

APPENDIX A

Mitigation Monitoring and Reporting Program

This Mitigation Monitoring and Reporting Program (MMRP) has been prepared by the California Department of Fish and Game (CDFG) in conjunction with the Proposed Project/Action. The Proposed Project/Action has been evaluated in an Initial Study/Environmental Assessment and Mitigated Negative Declaration/Finding of No Significant Impact prepared in accordance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). The legislation requires public agencies to ensure that adequate mitigation measures are implemented and monitored for Mitigated Negative Declarations.

The legal basis for the development and implementation of the MMRP lies within both CEQA (including the California Public Resources Code) and NEPA. Sections 21002 and 21002.1 of the California Public Resources Code state:

- Public agencies are not to approve projects as proposed if there are feasible alternatives or feasible mitigation measures available that would substantially lessen the significant environmental effects of such projects; and each public agency shall mitigate or avoid the significant effects on the environment of projects that it carries out or approves whenever it is feasible to do so.
- Section 21081.6 of the California Public Resources Code further requires that the public agency shall adopt a reporting or monitoring program for the changes made to the project or conditions of project approval, adopted to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance with mitigation measures during project implementation. The monitoring program must be adopted when a public agency makes its findings under CEQA so that the program can be made a condition of project approval in order to mitigate significant effects on the environment.

NEPA 40 CFR Sections 1502.14f requires:

- Agencies shall include appropriate mitigation measures not already included in the proposed action or alternatives.

This MMRP has been developed to ensure that project sponsor, Meridian Farms Water Company (MFWC), carries out the adopted measures to mitigate and/or avoid significant environmental impacts associated with the construction and operation of the Proposed Project/Action. This MMRP identifies new and/or modified mitigation measures specific to the Phase 2 Proposed Project/Action (Table C-1) as well as applicable 2008 IS/EA measures previously adopted by the CDFG (Table C-2). These 2008 IS/EA mitigation measures would be implemented, enforced, and

monitored consistent with the MMRP for the 2008 IS/EA and are included in the MMRP for the Proposed Project/Action for reference only.

TABLE C-1
MITIGATION MONITORING AND REPORTING PROGRAM
NEW AND/OR REVISED PHASE 2 MITIGATION MEASURES¹

Mitigation Measure	Implementing/ Funding Responsibility	Monitoring/Review Oversight	Timing	Verification of Compliance (Initials and Date)
Biological Resources				
Mitigation Measure BIO-2: Staging Areas. During construction operations, stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas and exclusive of the Environmentally Sensitive Areas (ESAs). A clear and solid barrier fence, such as a combination of exclusionary and silt fencing, will be installed along the boundaries of the staging area to prevent contamination of ESAs during such operations.	MFWC	CDFG/USBR	Prior to and throughout construction activities	
Mitigation Measure BIO-3: Pre-construction Surveys. No more than 24-hours prior to the commencement of construction activities, a USFWS-approved biologist shall survey areas deemed suitable giant garter snake (GGS) habitat for the presence of GGS. The biologist will provide the USFWS with a written report that adequately documents the methodology and results of the pre-construction survey. These areas shall be re-inspected by the biologist whenever a lapse in construction activity of two and removed at the end of each workday from the entire project site.	MFWC	CDFG/ USFWS	Prior to construction activities	
Mitigation Measure BIO-16: De-watering GGS Habitat. During the giant garter snake active period (May 1-September 31), giant garter snake aquatic habitat may be dewatered starting on April 15. Any dewatered habitat must remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling the dewatered habitat.	MFWC	CDFG/USBR	15 consecutive days prior to construction in any dewatered areas after April 15.	
Mitigation Measure BIO-18: Compensation. Compensation for temporary and permanent impacts to GGS habitat is the responsibility of MFWC. Temporary impacts shall be restored to pre-project conditions. Areas subject to temporary impacts shall be limited to one season (the calendar year period between May 1 and October 1) and be restored within two seasons. In addition, GGS habitats temporarily disturbed during the inactive season (3.4 acres of aquatic habitat and 6.4 acres of upland habitat) will be replaced at a level of 1:1 by purchasing credits in a USFWS-approved mitigation bank prior to project construction.	MFWC	CDFG/USBR	After completion of construction activities	
Mitigation Measure BIO-A: Spoil Sites. Spoil sites shall be located so they do not drain directly into the waterways. If a spoil site drains into a water body, catch basins shall be constructed to intercept sediment before it reaches the channels. Spoil sites shall be graded to reduce the potential for erosion.	MFWC	CDFG/USBR	Prior to and throughout construction activities	
Mitigation Measure BIO-B: Hazardous Materials. A spill prevention plan for potentially hazardous materials shall be prepared and implemented. The plan shall include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting of any spills. If necessary, containment berms shall be constructed to prevent spilled materials from reaching the creek channels.	MFWC	CDFG/USBR	Prior to construction activities	

Mitigation Measure	Implementing/ Funding Responsibility	Monitoring/Review Oversight	Timing	Verification of Compliance (Initials and Date)
Mitigation Measure BIO-C: Storage. Equipment and materials shall be stored at least 50 feet from waterways. No debris such as trash and spoils shall be deposited within 100 feet of waterways. Staging and storage areas for equipment, materials, fuels, lubricants and solvents, shall be located outside of the stream channel and banks. Stationary equipment such as motors, pumps, generators, compressors and welders, located within or adjacent to the stream shall be positioned over drip pans. Any equipment or vehicles driven and/or operated within or adjacent to the stream shall be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life. Vehicles shall be moved away from the stream prior to refueling and lubrication.	MFWC	CDFG/USBR	Throughout construction activities	
Mitigation Measure BIO-D: Vehicle Maintenance. Proper and timely maintenance for vehicles and equipment used during construction shall be provided to reduce the potential for mechanical breakdowns leading to a spill of materials into or around the creeks. Maintenance and fueling shall be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from sensitive drainages).	MFWC	CDFG/USBR	Throughout construction activities	
Mitigation Measure BIO-E: Dust Prevention. Water used for dust abatement, if necessary, shall be acquired from an authorized off-site source. Water shall be a clean water source in accordance with California RWQCB Construction Storm Water Program and/or as authorized under a separate National Pollutant Discharge Elimination System (NPDES) permit.	MFWC	CDFG/USBR	Throughout construction activities	
Mitigation Measure BIO-F: Daily Monitoring. A qualified biological monitor shall be on site during in-water construction activities. The biological monitor shall be authorized to halt construction if impacts to special-status salmonid species are evident.	MFWC	CDFG/USBR	Throughout construction activities	
Mitigation Measure BIO-G: Riparian Habitat. Current riparian vegetation shall be retained to extent feasible.	MFWC	CDFG/USBR	Throughout construction activities	
Mitigation Measure BIO-H: Fish Rescue Plan. A fish rescue plan shall be prepared by MFWC prior to the implementation of the project and provided for review and comment to U.S. National Marine Fisheries Service (NMFS), USFWS, and CDFG as appropriate. A qualified fisheries biologist will design and conduct a fish rescue and relocation effort to collect fish from the area within the cofferdam involving the capture and return of those fish to suitable habitat within the Sacramento River. To ensure compliance, a fisheries biologist shall provide observation during initial dewatering activities within the cofferdam. Following the fish rescue effort, a report shall be prepared by the fisheries biologist and submitted to NMFS within 30 days.	MFWC	NMFS	Prior to and during construction activities	
Mitigation Measure BIO-22: Swainson's Hawk, Nesting Raptors and Other Nesting Bird Survey. For any construction activities that will occur between March 1 and August 31 of any given year, the applicant shall conduct preconstruction surveys in suitable nesting habitat within 0.5 mile of the construction area for nesting raptors. Surveys shall be conducted by a qualified biologist. In addition, all trees slated for removal during the nesting season shall be surveyed by a qualified biologist no more than 48-hours before removal to ensure that no nesting birds are occupying the tree. If active nests are found during the survey, the applicant shall implement appropriate mitigation measures to ensure that the species will not be adversely affected, which will include establishing a	MFWC	CDFG/USBR	Prior to and throughout construction activities	

Mitigation Measure	Implementing/ Funding Responsibility	Monitoring/Review Oversight	Timing	Verification of Compliance (Initials and Date)
<p>no-work buffer zone as, approved by the CDFG, around the active nest. The no-work buffer may vary depending on species and site specific conditions as approved by CDFG. Appropriate mitigation measures include delaying construction activities until a qualified biologist determines that juveniles have fledged the nest(s), or establishing a "no construction" zone buffer around the nest.</p> <p>The results of the survey shall be documented in a letter report that is distributed to the CDFG. These measures would ensure compliance with the Migratory Bird Treaty Act and CDFG Code 3503.5.</p>				
<p>Mitigation Measure BIO-23: Riparian Habitat Exclusion. Where construction work occurs adjacent to riparian habitat (i.e., at the existing Drexler Diversion and Pumping Plant and the Grimes Canal modifications), there shall be no encroachment by construction equipment or personnel into existing riparian habitat areas located along the Sacramento River. Storage or parking of equipment shall be restricted within 100 feet of riparian habitat.</p>	MFWC	CDFG/USBR	Throughout construction activities	
<p>Mitigation Measure BIO-I: Pre-construction surveys for burrowing owls shall be conducted by a qualified biologist as approved by the CDFG within 30-days prior to the start of work activities where land construction is planned in known or suitable habitat. If construction activities are delayed for more than 30 days after the initial preconstruction surveys, then a new preconstruction survey shall be required. All surveys shall be conducted in accordance with the CDFG/California Burrowing Owl Consortium survey protocols. This survey can be conducted concurrently with Mitigation Measure BIO-22.</p>	MFWC	CDFG/USBR	Prior to and throughout construction activities	
<p>If burrowing owls are discovered in the proposed project site vicinity during construction, the onsite biologist shall be notified immediately. Occupied burrows should not be disturbed during the nesting season (February 1 through August 31) unless a qualified biologist approved by the CDFG verifies through non-invasive methods that either: (1) the birds have not begun egg-laying and incubation; or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.</p>				
<p>If this criteria is not met, occupied burrows during the nesting season will be avoided by establishment of a no-work buffer of 250-foot around the occupied/active burrow. Where maintenance of a 250-foot no-work buffer zone is not practical, the applicant shall consult with the CDFG to determine appropriate avoidance measures. Burrows occupied during the breeding season (February 1 to August 31) will be closely monitored by the biologist until the young fledge/leave the nest. The onsite biologist shall have the authority to stop work if it is determined that construction related activities are disturbing the owls.</p>				
<p>If criterion 1 or 2 above are met and as approved by CDFG, the biologist shall undertake passive relocation techniques by installing one-way doors in active and suitable burrows allowing owls to escape but not re-enter. Owls should be excluded from the immediate impact zone and within a 160-foot buffer zone by having one-way doors placed over the entrance to prevent owls from inhabiting those burrows.</p>				
<p>After nesting season ends (August 31) and the burrow is deemed unoccupied by the biologist, passive relocation techniques shall take place. Construction activities may occur once a qualified biologist has deemed the burrows are unoccupied.</p>				

Mitigation Measure	Implementing/ Funding Responsibility	Monitoring/Review Oversight	Timing	Verification of Compliance (Initials and Date)
<p>Mitigation Measure BIO-J: Wetlands. If it is determined that the Proposed Project/Action impacts waters of the U.S., the MFWC shall obtain all required permit approvals from the Corps, Regional Water Quality Control Board (RWQCB), CDFG and any other agencies with permitting responsibilities for construction activities within jurisdictional features. Permit approvals and certifications would likely include the following:</p> <p><u>Clean Water Act Section 404.</u> Permit approval from the Corps shall be obtained for the placement of dredge or fill material in waters of the U.S. pursuant to Section 404 of the federal Clean Water Act. The Section 404 permit application would require a delineation of wetlands and other waters of the U.S., a jurisdictional determination from the Corps, and preparation of a Pre-Construction Notification (PCN) and supporting documentation. A PCN outlines project activities, areas of impact, construction techniques, and methods for avoiding and reducing impacts to jurisdictional features. State and federal regulations require that the project applicant avoid or minimize impacts to wetlands and waters and develop appropriate protection for wetlands. Wetlands that cannot be avoided must be compensated to result in "no net loss" of wetlands to ensure that the project would maintain the current functions and values of onsite wetland habitats.</p> <p><u>Clean Water Act Section 401 Water Quality Certification/Porter-Cologne Act.</u> Approval of Water Quality Certification (WQC) under the CWA and/or Waste Discharge Requirements (WDRs) under the Porter-Cologne Act shall be obtained from the RWQCB for work within jurisdictional waters. Application for a WQC requires an application and supporting materials, including construction techniques, areas of impact, mitigation measures, project schedule, and proof of CEQA compliance. Application for a WDR requires an application and supporting materials, including a characterization of the discharge which includes but is not limited to: design and actual flows; a list of constituents and the discharge concentration of each constituent; a list of other appropriate waste discharge characteristics; a description and schematic drawing of all treatment process; a description of any BMPs used; and a description of disposal methods. Proof of CEQA compliance is also required.</p> <p><u>California Fish and Game Code Section 1602.</u> CDFG requires a Streambed Alteration Agreement for activities that result in alteration of the bed or bank of a stream (typically the top of bank or edge of riparian habitat, whichever is greater), or that adversely impact fish or wildlife resources. The notification package must include supporting materials, including construction techniques, areas of impact, mitigation measures, project schedule, and proof of CEQA compliance.</p>	MFWC	CDFG/USBR	Prior to construction activities	
<p>Mitigation Measure BIO-28: Compensation for Loss of Jurisdictional Wetlands. If the Proposed Project/Action results in the permanent degradation of riverine and wetland habitat, those impacts shall be compensated for at a 1:1 ratio through the purchase of similar habitat value from a USFWS-approved conservation bank. Compensation shall take the form of wetland and/or riverine preservation or creation in accordance with the Corps and CDFG mitigation requirements, as required under project permits. Preservation and creation may occur onsite through a conservation agreement or offsite through purchasing credits at a Corps approved mitigation bank.</p>	MFWC	CDFG/USBR	After completion of construction activities	
Transportation and Traffic				
<p>Mitigation Measure TRAFFIC-1: Following completion of construction activities, contractor(s) shall restore any damage to construction access routes to existing conditions or better.</p>	MFWC	CDFG/USBR	After completion of construction activities	

