of a solid, or 200 cubic feet of compressed gas, or extremely hazardous substances above the threshold planning quantity (40 CFR, Part 355, Appendix A), Reclamation will prepare and implement a hazardous materials management plan (HMMP). The HMMP will contain, at minimum, the following elements:

- A site plan
- An emergency plan
- An inventory of hazardous materials
- A description of preventative measures to be implemented to avoid accidental spills, hazardous materials management, and storage
- A description of the actions that will be taken in the event of a hazardous material spill
- A training program for employees on the safe on-site use and storage of hazardous materials.

E.18 Geology and Soils

None proposed.