Mitigation Measure	Implementing/ Funding Responsibility	Monitoring/Review Oversight	Timing	Verification of Compliance (Initials and Date)
<p>Mitigation Measure TRAFFIC-2: Prior to and during construction activities, contractor(s) shall prepare and implement a Traffic Control Plan in accordance with professional engineering standards prior to construction. The Traffic Control Plan should include the following requirements, or equally effective measures:</p> <ul style="list-style-type: none"> • Emergency services access to local land uses shall be maintained at all times for the duration of construction activities. Local emergency service providers shall be informed of road closures and detours. • For roadways requiring full closures, contractor(s), in coordination with Sutter County, shall develop circulation and detour plans to minimize impacts to local street circulation. This would include the use of signing to guide vehicles onto alternative roads around the construction zone. • Advanced warning signs of construction activities shall be posted to allow motorists to select alternative routes in advance. This will include noticing of residents and businesses fronting the alignment at least two weeks prior to the commencement of construction activities. • Access for local land uses including during construction activities shall be maintained. • Roadside safety protocols shall be complied with, so as to reduce the risk of accident. • A telephone resource shall be arranged to address public questions and complaints during project construction. 	MFWC	CDFG/USBR	Prior to and throughout construction activities	

¹Measures modified from the 2008 IS/EA are identified by numerals (e.g. BIO-2), while new measures are identified by letters (e.g. BIO-A)

TABLE C-2
MITIGATION MONITORING AND REPORTING PROGRAM
2008 IS/EA ADOPTED MITIGATION MEASURES

Mitigation Measure	Implementing/ Funding Responsibility	Monitoring/Review Oversight	Timing	Verification of Compliance (Initials and Date)
Air Quality				
Mitigation Measure AIR-1. Implement FRAQMD Best Available Mitigation Measures For Construction Activity: Implement PM10 control measures outlined in the FRAQMD Fugitive Dust Control Plan.	MFWC	CDFG/USBR	Prior to approval of dust control plan	
MFWC shall require its construction contractor(s) to assemble a comprehensive inventory list (i.e., make, model, engine year, horsepower, emission rates) of all heavy-duty off-road (portable and mobile) equipment (50 horsepower and greater) that will be used an aggregate of 40 or more hours for both Phases 1 and 2 construction activities and apply the following mitigation measure: <i>Reducing NOx emissions from off-road diesel powered equipment</i> MFWC or its construction contractor(s) shall provide a plan for approval by FRAQMD demonstrating that the heavy-duty (equal to or greater than 50 horsepower) off-road equipment to be used in construction of Phases 1 and 2, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20 percent NOx reduction and 45 percent particulate reduction 1 compared to the most recent CARB fleet average at time of construction. A Construction Mitigation Calculator (MS Excel) may be downloaded from the SMAQMD web site to perform the fleet average evaluation http://www.airquality.org/ceqa/index.shtml . Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, perform offsite mitigation projects, provide funds for air district offsite mitigation projects, and/or other options as they become available. The District should be contacted to discuss alternative measures.	MFWC	CDFG/USBR	Throughout construction activities	
Construction equipment exhaust emissions shall not exceed FRAQMD Regulation III, Rule 3.0, Visible Emissions limitations (40 percent opacity or Ringelmann 2.0). Operators of vehicles and equipment found to exceed opacity limits shall take action to repair the equipment within 72 hours or remove the equipment from service. Failure to comply may result in a Notice of Violation.	MFWC	CDFG/USBR	Throughout construction activities	
The primary contractor shall be responsible to ensure that all construction equipment is properly tuned and maintained.	MFWC	CDFG/USBR	Throughout construction activities	
Minimize idling time to 10 minutes – saves fuel and reduces emissions.	MFWC	CDFG/USBR	Throughout construction activities	
No open burning of removed vegetation during infrastructure improvements. Vegetative material should be chipped or delivered as waste to energy facilities.	MFWC	CDFG/USBR	Throughout construction activities	
Portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, may require California Air Resources Board (CARB) Portable Equipment Registration with the State or a local district permit. The owner/operator shall be responsible for arranging appropriate consultations with the CARB or the District to	MFWC	CDFG/USBR	Throughout construction activities	

determine registration and permitting requirements prior to equipment operation at the site.

Biological Resources			
Mitigation Measure BIO-1: Traffic Routing, and Movement:	MFWC	CDFG/USBR	Prior to and throughout construction activities
During construction operations, the number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary.			
Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance.	MFWC	CDFG/USBR	Prior to and throughout construction activities
Project-related vehicles shall observe a 20-mile-per-hour speed limit within construction areas, except on County roads and on State and Federal highways. This is particularly important during periods when the GGS may be sunning or moving on roadways. All heavy equipment, vehicles, and supplies will be stored at the designated staging area at the end of each work period.	MFWC	CDFG/USBR	Prior to and throughout construction activities
Mitigation Measure BIO-4: Timing of Construction:	MFWC	CDFG/USFWS	May 1 through October 1
Construction activity within GGS habitat (e.g. aquatic, upland, and rice habitat) shall be conducted between May 1 and October 1.			
If it appears that construction activity may go beyond October 1, the project proponents shall contact the USFWS as soon as possible, but not later than September 15 of the year in question, to determine if additional measures are necessary to minimize take.	MFWC	CDFG/USFWS	May 1 through September 15 (Conditionally).
Construction activities within 200 feet from the banks of snake aquatic habitat will be avoided during the snake's inactive season. If this is not feasible, the Project Proponent must consult with USFWS to determine measures to avoid impacts to GGS.	MFWC	CDFG/USFWS	May 1 through October 1 May 1 through September 15 (Conditionally)
Mitigation Measure BIO-6: Worker Awareness Training:	MFWC	CDFG/USBR /USFWS	Prior to and throughout construction activities
A Worker Environmental Awareness Training Program for construction personnel shall be conducted by the USFWS-approved biologist for all construction workers, including contractors, prior to the commencement of construction activities.			
The program shall provide workers with information on their responsibilities with regard to the snake, an overview of the life history of this species, information on take prohibitions, protections afforded this animal under the Act, and an explanation of the relevant terms and conditions of this biological opinion.	MFWC	CDFG/USBR /USFWS	Prior to and throughout construction activities
Written documentation of the training must be submitted to the Sacramento Fish and Wildlife Office within 30 days of the completion of training. As needed, training shall be conducted in Spanish for Spanish language speakers.	MFWC	CDFG/USBR /USFWS	Prior to and throughout construction activities
Mitigation Measure BIO-7: Install Snake Exclusion Fencing:	MFWC	CDFG/USBR	Prior to and throughout construction activities
Prior to the commencement of construction activities, high visibility fencing will be erected around the habitats of federally listed species to identify and protect these designated ESAs from encroachment of personnel and equipment. These areas will be avoided by all construction personnel.			
The fencing shall be inspected by the Contractor before the start of each work day and maintained by the Contractor until completion of the project. The fencing may be removed only when the construction of the project is completed.	MFWC	CDFG/USBR	Prior to the start of each work day
Fencing will be established in upland immediately adjacent to aquatic snake habitat and extending	MFWC	CDFG/USBR	Prior to and throughout

up to 200 feet from construction activities. Silt fencing, if properly installed, may serve as suitable snake exclusion fencing.

Mitigation Measure BIO-8: Provide Adequate Signage:

Signs will be posted by the Contractor every 50 feet along the edge of the ESAs, with the following information: "This area is habitat of federally-threatened and/or endangered species, and must not be disturbed. These species are protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained by the Contractor for the duration of construction.

MFWC

CDFG/USBR

construction activities

Prior to and throughout construction activities

Mitigation Measure BIO-9: Implement BMPs:

Best Management Practices (BMPs), including a Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP), will be implemented to minimize effects to the GGS during construction.

MFWC

CDFG/USBR

Prior to and throughout construction activities

Best management practices will be implemented to prevent sedimentation from entering ESAs and to reduce erosion, dust, noise, and other deleterious aspects of construction related activities. These BMPs may include, but are not limited to, silt fencing, temporary berms, restrictions on cleaning equipment in or near ESAs, installation of vegetative strips, and temporary sediment disposal. Runoff from dust control and hazardous materials will be retained on the construction site and prevented from flowing into the ESAs.

MFWC

CDFG/USBR

Prior to and throughout construction activities

Mitigation Measure BIO-10: Erosion Control Materials:

Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material shall be used for erosion control and other purposes at the ESA to ensure that the GGS is not trapped or becomes entangled. This limitation shall be communicated to the contractor using special provisions included in the bid solicitation package.

MFWC

CDFG/USBR/NMFS

Prior to and throughout construction activities

Mitigation Measure BIO-11: Properly Dispose of Garbage:

To eliminate an attraction to predators of the snake, all food-related trash items, such as wrappers, cans, bottles, and food scraps, must be disposed of in closed containers and removed at the end of each workday from the entire project site.

MFWC

CDFG/USBR

Throughout construction activities

Mitigation Measure BIO-12: Use Approved Aggregate, Fill, or Borrow Materials:

The Contractor shall provide documentation that aggregate, fill, or borrow material provided for the proposed project was obtained in compliance with the State Mining and Reclamation Act (SMARA). Evidence of compliance with the Act shall be demonstrated by providing the resident engineer with one of the following: 1) a letter from the USFWS stating that the use of the borrow pit will not result in the incidental take of species; 2) an incidental take permit for contractor-related activities issued by the USFWS pursuant to section 10(a)(1)(B) of the Act; 3) a biological opinion or letter concurring with a "not likely to adversely affect" determination issued by the USFWS to the Federal agency having jurisdiction over contractor-related services; 4) a letter from the USFWS concurring with the "no effect" determination for contractor-related activities; or 5) contractor submittal of information to the resident engineer indicating compliance with the SMARA and provision of County land use permits and California Environmental Quality Act (CEQA) clearance.

MFWC

CDFG/USBR /USFWS

Prior to and throughout construction activities

Mitigation Measure BIO-13: Restore Temporarily Affected Habitat:

After construction activities are complete, any temporary fill or construction debris shall be removed and disturbed areas restored to their pre-project conditions. An area subject to "temporary" disturbance includes any area that is disturbed during the project, but that, after project completion, will not be subject to further disturbance and has the potential to be re-vegetated.

MFWC

CDFG/USBR /USFWS

After completion of construction activities

All ESA GGS habitats subject to temporary ground disturbances, including storage and staging areas and temporary roads, will be restored to pre-project conditions. If appropriate, these areas shall also be re-contoured to pre-project conditions. A written report shall be submitted to the USFWS within ten (10) working days of the completion of construction at the project site and restoration of the site to pre-project conditions.

MFWC CDFG/USBR /USFWS After completion of construction activities

A written report shall be submitted to the USFWS within ten (10) working days of the completion of construction at the project site and restoration of the site to pre-project conditions.

MFWC CDFG/USBR /USFWS 10 days after completion of construction activities

Mitigation Measure BIO-14: Post-construction Monitoring:

An inspection of the site, with a photo documentation report showing pre- and post-project area photos, will be conducted and photos and a brief report will be submitted to USFWS one year from implementation of restoration to pre-project conditions.

MFWC CDFG/USBR /USFWS After the completion of construction activities

Measure BIO-17: Giant Garter Snake Monitoring During Construction. A USFWS-approved biologist shall inspect construction-related activities at the proposed project site to ensure that no unauthorized take of federally listed species or destruction of their habitat occurs. The biologist shall be available for monitoring throughout all phases of construction that may result in adverse effects to the giant garter snake. This includes clearing and grubbing and other construction activities in the areas of wetland vegetation/aquatic habitat, adjacent upland habitat, and during exclusion fence installation. Furthermore, the biologist shall have the authority through communication with the resident engineer to stop construction activities in the immediate area if a giant garter snake is encountered during construction until appropriate corrective measures have been completed or until the snake is determined to be unharmed. Snakes encountered during construction activities shall be allowed to move away from the area on their own volition. The biologist shall notify the USFWS immediately if any listed species are found on-site, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take of listed species to the USFWS immediately by telephone at 916/ 414-6600 and by electronic mail or written letter addressed to the Chief, Endangered Species Division, within three (3) working days of the incident. The Service does not authorize any handling or moving of a giant garter snake by other than USFWS-permitted biologist.

MFWC CDFG/USFWS Throughout construction activities

Mitigation Measure BIO- 19: Pile Driving Activities:

For Phases 1 and 2, the contractor shall use vibrational pile driving to the greatest extent feasible. If percussive pile driving is necessary, its use shall be minimized to the maximum extent possible and comply with the following *Interim Criteria for Injury of Fish to Pile Driving Operations* (Popper et al., 2006):

The Sound Exposure Level (SEL) shall not exceed 187 dB (re:1 $\mu\text{Pa}^2 \text{ sec}$) in any single strike, measured at a distance of 32.8 ft from the source;

The peak sound pressure level should not exceed 208 dB (re:1 $\mu\text{Pa}_{\text{peak}}$) in any single strike, measured at a distance of 32.8 ft from the source.

MFWC CDFG/USBR Throughout construction activities

Mitigation Measure BIO-21: Tree Removal Period:

If possible, trees required for removal shall be removed outside of the nesting period (nesting period = March 1st through August 31st).

MFWC CDFG/USBR March 1 through August 31

Mitigation Measure BIO-20: Dewatering:

Pump(s) used for dewatering the construction site will be screened according to NMFS fish screening criteria for anadromous salmonids (NMFS, 1997b). A qualified biologist will be on-site

MFWC CDFG/USBR/NMFS Throughout construction activities

during such pumping activities to ensure that any fish that may be present within the construction area are relocated to suitable habitat near the project area.

Hydrology and Water Quality			
Mitigation Measure HYDRO-1: Identify Site-Specific Control Measures:	MFWC	CDFG/USBR	Prior to, throughout, and following construction activities
To minimize the exposure of sediments to runoff, MFWC or its construction contractor(s) will identify and implement site-specific construction and post-construction water quality control measures for both Phase 1 and 2 of the Proposed Project/Action facilities.			
Control measures will include those contained in the Construction Contractor's Guide and Specification of the Caltrans Storm Water Quality Handbook (The Handbook; April 1997); Sutter County Code Section 5, Storm Drainage Design, and the State Water Resources Control Board (SWRCB) Water Quality Order 99-08-DWQ, NPDES, General Permit for Stormwater Discharge Associated with Construction Activity.	MFWC	CDFG/USBR	Prior to, throughout, and following construction activities
Noise			
Mitigation Measure NOISE-1. Minimization of the Construction and Operational Noise:	MFWC	CDFG/USBR	Prior to and throughout construction activities
Standard noise abatement measures will be implemented during construction to reduce noise impacts from construction activities. Construction activities will be limited between 7:00 a.m. and 5:00 p.m. on weekdays to reduce potential noise impacts to area residents. In addition, staging areas and stationary noise generating construction equipment will be located as far as possible from sensitive receptors, and all construction equipment will be maintained with the manufacturer's specified noise-muffling devices.			
Final design of the facilities of the Proposed Project/Action will incorporate noise attenuating technologies and noise barriers to mitigate that noise emanating from the facilities at maximum operational load will not exceed applicable standards or lead to cumulative increases in ambient noise levels.	MFWC	CDFG/USBR	During operational activities

MERIDIAN FARMS FISH SCREEN PROJECT

Supplemental Action Specific Implementation Plan for Phase 2

Prepared for:
Meridian Farms Water Company
August 2012

Action Agencies:
U.S. Bureau of Reclamation
California Department of Fish and Game

This page intentionally left blank.

Table of Contents

Chapter 1	1
Introduction.....	1
1.1 Project Background	2
1.2 ASIP Process	6
1.3 Relationship to CALFED Program.....	10
1.4 Species Addressed in this ASIP.....	10
1.5 NCCPA Habitats	20
Chapter 2	23
Description of the Proposed Project/Action	23
2.1 Authorities.....	23
2.2 Proposed Project/Action Area	24
2.3 Proposed Project/Action Characteristics.....	29
2.4 Proposed Project/Action Specifics.....	30
2.5 Construction Phase	38
2.6 Actions Contributing to MSCS Goals.....	40
2.7 Conservation Measures	41
Chapter 3	55
Environmental Baseline.....	55
3.1 Baseline Conditions for Species	56
3.2 Critical Habitat	68
3.3 Essential Fish Habitat	70
Chapter 4	73
Effects of Proposed Project/Action on Special Status Species	73
4.1 Direct and Indirect Effects	74
4.2 Interrelated and Interdependent Effects	74
4.3 Effects on Species.....	74
4.4 Effects on Critical Habitat.....	89
4.5 Effects on Essential Fish Habitat.....	89
Chapter 5	91
Environmental Baseline - NCCPA Communities	91
5.1 NCCPA Habitats	91
5.2 NCCPA Fish Groups	92
Chapter 6	93
Effects of the Proposed Project/Action on NCCPA Communities.....	93
6.1 Proposed Project/Action Effects and Conservation Measures	93
Chapter 7	95
Interrelated, Interdependent, and Cumulative Effects	95
7.1 Interrelated and Interdependent Effects	95
7.2 Cumulative Effects	95
Chapter 8	97
Monitoring Needs.....	97
Chapter 9	99
Changed Circumstances	99
Chapter 10	101
Effects Determination Conclusion	101
10.1 Summary of Effects	101
10.2 Critical Habitat	104
10.3 Essential Fish Habitat	104
10.4 NCCPA Communities.....	105

Chapter 11	107
References	107

Figures

Figure 1-1. Project Location Map
Figure 2-1. Action Area
Figure 2-2. Vegetation in the Action Area
Figure 3-1. Giant Garter Snake Habitat in the Action Area
Figure 4-1. Location of Temporary Giant Garter Snake Habitat Impacts in the Limit of Work Area
Figure 4-2. Location of Permanent Giant Garter Snake Habitat Impacts in the Limit of Work Area – Drexler Relift Pumping Plant

Tables

Table 1-1. MFWC Proposed Project/Action Components
Table 1-2. Animal Species with Potential to Occur in the Action Area
Table 1-3. Plant Species with Potential to Occur in the Action Area
Table 1-4. NCCPA Communities Analyzed in this ASIP
Table 2-1. Proposed Canal Modifications
Table 2-2. Affected Roadway Segments
Table 2-3. CALFED MSCS Species Goal and Conservation Measures for Special-Status Species Occurring in the Action Area
Table 2-4. CALFED Conservation Measures for NCCPA Natural Communities Occurring in the Action Area
Table 3-1. Species, Critical Habitat, and Essential Fish Habitat Addressed in Detail in this ASIP
Table 3-2. Summary of Giant Garter Snake Habitat in the Action Area
Table 4-1. Summary of Special-Status Fish Exposure to Stressors as a Result of the Proposed Project/Action
Table 4-2. Summary of Giant Garter Snake Impacts

Appendices

Appendix A. Species Lists
Appendix B. Photos
Appendix C. Fish Rescue Plan

CHAPTER 1

Introduction

This document is an Action Specific Implementation Plan (ASIP) which analyzes the potential environmental effects on aquatic and terrestrial species of the Meridian Farms Water Company (MFWC) proposed plan to construct positive barrier fish screen diversions on the Sacramento River and to modify their distribution system to accommodate the changed intakes. The MFWC Fish Screen and Diversion Project is divided into two phases, which are described in Chapter 2. An ASIP was prepared and distributed during Phase 1 of the project (see Section 1.2.3). This Supplemental ASIP is being prepared to provide updated ESA information for Phase 2 components of the project. The ASIP was a product of the CALFED Bay-Delta Program (CALFED) and was meant to streamline the regulatory process for CALFED Actions. The MFWC Fish Screen and Diversion Project were included as a CALFED Action.

The CALFED Bay-Delta Program was a collaborative effort of more than 20 Federal and State agencies that seek to resolve water supply and water quality issues as well as restore ecological health of the San Francisco Bay-Delta. After assessing the effects of potential CALFED Actions on the environment, the CALFED agencies developed initial conservation measures that, when implemented, would meet the overall CALFED Program objectives. These are contained within the Multi-Species Conservation Strategy (MSCS).

The MSCS explains how CALFED Program Actions will comply with the Federal Endangered Species Act (FESA), California Endangered Species Act (CESA), and Natural Communities Conservation Planning Act (NCCPA) requirements. The U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) Fisheries used the MSCS as the program-level biological assessment to develop the programmatic Biological Opinions (BOs) for the CALFED Preferred Program Alternative. The California Department of Fish and Game (CDFG) used the MSCS for compliance with the CESA and NCCPA.

The MSCS contains a two-tiered approach to FESA, CESA, and NCCPA compliance that corresponds to the CALFED Program's two-tiered approach to compliance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The first tier of compliance is embodied in the MSCS itself. For the CALFED Program's Project Actions identified in the Programmatic Environmental Impact Statement / Environmental Impact Report (PEIS/EIR) and Record of Decision (ROD), an ASIP is developed to address the FESA, CESA, and NCCPA consultation requirements of Federal and State agencies. As a second tier document, this ASIP focuses on issues specific to MFWC's Fish Screen and Diversion Project (Proposed Project/Action). Therefore, this ASIP addresses the biological assessment requirements related to the Proposed Project/Action described in Chapter 2. The USFWS and NOAA Fisheries may use this ASIP for informal consultation and/or to develop action-specific BOs relative to the

Proposed Project/Action. The CDFG will use this ASIP to address compliance with the CESA and NCCPA.

The CALFED Bay-Delta Program transitioned to the Delta Stewardship Council, established by S.B. No. 1 (Ch. 5, Stats. 09-10, 7th Ex. Sess.), on February 3, 2010. In conjunction with this change, ASIPs are no longer being used by agencies to review new projects. Because Phase 2 is a continuation of the larger MFWC Fish Screen Project, and effects to species and habitat were evaluated through the ASIP process during Phase I, USFWS indicated that this format could be continued in Phase 2 (pers. comm. with T. Adelsbach, USFWS, January 5, 2012).

1.1 Project Background

The MFWC is located in Sutter County, between Interstate 5 and Highway 99, east of the Sacramento River and southwest of the Sutter Bypass. **Figure 1-1** depicts the approximate limits of the MFWC Service Area. MFWC provides irrigation water to three distinct Service Areas encompassing approximately 9,150 acres, with an estimated annual water delivery of 35,000 acre-feet (af). The water service is provided by surface water diversions from the Sacramento River, drain water reuse, and groundwater pumping. Both lined and unlined canals are used for water conveyance. As irrigation water circulates through the canals and laterals, drainage water is collected and pumped into the conveyance facilities via re-lift pumps, providing a blend with better quality irrigation water from the Sacramento River.

MFWC diverts surface water from the Sacramento River under the provisions of a License for Diversion and Use of Water with a priority date of September 10, 1918. Presently MFWC diversions are at three locations on the Sacramento River: Meridian, Drexler, and Grimes. These diversions utilize unscreened intakes which likely entrain juvenile Chinook salmon, steelhead trout, green sturgeon, and other anadromous fish species that pass by the intake. Improvements to these diversions would fulfill conservation goals established by the CVPIA, which passed in 1992 for the protection and recovery of fisheries and fish habitat.

1.1.1 Project Overview

The primary purpose of the Proposed Project/Action is to prevent entrainment of migrating, at-risk, native fish species at MFWC's existing diversion facilities by removing one intake and installing fish screen structures at the other two intakes. Each existing pump utilizes an unscreened intake which likely entrains juvenile Chinook salmon and steelhead trout, green sturgeon and other fish species. Consequently, the continued operation of the MFWC diversion facilities likely remove some of the salmonid and sturgeon out-migrants from the main stem of the Sacramento River. Under the CVPIA, the diversion pumps are now required to operate without causing detrimental effects to migrating fish; therefore, it is essential that fish screens be installed at the water intakes. As the existing diversion or pump station facilities cannot be retrofitted with a fish screen that would comply with CDFG and NOAA Fisheries criteria, MFWC will construct new positive barrier fish screen diversions that meet these criteria. Positive barrier fish screens will physically prevent fish from passing through the intake; these differ from behavioral barrier fish screens which encourage fish to swim away from a structure.

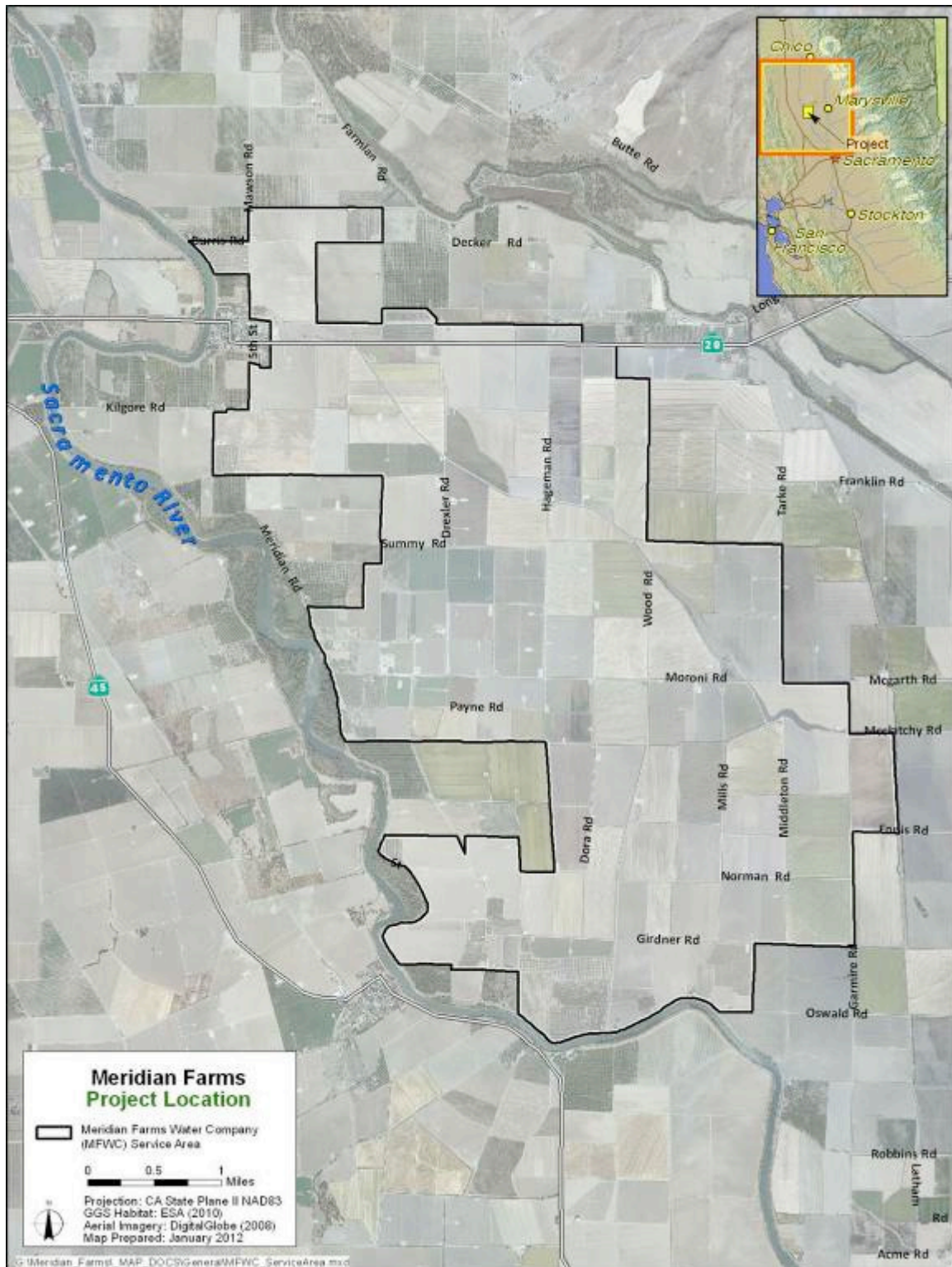


Figure 1-1. Project Location Map

The Proposed Project/Action will allow migrating Chinook salmon, steelhead trout, and green sturgeon to pass by the intake without risk of entrainment and, thus, contribute to the recovery of the anadromous and resident fish populations in the Sacramento River. The Proposed Project/Action will also allow MFWC to continue the diversions even while listed species are present in the vicinity of the diversion, enabling MFWC to provide a reliable long-term water supply to the MFWC Service Area in a manner that complies with present regulatory requirements.

The Proposed Project/Action is composed of several components, which were defined through a March 2002 Feasibility Study and subsequently selected as part the preferred project alternative by the MFWC Board of Directors. MFWC proposes to implement these components, which include the fish screen improvements and other associated conveyance improvements, in two separate phases. Each phase is independent of the other, and each will benefit fish species. The implementation of the Proposed Project/Action in two separate phases is more economically feasible and would coordinate better with MFWC operations. The components of these phases are listed in **Table 1-1** and each component is detailed in Chapter 2.

The Proposed Project/Action Area (Action Area) is defined to include all components of the Proposed Project/Action plus a 200-foot buffer of these components. On the landward side of the levee along the Sacramento River, no direct or indirect effects are anticipated outside this 200-foot zone due to the localized and temporary disturbance of the Proposed Project/Action upon the habitat. Similarly, on the riverside of the levee along the Sacramento River, no direct or indirect effects are anticipated within this 200-foot zone. The benefits resulting from implementation of the Proposed Project/Action, however, extend beyond the Action Area to include the entire Sacramento River migration corridor for fishes, from the Delta to spawning areas upstream from the Action Area. Implementation of the Proposed/Action would benefit fish populations by decreasing fish entrainment in diversions on the Sacramento River.

**TABLE 1-1
MFWC PROPOSED PROJECT/ACTION
COMPONENTS**

PHASE 2
New Meridian Diversion/Pumping Plant
Removal of Existing Meridian Diversion/Pumping Plant
Main Canal Modifications
Drexler Pipeline (option)
New Drexler Re-lift Pumping Plant
Removal of Existing Drexler Diversion/Pumping Plant

1.1.2 Current Management Direction

Currently, MFWC provides water to farmers for irrigation of their crops. There are 173 individual fields within the MFWC water Service Area. In the year 2011, approximately 57 percent of the irrigated area comprised of rice, which was the predominant grain crop. Tomatoes, wheat, and

sunflower are also important crops, with each comprising six to seven percent of the cropping pattern during the same year. Permanent tree crops (orchards) encompass about 10 percent of the planted area, with walnuts being the predominant crop.

MFWC's goals are to be able to maintain water diversion operations while avoiding entrainment of listed fish species present near the water intake. MFWC will achieve this goal by decommissioning and relocating the existing Grimes pumping plant and replacing the existing Meridian and Drexler facilities with a newly consolidated facility that complies with CDFG and NOAA Fisheries fish screen standards. The amount of water diverted from the Sacramento River will not increase as a result of the Proposed Project/Action to construct new facilities, as the existing facilities will be removed.

1.1.3 Implementing Entities

Both Federal and State agencies are involved in administering the MFWC Fish Screen Project. The U.S. Bureau of Reclamation (Reclamation) is the federal agency under NEPA, and the CDFG is the state lead under CEQA. The Project/Action may involve the use of federal funds from Reclamation, and Reclamation would be responsible for administering those funds.

The State and Federal agencies – USFWS, NOAA Fisheries, and CDFG – act as regulatory agencies and are responsible for making recommendations for actions to be taken to protect fish populations and special status wildlife and plant species. Reclamation, is the lead Action Agency under the Federal Endangered Species Action, and also has coordinated agency participation throughout the ASIP process. As MFWC would construct, own, and operate the new facilities in the Project, MFWC would be responsible for implementing operational changes based on the recommendations.

1.1.4 ASIP Contents

To fulfill the requirements of FESA Section 7 and California Fish and Game Code Sections 2835 and 2081, as applicable, the MFWC Fish Screen ASIP includes the following information pursuant to the November 2001 Guide to Regulatory Compliance for Implementing CALFED Actions (CALFED 2001a).

- A detailed project description (Proposed Project/Action – Chapter 2);
- A list of covered species and any other special-status species that may occur in the Action Area (Chapter 3);
- A discussion of essential habitat (Chapter 3);
- The analysis identifying the direct, indirect, and cumulative impacts on the covered species, other special-status species occurring in the Action Area (along with an analysis of impacts on any designated Critical Habitat) likely to result from the Proposed Fish Screen Project, as well as actions related to and dependent on the Proposed Project/Action (Chapter 4);
- The analysis identifying the direct, indirect, and cumulative impacts on Natural Community Conservation Planning (NCCPA) communities occurring in the Action Area likely to result

from the Proposed Fish Screen Project, as well as actions related to and dependent on the Proposed Project/Action (Chapter 6);

- The conservation measures that the Proposed Project/Action agencies will undertake to minimize adverse effects to species (Chapters 2 and 4), and as appropriate, measures to enhance the condition of NCCPA communities (Chapters 2 and 6) and covered species along with a discussion of:
 - A plan to monitor the impacts and the implementation and effectiveness of these measures (Chapter 8), and
 - The procedures to address changed circumstances (Chapter 9);
- The additional measures USFWS, NOAA Fisheries, and CDFG may require as necessary or appropriate for compliance with FESA, CESA, and NCCPA; and a description of how and to what extent the action or group of actions addressed in the ASIP will help the CALFED Program to achieve the MSCS's goals for the affected species (Chapters 4, 6, and 8).

1.2 ASIP Process

The ASIP process is directly related to the relationships between the FESA, CESA, and State NCCPA. If neither the programmatic BOs nor the programmatic NCCPA determination for the CALFED Program authorizes incidental take of MSCS-covered species, ASIPs, which serve as individual consultation documents, are required for each Project or Action. Take authorization for implementing CALFED Program Actions follow a simplified compliance process that tiers from the MSCS and programmatic determinations. CDFG may authorize incidental take of State-listed Endangered, Threatened, or Candidate species through a CDFG Consistency Determination (Fish and Game Code 2081(b)). The entity implementing CALFED Program Actions (Reclamation) will coordinate the development of the ASIP with USFWS, NOAA Fisheries, and CDFG to ensure that the ASIP incorporates appropriate conservation measures for the Proposed CALFED Program Actions consistent with the MSCS.

The CALFED Program MSCS evaluates 244 species and 20 natural communities. Included within the MSCS are species identified by USFWS, NOAA Fisheries, and CDFG that are covered under BOs and NCCPA determination. An ASIP is prepared for FESA-, CESA-, and NCCPA-covered species. In the case of the MFWC Project, the ASIP will be used for informal or formal consultation on CESA species. Effects to FESA- and CESA-covered species are addressed in this ASIP, and typically the species evaluated will be a subset of the overall 244 species included in the MSCS.

1.2.1 Informal and Formal Consultation Processes

ASIPs are developed for individual CALFED Program Actions or groups of Actions when enough detailed information about the actions is available to fully analyze their impacts on covered species and habitats. Informal consultation is conducted in coordination with the development of an ASIP. Pursuant to the FESA, the Fish and Wildlife Coordination Act, and the Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA) regarding Essential

Fish Habitat (EFH), the lead Project agency (Reclamation) has organized meetings throughout the development of the ASIP to (1) identify covered species and endangered, threatened, and proposed or candidate species that may occur in the Action Area; (2) develop an appropriate approach for assessing species listed and proposed for listing as part of the Section 7 consultations required by FESA; and (3) determine to what extent the action may affect any of the identified species, including impacts to EFH.

The MFWC Project ASIP is submitted on behalf of Reclamation to USFWS, NOAA Fisheries, and CDFG to consult with these agencies on the potential for the Proposed Project/Action to affect special-status species. USFWS and NOAA Fisheries will review the ASIP for compliance with FESA, under Section 7. NOAA Fisheries will also review the ASIP for compliance with the MSFCMA. The conclusion of the formal consultation process is for USFWS and NOAA Fisheries to prepare BOs on the species that the action is likely to adversely affect. As part of these BOs, USFWS and NOAA Fisheries may authorize incidental take of endangered and threatened species. For this project, a NCCP is not required by CDFG because the project would not result in a change in land use within the Water District Service Area. The ASIP will be used to meet its requirements under CESA, including consideration of species listed for protection under CESA and NCCPA. Acceptance of the ASIP will fulfill CDFG's requirements for a Consistency Determination under Fish and Game Code Section 2081.

1.2.3 Consultations to Date

For implementation of the Proposed Project/Action to be economically feasible and for ease of coordination, consultation on the project has occurred separately for each phase. During the Phase 1 consultation, an official list of threatened and endangered species that may occur within the Action Area and vicinity was generated online from the Sacramento Fish and Wildlife Office website. The California Natural Diversity Database (CNDDDB) and California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants were also queried during the Phase 1 consultation for special-status species that may occur in the Proposed Project/Action and surrounding area. The USGS 7.5-minute quadrangles that were considered in the Phase 1 evaluation included: Grimes, Kirkville, Dunnigan, Arbuckle, Colusa, Wildwood School, Tisdale Weir, Sutter Buttes, and Meridian, CA.

The Phase 1 ASIP was submitted to USFWS and NOAA on February 22, 2008, initiating formal consultation. Analysis of potential effects to giant garter snake in the Phase 1 ASIP determined that 1.67 acres of upland habitat and 0.01 acres of aquatic habitat would be affected. On May 27, 2008, USFWS issued a Biological Opinion concluding that Phase 1 of the project was likely to adversely affect the snake through temporary loss of habitat, but that the level of anticipated take is not likely to result in jeopardy to the giant garter snake.

On May 1, 2008, NOAA issued a letter concurring with Reclamation's conclusion that the project is not likely to adversely affect Federally listed endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*), threatened Central Valley steelhead (*O. mykiss*), threatened Southern Distinct Population Segment (DPS) of North American green sturgeon (*Acipenser medirostris*) or

designated critical habitat. NOAA also concluded that Phase 1 of the project would not adversely affect EFH for Pacific salmon.

This Supplemental ASIP document analyzes Phase 2 effects at the level of detail necessary for consultation. There has been informal consultation with both USFWS and NOAA Fisheries throughout development of both phases of the ASIP.

A new USFWS custom list and consultation letter were generated for the Phase 2 consultation (USFWS 2012). Only the USGS 7.5-minute quadrangles containing the Action Area were queried for federal species (Meridian and Grimes). New CNDDDB (CDFG 2012a) and CNPS (CNPS 2012) queries were also generated during Phase 2. CNDDDB and CNPS queries included the Action Area and immediately surrounding quadrangles (Moulton Weir, Sanborn Slough, Pennington, Colusa, Meridian, Sutter Buttes, Arbuckle, Grimes, Tisdale Weir, Wildwood School, Dunnigan, and Kirkville). The Phase 2 USFWS custom list and consultation letter, and results of the CNDDDB and CNPS queries are included in **Appendix A**.

A pre-application meeting was held on January 5, 2012 with the U.S. Army Corps of Engineers to describe the Phase 2 project components and schedule. USFWS and NOAA Fisheries staff were in attendance at the meeting and indicated that an ASIP could be submitted for Phase 2 components of the project.

1.2.4 Compliance with Federal Endangered Species Act

USFWS and NOAA Fisheries share responsibility for administering FESA. NOAA Fisheries is primarily responsible for implementing FESA on behalf of marine fishes and mammals, including migratory or anadromous fish species such as salmon, steelhead, and green sturgeon. USFWS is primarily responsible for non-marine species. The FESA section 7(a)(2) consultation requirement is meant to ensure that any action authorized, funded, or carried out by any Federal agency is not likely to jeopardize the continued existence of any covered species or result in the destruction of Critical Habitat. Typically, in order to comply with this regulation, a biological assessment (BA) is prepared to analyze effects on listed and proposed species and designated and proposed Critical Habitat. This ASIP is intended to function as a BA and fulfill the requirements of the MFWC Action agencies pursuant to the FESA as amended.

1.2.5 Compliance with Magnuson-Stevens Fisheries Conservation and Management Act

Public Law 104-297, the Sustainable Fisheries Act of 1996, amended the MSFCMA to establish new requirements for EFH descriptions in federal Fisheries Management Plans (FMPs). The MSFCMA, which was reissued in 2006, requires all fishery management councils to amend their FMPs to describe and identify EFH for each managed fishery. The EFH assessment is meant to determine whether a Proposed Project/Action may adversely affect a designated EFH for federally managed species in the Action Area. In California, there are three FMPs that cover coastal pelagic species, groundfish, and Pacific salmon. In consideration of the Proposed

Project/Action, the Pacific Chinook salmon and steelhead have potential to be affected. These effects will be addressed in this document.

In addition, the MSFCMA requires federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH. The MSFCMA contains procedures to identify, conserve, and enhance EFH. NOAA Fisheries is required to provide EFH conservation and enhancement recommendations to Federal and State agencies for actions that adversely affect EFH. This ASIP will meet all the compliance requirements that have been identified for consulting with NOAA Fisheries on effects to EFH.

1.2.6 Compliance with California Endangered Species Act and Natural Community Conservation Plan

The CESA (CDFG Code Sections 2050-2097) is similar to the FESA. The California Fish and Game Commission is responsible for maintaining lists of threatened and endangered species under the CESA, which prohibits the “take” of listed and candidate species. “Take” as defined under California law is to “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill” (CDFG Code Section 86). To this date, there are several State-listed species – primarily salmonid fish species – that may occur within the Action Area; therefore, a CDFG Consistency Determination (CDFG code 2081) authorizing incidental take of State-listed species may be required for the Proposed Project/Action.

The California Natural Community Conservation Planning Act (NCCPA) (California Fish and Game Code, section 2800, et seq.) was enacted to form a basis for broad-based planning to provide for effective protection and conservation of the State’s wildlife heritage, while continuing to allow appropriate development and growth. State of California NCCPA General Process Guidelines define an NCCPA as “...a plan for the conservation of natural communities that takes an ecosystem approach and encourages cooperation between private and governmental interests. The plan identifies and provides for the regional or area-wide protection and perpetuation of plants, animals, and their habitats, while allowing compatible land use and economic activity. An NCCPA seeks to anticipate and prevent the controversies caused by species’ listings by focusing on the long-term stability of natural communities” (CDFG 2000a).

The purpose of natural community conservation planning is to sustain and restore those species and their habitat identified by CDFG that are necessary to maintain the continued viability of biological communities impacted by human changes to the landscape. An NCCPA identifies and provides for those measures necessary to conserve and manage natural biological diversity within the plan area while allowing compatible use of the land.

On February 2, 2002, SB 107 was signed by Governor Gray Davis, which repealed and replaced the NCCPA with a new NCCPA. Although SB 107 became effective on January 1, 2003, the MSCS will continue to be in-effect as an approved NCCP, in accordance with Section 2830 (c) of the same bill.

This ASIP is a multi-purpose project-level document that is intended to streamline the environmental regulatory process for CALFED Program Actions. The Proposed Project/Action is such an action, as it will protect species covered under the MSCS. This ASIP provides all the information necessary to initiate project-level compliance with the FESA and NCCPA. Not only will this ASIP fulfill CDFG's requirements under Fish and Game Code Sections 2835 and 2081, it will also include appropriate conservation measures relevant to the Proposed Project/Action.

1.3 Relationship to CALFED Program

The CALFED Program's purpose is to develop and implement a comprehensive, long-term plan that will restore ecological health to the Bay-Delta system and improve management of water for beneficial uses. The MFWC Project falls within one component of the overall CALFED Program strategy. CALFED agencies plan to address issues of the Bay-Delta region within the following categories: ecosystem quality, water quality, water supply reliability, and levee system integrity. CALFED agencies must consider important physical, ecological, and socioeconomic linkages between the problems and potential solutions in each of these resource categories. The CALFED planning effort was therefore divided into a three-phase cooperative planning process in order to facilitate determining the most appropriate strategy and actions to reduce conflicts in the Bay-Delta system.

The construction of fish screens that use the best available technology will eliminate fish passage barriers. The fish screens will be funded with federal funds from the CALFED Bay-Delta Authority (CBDA) and Reclamation would be responsible for administering those funds. Implementation of the Proposed Project/Action will help MFWC continue to draw water from the Sacramento River without entraining native fish species that may reside in the Sacramento River near, or which may pass by, the existing diversions.

1.4 Species Addressed in this ASIP

To comply with FESA, CESA, and NCCPA requirements, a list of special-status species is evaluated and presented in this ASIP. The following tables (**Table 1-2** and **Table 1-3**) list the species with potential to occur in the Action Area, their Federal and State status, and how likely they are to occur in the Proposed Project/Action Area. Those species with potential to be affected by the Proposed Project/Action are shown in bold text and are addressed in more detail in Chapter 3.

**TABLE 1-2
ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ACTION AREA**

Scientific Name Common Name	Federal Status	State Status	CNPS Listing	Habitat Description	Potential to Occur in the Action Area
Fish					
<i>Acipenser medirostris</i> North American green sturgeon (Southern DPS)	FT	CSC	--	Spawns in large cobble in deep and turbulent river main stem. The Southern DPS spawns in the Sacramento River basin and in the Sacramento-San Joaquin Delta and Estuary.	High. Migratory route in the Sacramento River; also provides suitable rearing habitat in riparian bank areas.
<i>Hypomesus transpacificus</i> Delta smelt	FT	CT	--	Found in the Sacramento-San Joaquin delta, Suisun bay, Carquinez Straight, and San Pablo Bay.	Unlikely. Project outside area designated as Critical Habitat project site does not have Critical Habitat for reproduction or cover. Project site likely outside of the upstream migratory extent.
<i>Oncorhynchus mykiss</i> Central Valley steelhead	FT	--	--	Spawns in Sacramento River and tributaries where gravelly substrate and suitable water conditions occur.	High. Migratory route in the Sacramento River; also provides suitable rearing habitat in riparian bank areas.
<i>Oncorhynchus tshawytscha</i> Central Valley spring-run Chinook	FT	CT	--	Spawns in Sacramento River and few select tributaries where gravelly substrate and suitable water conditions occur.	High. Migratory route in the Sacramento River; also provides suitable rearing habitat in riparian bank areas.
<i>Oncorhynchus tshawytscha</i> Sacramento River winter-run Chinook	FE	CE	--	Spawns primarily in upper reaches of the main stem Sacramento River.	High. Migratory route in the Sacramento River; also provides suitable rearing habitat in riparian bank areas.
Reptiles					
<i>Thamnophis gigas</i> giant garter snake	FT	CT	--	Generally inhabits marshes, sloughs, ponds, slow-moving streams, ditches, and rice fields which have water from early spring through mid-fall, emergent vegetation (such as cattails and bulrushes), open areas for sunning, and high ground for hibernation and escape cover.	Moderate. Limited aquatic habitat in the Main Canal, in adjacent Reclamation drains, or within adjacent seasonally inundated rice fields. Potential upland habitat in unpaved areas up to 200 feet from aquatic habitat.
<i>Emys marmorata</i> western pond turtle	--	CSC	--	Permanent ponds, lakes, streams, irrigation ditches or permanent pools along intermittent streams. Require basking sites such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks	Unlikely. No suitable habitat within or adjacent to the project site.

**TABLE 1-2
ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ACTION AREA**

Scientific Name Common Name	Federal Status	State Status	CNPS Listing	Habitat Description	Potential to Occur in the Action Area
Amphibians					
<i>Ambystoma californiense</i> California tiger salamander	FT	CT	--	Annual grassland and grassy understory of valley-foothill hardwood habitats in central and northern California. Needs underground refuges and vernal pools or other seasonal water sources.	Unlikely. No suitable habitat within or adjacent to the project site.
<i>Rana aurora draytonii</i> California red-legged frog	FT	CSC	--	Breeds in slow moving streams with deep pools, ponds, and marshes with emergent vegetation.	Unlikely. No suitable habitat within or adjacent to the project site.
<i>Spea (=Scaphiopus) hammondi</i> western spadefoot toad	--	CSC	--	Occurs seasonally in grasslands, prairies, chaparral, and woodlands, in and around wet sites. Breeds in shallow, temporary pools formed by winter rains. Takes refuge in burrows.	Unlikely. No suitable habitat within or adjacent to the project site.
Birds					
<i>Agelaius tricolor</i> tricolored blackbird	--	CSC	--	Nests in dense thickets of cattails, tules, willow, blackberry, wild rose, wheat and barley crops, and other tall herbs near fresh water.	Unlikely. Marginal riparian nesting habitat along Sacramento River banks. However, no suitable nesting habitat in the immediate vicinity of the project.
<i>Ardea alba</i> (nesting) great egret	--	--	--	Colonial nester in large trees. Rookery sites located near marshes, tide flats, irrigated pastures and margins of rivers and lakes.	Unlikely. No suitable nesting habitat in the immediate vicinity of the project.
<i>Ardea herodias</i> (nesting) great blue heron	--	--	--	Colonial nester in tall trees, cliff sides and isolated marsh habitats.	Unlikely. No suitable nesting habitat in the immediate vicinity of the project.
<i>Athene cunicularia</i> western burrowing owl	--	CSC	--	Utilizes ground squirrel (or other mammal) burrows within open grasslands, prairies, savanna, or agricultural fields.	Moderate. Potential nesting habitat along the perimeter of agricultural fields and along the banks/levees of the Sacramento River.
<i>Branta hutchinsii leucopareia</i> cackling (=Aleutian Canada) goose	FD	--	--	Breeds in open or forested areas near water. Often found in wetlands, grasslands, or cultivated fields during migration.	Moderate. Marginal foraging habitat occurs in agricultural fields adjacent to project.

**TABLE 1-2
ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ACTION AREA**

Scientific Name Common Name	Federal Status	State Status	CNPS Listing	Habitat Description	Potential to Occur in the Action Area
<i>Buteo swainsoni</i> Swainson's hawk	--	CT	--	Breeds in California's Central Valley. Winters primarily in Mexico. Typically nests in scattered trees or along riparian systems adjacent to agricultural fields or pastures.	Moderate. The CNDDDB (CDFG 2012a) records several historic occurrences near the project site. Suitable nesting habitat occurs within trees along the Sacramento River and within the Action Area. The Action Area also provides foraging for this species.
<i>Charadrius montanus</i> mountain plover (wintering)	--	CSC	--	In California, winters in open short grasslands and plowed agricultural fields in the Central Valley and in foothill valleys west of San Joaquin Valley, and in Imperial Valley. Winters below 1000 m (3200 ft).	Unlikely. Project area is outside of known species range.
<i>Circus cyaneus</i> northern harrier	--	CSC	--	Forages over open ground. Nests on ground in shrubby vegetation, usually at marsh edge in emergent wetland or along rivers or lakes, but also in grasslands, grain fields, or on sagebrush flats several miles from water	Unlikely. Suitable nesting habitat does not occur within the Action Area or immediate vicinity.
<i>Coccyzus americanus occidentalis</i> western yellow-billed cuckoo	FC	CE	--	Nests in extensive riparian forests (at least 40 hectares).	Unlikely. Riparian area surrounding project site is highly fragmented.
<i>Grus canadensis tabida</i> greater sandhill crane	--	CSC	--	Open habitats, shallow lakes, and emergent wetlands. In winter also uses dry grasslands and croplands near wetlands.	Unlikely. No suitable habitat within or adjacent to the project site.
<i>Laterallus jamaicensis coturniculus</i> California black rail	--	CT	--	Occurs most commonly in tidal emergent wetlands dominated by pickleweed, or in brackish marshes supporting bulrushes in association with pickleweed. In freshwater, usually found in bulrushes, cattails, and saltgrass	Unlikely. No suitable habitat within or adjacent to the project site.
<i>Pandion haliaetus</i> osprey	--	--	--	Preys mostly on fish, requires open, clear waters for foraging. Uses large trees, snags, and dead-topped trees in open forest habitats for cover and nesting.	Moderate. Suitable nesting habitat occurs within trees along the Sacramento River and within the Action Area. The Action Area also provides foraging for this species.
<i>Plegadis chihi</i> white-faced ibis	--	--	--	Nest and forages in freshwater marshes and rivers, respectively.	Unlikely. No suitable nesting habitat within or adjacent to the project site.

**TABLE 1-2
ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ACTION AREA**

Scientific Name Common Name	Federal Status	State Status	CNPS Listing	Habitat Description	Potential to Occur in the Action Area
<i>Riparia riparia</i> (nesting) bank swallow	--	CT	--	Nests in holes dug in sandy cliffs and river banks near water.	Moderate. The CNDDDB (CDFG 2012a) records occurrence near the Drexler Diversion and Grimes Canal. Potential nesting habitat along the banks of the Sacramento River in the vicinity of the project.
<i>Spinus (=Carduelis) lawrencei</i> Lawrence's goldfinch	--	--	--	Dry grassy slopes with weed patches, chaparral, and open woodlands; nests in trees or shrubs.	Unlikely. No suitable habitat within or adjacent to the project site.
Mammals					
<i>Antrozous pallidus</i> pallid bat	--	CSC	--	Prefers caves, crevices, hollow trees, or buildings in areas adjacent to open space for foraging. Associated with lower elevations in California.	Unlikely. No suitable roost or maternity sites occur in the immediate vicinity of the project.
<i>Dipodomys californicus eximius</i> Marysville California kangaroo rat	--	CSC	--	Needs friable soil, grass stages of chaparral. Only found in the area of the Sutter Buttes.	Unlikely. No suitable habitat within or adjacent to the project site.
<i>Lasiurus blossevillii</i> western red bat	--	--	--	Roosts primarily in trees, 2-40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	Unlikely. No suitable roost or maternity sites occur in the immediate vicinity of the project.
<i>Lasiurus cinereus</i> hoary bat	--	CSC	--	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths; requires water.	Unlikely. Limited roosting habitat within forested areas along the Sacramento River; however, dense foliage for roosting is not available in the Action Area.
<i>Myotis ciliolabrum</i> western small-footed myotis	--	--	--	In association with steep limestone outcrops and talus slopes. Forages over a wide range of habitats, mostly open, arid wooded and brushy uplands near water. Seeks cover in caves, buildings, mines and crevices.	Unlikely. No suitable roost or maternity sites occur in the immediate vicinity of the project.

**TABLE 1-2
ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ACTION AREA**

Scientific Name Common Name	Federal Status	State Status	CNPS Listing	Habitat Description	Potential to Occur in the Action Area
<i>Myotis yumanensis</i> Yuma myotis	--	--	--	Roosts in buildings, mines, caves, crevices, or under bridges. Optimal habitats are open forests and woodlands with sources of water over which to feed.	Unlikely. Limited roosting habitat within forested areas along the Sacramento River; however, dense foliage for roosting is not available in the Action Area.
<i>Perognathus inornatus inornatus</i> San Joaquin pocket mouse	--	--	--	Uses arid annual grassland, savanna, and desert scrub, with sandy washes, fine soils, and scattered vegetation between 1,100 and 2,000 feet in elevation.	Unlikely. Marginal vegetation along irrigation ditch and not within the required elevation range.
Invertebrates					
<i>Branchinecta conservatio</i> Conservancy fairy shrimp	FE	--	--	Lifecycle restricted to large, cool-water vernal pools with moderately turbid water.	Unlikely. No suitable habitat within or adjacent to the project site.
<i>Branchinecta lynchi</i> vernal pool fairy shrimp	FT	--	--	Lifecycle restricted to vernal pools.	Unlikely. No suitable habitat within or adjacent to the project site.
<i>Cicindela hirticollis abrupta</i> Sacramento Valley (Hairy-necked) tiger beetle	--	--	--	Larvae and usually adults occur on sand bars, sandy shores, flood scours etc. immediately associated with rivers. Requires fine sand that is damp at, or a few centimeters below, the surface, and sparse or absent vegetation. Habitats must also not be subject to inundation for more than a few days at a time.	Unlikely. The project site habitat conditions are not suitable for this species.
<i>Desmocerus californicus dimorphus</i> Valley elderberry longhorn beetle	FT	--	--	Breeds and forages exclusively on blue elderberry shrubs (<i>Sambucus mexicana</i>) below 3,000 feet in elevation.	Unlikely. No elderberry shrubs with stems measuring at least one inch in diameter occur within 100 feet of the Proposed Project/Action.
<i>Lepidurus packardii</i> vernal pool tadpole shrimp	FE	--	--	Found in vernal pools, swales, ephemeral drainages, stock ponds, reservoirs, or ditches.	Unlikely. No suitable habitat within or adjacent to the project site.

**TABLE 1-2
ANIMAL SPECIES WITH POTENTIAL TO OCCUR IN THE ACTION AREA**

Scientific Name Common Name	Federal Status	State Status	CNPS Listing	Habitat Description	Potential to Occur in the Action Area
--	---------------------------	-------------------------	-------------------------	----------------------------	--

SOURCE: USFWS (2012), CDFG (2011, 2012a, 2012b).

Notes:

The "Potential for Effect" category is defined as follows:

Unlikely:	The project site and/or immediate area do not support suitable habitat for a particular species. Project site is outside of the species known range.
Low Potential:	The project site and/or immediate area only provide limited habitat for a particular species. In addition, the known range for a particular species may be outside of the Proposed Project/Action Area.
Moderate Potential:	The project site and/or immediate area provide suitable habitat for a particular species.
High Potential:	The project site and/or immediate area provide ideal habitat conditions for a particular species.

Species that have medium or high potential to be impacted by the proposed project are shown in boldface type.

STATUS CODES:

FEDERAL:

FE	=	Listed as "endangered" under the federal Endangered Species Act
FT	=	Listed as "threatened" under the federal Endangered Species Act
FC	=	Candidate for listing under the federal Endangered Species Act
FD	=	Delisted
FSC	=	NOAA Fisheries designated "species of concern"

STATE:

CE	=	Listed as "endangered" under the California Endangered Species Act
CT	=	Listed as "threatened" under the California Endangered Species Act
CSC	=	California Department of Fish and Game designated "species of special concern"

**TABLE 1-3
PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE ACTION AREA**

Scientific Name Common Name	Federal Status	State Status	CNPS Listing	Life Form	Habitat Description / Elevation Range (meters) / Blooming Period	Potential to Occur in the Action Area
<i>Astragalus tener</i> var. <i>ferrisiae</i> Ferris's milk-vetch	--	--	1B.1	annual herb	Meadows and seeps (vernally mesic), valley and foothill grasslands (subalkaline flats) / 5-75 m / April – May	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Atriplex cordulata</i> heartscale	--	--	1B.2	annual herb	Chenopod scrub, meadows and seeps, valley and foothill grassland (sandy/saline or alkaline) / 0-560 m / April – October	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Atriplex depressa</i> brittlescale	--	--	1B.2	annual herb	Chenopod scrub, meadows and seeps, playas, valley and foothill grasslands, vernal pools (alkaline, clay) / 1-321 m / May – October	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Atriplex joaquiniana</i> San Joaquin saltbrush	--	--	1B.2	annual herb	Chenopod scrub, meadows and seeps, playas, valley and foothill grasslands (alkaline) / 1-835 m / April – October	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Atriplex minúscula</i> lesser saltscale	--	--	1B.1	annual herb	Chenopod scrub, playas, valley and foothill grasslands / 15- 200 m / May – October	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Atriplex persistens</i> vernal pool smallscale	--	--	1B.2	annual herb	Vernal pools / 10-115 m / June – October	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Atriplex subtilis</i> subtle orache	--	--	1B.2	annual herb	Valley and foothill grasslands / 40-100 m / June – August (also October - uncommon)	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Brasenia schreberi</i> watershield	--	--	2.3	perennial rhizomatous herb aquatic	Marshes and swamps (freshwater) / 30-2200 m / June – September	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>California macrophylla</i> round-leaved filaree	--	--	1B.1	annual herb	Cismontaine woodland, valley and foothill grassland / 15-1200 m / March – May	Unlikely. No suitable habitat within the immediate vicinity of the project site.

**TABLE 1-3
PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE ACTION AREA**

Scientific Name Common Name	Federal Status	State Status	CNPS Listing	Life Form	Habitat Description / Elevation Range (meters) / Blooming Period	Potential to Occur in the Action Area
<i>Castilleja rubicundula</i> ssp. <i>rubicundula</i> pink creamsacs	--	--	1B.2	annual herb	Chaparral (openings), cismontaine woodland, meadows and seeps, valley and foothill grassland / 20-910 m / April – June	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Centromadia parryi</i> ssp. <i>parryi</i> pappose tarplant	--	--	1B.2	annual herb	Chaparral, coastal prairie, meadows and seeps, marshes and swamps (coastal salt), valley and foothill grassland (vernally mesic, often alkaline) / 2-420 m / May – November	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Chloropyron palmatus</i> palmate-bracted bird's beak	FE	CE	1B.1	annual herb hemiparasitic	Chenopod scrub, valley and foothill grasslands (alkaline) / 5-155 m / May – October	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Cuscuta obtusiflora</i> var. <i>glandulosa</i> Peruvian dodder	--	--	2.2	annual vine parasitic	Marshes and swamps (freshwater) / 15-280 m / July – October	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Hibiscus lasiocarpus</i> rose mallow	--	--	1B.2	perennial rhizomatous herb emergent	Marshes and swamps (freshwater) / 0-120m / June – September	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i> Coulter's goldfields	--	--	1B.1	annual herb	Marshes and swamps (coastal salt), playas, vernal pool / 1-1200 m / February – June	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Layia septentrionalis</i> Colusa layia	--	--	1B.2	annual herb	Chaparral, cismontane woodland, valley and foothill grassland (sandy, serpentine) / 100-1095 m / April – May	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Navarretia</i> <i>leucocephala</i> ssp. <i>bakeri</i> Baker's navarretia	--	--	1B.1	annual herb	Cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools (mesic) / 5-1740 m / May – July	Unlikely. No suitable habitat within the immediate vicinity of the project site.

**TABLE 1-3
PLANT SPECIES WITH POTENTIAL TO OCCUR IN THE ACTION AREA**

Scientific Name Common Name	Federal Status	State Status	CNPS Listing	Life Form	Habitat Description / Elevation Range (meters) / Blooming Period	Potential to Occur in the Action Area
<i>Silene verecunda</i> ssp. <i>verecunda</i> San Francisco campion	--	--	1B .2	perennial herb	Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, valley and foothill grassland (sandy) / 30- 645 m / March – June (also August - uncommon)	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Trichocoronis wrightii</i> var. <i>wrightii</i> Wright's trichocoronis	--	--	2.1	annual herb	Meadows and seeps, marshes and swamps, riparian forest, vernal pools (alkaline) / 5-435 m / May - September	Unlikely. No suitable habitat within the immediate vicinity of the project site.
<i>Wolffia brasiliensis</i> Brazilian watermeal	--	--	2.3	perennial herb aquatic	Marshes and swamps (assorted shallow freshwater) / 30-100 m / April - December	Unlikely. No suitable habitat within the immediate vicinity of the project site.

SOURCE: USFWS (2012), CDFG (2012a), CNPS (2012).

Notes:

The "Potential for Effect" category is defined as follows:

Unlikely: The project site and/or immediate area do not support suitable habitat for a particular species. Project site is outside of the species known range.

Species that have medium or high potential to be impacted by the proposed project are shown in boldface type.

STATUS CODES:

FEDERAL:

FE = Listed as "endangered" under the federal Endangered Species Act

STATE:

CE = Listed as "endangered" under the California Endangered Species Act

CNPS:

List 1B = Plants rare, threatened, or endangered in California and elsewhere

List 2 = Plants rare, threatened, or endangered in California, but more common elsewhere

List 3 = Plants about which we need more information--a review list

List 4 = Plants of limited distribution--a watch list

Extensions: .1 = Seriously endangered in California

.2 = Fairly endangered in California

.3 = Not very endangered in California

1.4.1 Identification of Species Analyzed in Detail in the ASIP

Pursuant to Section 7(c) of FESA, a species list was requested from USFWS regarding any species listed or proposed for listing as Threatened or Endangered, including designated or proposed Critical Habitats under FESA, that may be present in the Action Area (USFWS 2007, USFWS 2012). Additionally, a list of special-status species known to occur or with the potential to occur within the Action Area was compiled from a query of the California Natural Diversity Database (CNDDDB) (CDFG 2007, CDFG 2012a) and the California Native Plant Society's Inventory of Rare and Endangered Plants (CNPS 2007, CNPS 2012). Special-status fish, wildlife, and plant species considered in the MSCS (CALFED 2001b) combined with the results from the species request lists and the database searches were used to generate a preliminary species list.

Initial screening of the overall species list eliminated from further consideration those species that only inhabited areas outside of the general Action Area. The second level of screening was based on species that occasionally visited (their life cycles are not dependent on) habitats affected by the MFWC Project/Action. These included mostly migratory species that may be observed infrequently in areas where the Proposed Project will occur. Finally, a focused list of Federal- or State-listed, Special-concern, or CALFED MSCS-covered species was compiled for detailed analysis in this ASIP and is included in Chapter 3. There are no candidate species potentially occurring in the Action Area.

1.4.2 Critical Habitat

Critical Habitat is designated in the Sacramento River within the project area for the listed Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, and Southern Distinct Population Segment (DPS) of the North American Green Sturgeon which are presented in this ASIP. Critical Habitat for vernal pool tadpole shrimp is designated within the region, but it is not included within the Action Area. The nearest Critical Habitat Unit for vernal pool tadpole shrimp is located approximately 3 miles northwest of shrimp in the Action Area. Details on the Critical Habitat designations are included in the species descriptions in Chapter 3. There is no suitable habitat for vernal pool tadpole in the Meridian Farms Service Area boundary.

1.4.3 Essential Fish Habitat

The Action Area is within the region identified as Essential Fish Habitat (EFH) for Pacific salmon, including all Chinook salmon runs, in Amendment 14 of the Pacific Salmon FMP. This ASIP addresses potential effects of the MFWC Project on delineated EFH in the Sacramento River within the Action Area.

1.5 NCCPA Habitats

A total of 20 natural communities were analyzed on a broad, programmatic level in the MSCS – 18 habitats and 2 ecologically based fish groups. The term “NCCPA communities” refers to both habitats and fish groups. Of the 20 community types and fish groups, four are included in the

Action Area and are evaluated in this ASIP. The others were not considered either because there was no such habitat in the Action Area or because the Proposed Project/Action would not affect the habitat. Although there is no estuarine habitat within the Action Area, this NCCPA Fish Group is included in the analysis in order to consistently analyze effects to a few estuarine fish species which may migrate through the Action Area. Descriptions of the two NCCPA Habitats and two NCCPA fish group are listed below (**Table 1-4**) and detailed in Chapter 5.

TABLE 1-4
NCCPA COMMUNITIES ANALYZED IN THIS ASIP

NCCPA Habitats	NCCPA Fish Groups
Valley Riverine Aquatic	Anadromous Fish Species
Valley/Foothill Riparian	Estuarine Fish Species

This page intentionally left blank.

CHAPTER 2

Description of the Proposed Project/Action

The objective of the Proposed Project/Action is to ensure that no fish species are entrained in MFWC's diversion pumps, so that MFWC is in compliance with present regulatory requirements, including ESA compliance, and is able to continue to divert water for agricultural irrigation, avoiding effects to listed fisheries species that may be present near the diversions. Needed conveyance improvements related to the fish screen improvements are included within the Proposed Project/Action. This chapter describes the two phases of the Proposed Project/Action and existing conditions of Action Area, including the existing intake facilities. A description of the regulatory authorities that set the regulatory framework for the Proposed Project/Action is included. Conservation measures included with the Proposed Project/Action are described as well.

2.1 Authorities

2.1.1 Central Valley Improvement Act and Anadromous Fish Screen Program

On October 30, 1992, a multipurpose water law which contained 40 separate titles providing for water resource projects throughout the Western United States was established. Title 34, the CVPIA, mandates changes in management of the Central Valley Project, particularly for the protection, restoration, and enhancement of fish and wildlife. Under the CVPIA, a program dedicated to screening agricultural water diversions to protect anadromous fish in California's Central Valley was developed. The U.S. Department of the Interior established the Anadromous Fish Screen Program (AFSP) which satisfies section 3406(b)(21) of the CVPIA. CVPIA section 3406 (b)(21) states that the AFSP will "assist the State of California in efforts to develop and implement measures to avoid losses of juvenile anadromous fish resulting from unscreened or inadequately screened diversions on the Sacramento-San Joaquin Delta, and the Suisun Marsh. Such measures shall include but shall not be limited to construction of screens on unscreened diversions, rehabilitation of existing screens, replacement of existing non-functioning screens, and relocation of diversions to less fishery-sensitive areas. The Secretary's share of costs associated with activities authorized under this paragraph shall not exceed 50 percent of the total cost of any such activity." The Proposed MFWC Project is being proposed to meet the objectives of the CVPIA Anadromous Fish Screen Program.

2.1.2 Endangered Species Acts

This ASIP is intended to provide all the necessary elements to comply with the FESA and CESA. Currently, there are eight species addressed within this ASIP that are identified as a listed species or a candidate for listing, and two that have been delisted. The Central Valley steelhead is federal-

listed threatened, and the Central Valley spring-run Chinook is both federal- and state-listed threatened. The Sacramento River winter-run Chinook salmon is federal- and state-listed endangered. The North American green sturgeon (Southern DPS) is federal-listed threatened. The giant garter snake is both federal- and state-listed threatened, and the Swainson's hawk is state-listed threatened. The bank swallow is state-listed threatened. The cackling goose has been federally delisted, but still remains under scrutiny, and is therefore included in this ASIP. All of these species are covered in the MSCS.

2.2 Proposed Project/Action Area

The MFWC is located in Sutter County, between Interstate 5 and Highway 99, east of the Sacramento River and southwest of the Sutter Bypass. The approximate limits of MFWC Service Area are shown in **Figure 1-1**. MFWC provides irrigation water to three distinct Service Areas encompassing approximately 9,150 acres of mostly agricultural land, with an estimated annual water delivery of 35,000 acre-feet (af). Small areas of riparian forest, grassland, wetland and open water, as well as the small urban area of Meridian, are also included in the Service Area.

The Action Area includes the existing MFWC diversion facilities, locations of the proposed new and improved facilities, conveyance improvements, proposed construction equipment staging areas, and proposed grading and in-water construction locations. Areas within 200 feet of these project components are also included within the Action Area. Most of this area will not be affected by the Proposed Project/Action, but is included in order to analyze all potential effects resulting from the Proposed Project/Action. The Action Area is depicted in **Figure 2-1**.

Biological communities in the Action Area include valley riparian/Cottonwood riparian forest, annual grassland, and valley riverine habitat (Sacramento River). Agricultural land also provides habitat for wildlife. The Sacramento River provides freshwater habitat for fish, amphibians, reptiles, and waterfowl. Roads, levees, and agricultural activities have modified the adjacent riparian habitat. Inland project areas, beyond the Sacramento River and associated habitats, are characterized as agricultural (field crops and orchards). Human presence within the Action Area is minimal based on the surrounding land use, however river recreation activities increase during the late spring, summer and fall. **Figure 2-2** depicts the vegetation communities, including crop types, within the Action Area.

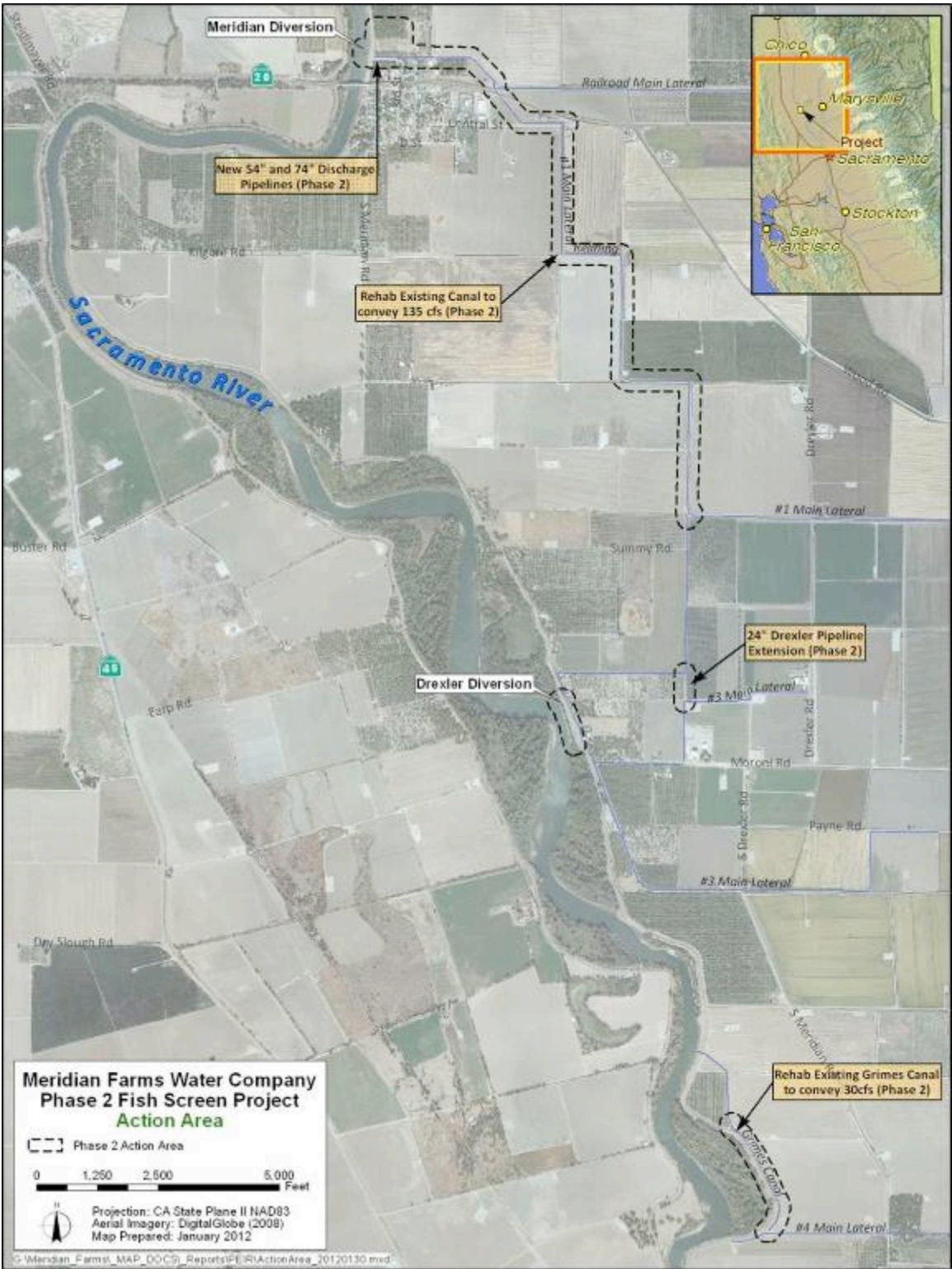


Figure 2-1. Action Area

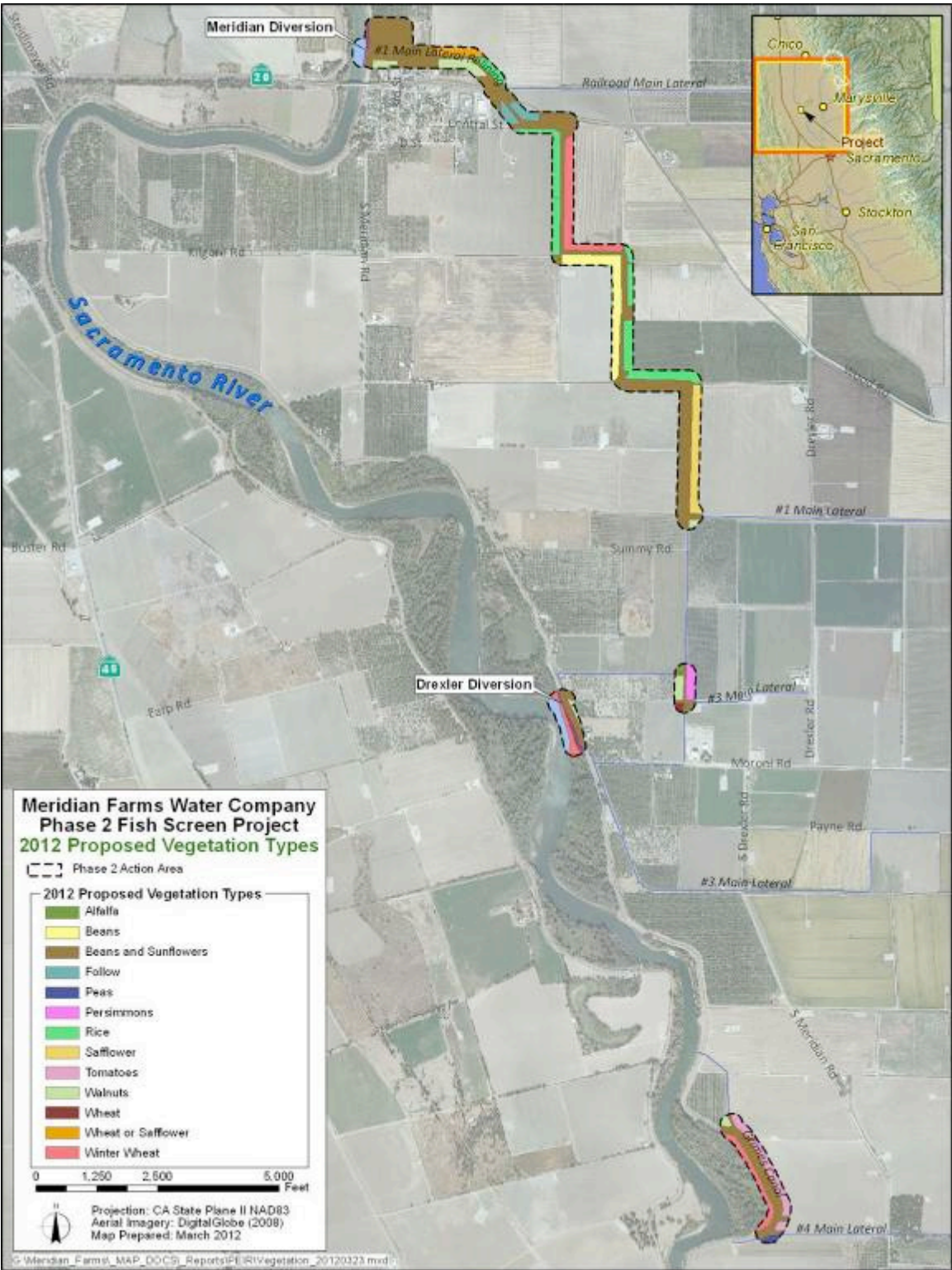


Figure 2-2. Vegetation in the Action Area

2.2.1 General Habitat

Valley Riparian/Cottonwood Riparian Forest

The valley riparian and riparian forest habitats are located adjacent to the Sacramento River system as it winds south along the western boundary of the MFWC Service Area, and much of the habitat is located within the flood plain of the levee system. Riparian areas with less mature canopy cover are dominated by narrow-leaf willow (*Salix exigua*) and black willow (*S. gooddingii*), with occurrences of valley oak (*Quercus lobata*) and cottonwood (*Populus fremontii*). Himalayan blackberry (*Rubus discolor*), California rose (*Rosa californica*), nutsedge (*Cyperus* spp.), curly dock (*Rumex crispus*), poison oak (*Toxicodendron diversilobum*) and several species of exotic grass characterize the shrub and herbaceous layers. Mature cottonwood stands dominate the closed canopy overstory and characterize the riparian forest areas adjacent to and within (during high flow season) the riverine environment. See **Photos 1 and 2** in **Appendix B** for a view of riparian habitat in the Action Area.

Valley Riparian/Cottonwood Riparian Forest habitats provide food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for an abundance of wildlife. At least 50 amphibians and reptiles and 147 bird species occur in lowland riparian systems. Additionally, 55 species of mammals are known to use California's Central Valley riparian communities.

Valley Riparian/Cottonwood Riparian Forest occurs along the Sacramento River within the general vicinity of the Proposed Project/Action. Within the Action Area, riparian habitat is included along a portion of the proposed Grimes conveyance improvements and the existing diversion facility. In addition, disturbed patches of mixed willow riparian habitat occur in the vicinity of the Drexler and Meridian diversions. The area of the Meridian diversion primarily supports nonnative herbaceous and shrubby vegetation; vegetation is denser, with larger trees and shrubs in the vicinity of the Drexler Diversion. Riparian areas provide food, cover, and nesting for a variety of birds, mammals, amphibians, and even reptiles and fish. Riparian vegetation along the banks of the Sacramento River provide shaded aquatic riverine habitat for fish species.

Sacramento River

Within the vicinity of the Action Area the Sacramento River riverine habitat is characterized by freshwater aquatic and shaded riparian habitats. The adjacent riparian habitat has been modified by trails (both paved and unpaved), levees, and general recreation activities. Flows are relatively slow within the Action Area, exhibiting deep channel characteristics with levied banks. Channel substrate generally consists of fine sandy-loam with sparse areas of imported rip-rap along the banks used to reinforce the adjacent levees. At the proposed Meridian diversion location the river is channelized, exhibiting a deep, cold and slow moving flow. The Sacramento River in this vicinity is channelized, lacks aquatic vegetation, and has minimal streambank vegetative cover. The value of shaded riverine aquatic habitat in the Action Area near the diversions is minimal for fish (see **Photo 1** in **Appendix B**).

The Sacramento River in the vicinity of the proposed intake locations serves as a migratory corridor for the upstream migration of adult salmon and steelhead, and the downstream migration

of juvenile salmon and steelhead. North American green sturgeon may also utilize the Action Area as migratory habitat. Other fish species common in the Sacramento River near the proposed intake locations include striped bass, threadfin shad, American shad, catfish, Sacramento pikeminnow, tule perch, sculpin, bullhead, and a variety of other resident fish species. The Sacramento River near Sacramento also provides habitat for a variety of invertebrates, including planktonic species such as copepods, and epibenthic species such as crawfish and amphipods.

Agriculture

Agriculture, irrigated with water drawn from the Sacramento River, dominates the surrounding landscape. Although the specific crop cultivated on a parcel of land may vary annually, the general types of crops grown in the region remain relatively consistent. The major crops include rice, safflower, sunflower, tomatoes, and beans. Hay crops, such as alfalfa, are widely grown, and orchards in the area grow walnuts and persimmons. These crops are irrigated by a series of canals that deliver water from the Sacramento River (**Photos 3 through 9 in Appendix B**). The delivery canals within the Action Area are generally well maintained, typically concrete lined, and support minimal vegetation. There are unlined overflow ditches characterized by emergent aquatic vegetation such as cattails (*Typha latifolia*) and tules (*Scripus californicus*) that occur within the study area, adjacent or perpendicular to the Main Canal. All ditches owned and managed by MFWC are maintained annually, and generally lack dense upland or aquatic vegetation. A few ditches that are owned by the local Reclamation District are not maintained as regularly, and support denser stands of tules and cattail. Agricultural crops and irrigation drainages provide foraging and cover habitat for a variety of wildlife such as birds, mammals, and some reptiles.

All Proposed Project/Action components are located in or adjacent to agriculture. The Main Canal and other delivery canals that are proposed for widening (increased conveyance) are surrounded by lands in active crop production. These canals are generally concrete-lined; although, in some locations, the concrete bed is damaged and there are places where the canals are unlined. The proposed Drexler Re-Lift Station is adjacent to existing canals and ditches. Irrigation ditches lateral to the Main Canal in the vicinity of the Proposed Project/Action support emergent aquatic vegetation. The proposed Drexler pipeline is located adjacent to existing orchards and an irrigation ditch (seep). Canals and ditches may provide habitat for fish, aquatic invertebrates, and aquatic snakes.

Ruderal

In the study area, ruderal or disturbed habitats generally occur in narrow stretches adjacent to levees, roads, and along canals, ditches, river banks and agricultural land boundaries. Ruderal areas within the Action Area are located along the banks of the Sacramento River and are characterized by non-native annual grassland. Non-native annual grassland includes ripgut brome (*Bromus diandrus*), and wild oats (*Avena barbata*), and other common species including Johnson grass (*Sorghum halepense*), Leymus (*Leymus triticoides*), thistle (*Sonchus asper*), and filaree (*Erodium moschatum*). This habitat is also present in the understory of the riparian woodland habitat, and within the Action Area represents much of the vegetation growing within and along the banks of drainage ditches and irrigation canals. Ruderal grasslands provide important foraging, breeding, and resting habitat for many species of wildlife.

Developed / Disturbed

Developed and disturbed areas include major roads, highways, and buildings and structures within more urban areas, but also facilities and access roads which are located throughout agricultural areas within the Action Area. Also included within this category are the unpaved turnouts and shoulders of dirt access roads, and the regularly maintained banks of the levee, adjacent to the Sacramento River. Vegetation on these levees is removed through burning or by dragging a chain across its slopes.

2.2.2 Current Facilities

MFWC currently operates three surface water diversion/pumping plants on the Sacramento River at Meridian, Drexler, and Grimes in Sutter County. The diversions use pumps with unscreened intakes which likely entrain juvenile Chinook salmon, steelhead trout, and other native fishes that pass by the intake. Current facilities and improvements are described in more detail the following section which describes the Proposed Project/Action. The locations of the existing facilities are shown in **Figure 1-1**.

2.3 Proposed Project/Action Characteristics

2.3.1 Project Components

The MFWC Proposed Project/Action includes several components which were divided into two project phases (**Table 1-1**). The purpose for the phasing was to be able to implement the Proposed Project/Action in a way that was both economically feasible and practical for MFWC. The phases are independent of the other and were both designed to benefit fish species while allowing MFWC to more efficiently deliver water to its service areas. Consultation and implementation of Phase 1 is complete. Phase 2 components are the focus of this ASIP.

Phase 2 includes the construction of the New Meridian Diversion/Pumping Plant, removal of the Existing Meridian Diversion/Pumping Plant, modifications to the Main Canal, construction of the New Drexler Re-lift Pumping Plant, and removal of the Existing Drexler Diversion/Pumping Plant. The new diversion with fish screen will increase diversion capacity to compensate for the abandonment and removal of the existing Drexler Diversion while reducing fish entrainment in the pumps. The Main Canal modifications will increase conveyance capacity in order to handle increased flows resulting from the consolidation of the existing Drexler and Meridian diversions. A relift pump station will be constructed to deliver flows to the Drexler Service Area via the Drexler Pipeline.

The following is a summary of the Project facilities and proposed improvements in Phase 2 (also shown in **Figure 1-1**):

- **New Meridian Diversion/Pumping Plant.** A new 135 cfs diversion with fish screen and pumping plant will be located adjacent to and will replace the existing Meridian Diversion.

- **Main Canal Modifications.** Increase the capacity of approximately 15,200 lineal feet of the Main Canal to convey flows over to the Drexler Service Area in order to accommodate the consolidation of the Meridian and Drexler diversions.
- **New Drexler Re-lift Pumping Plant.** A new 35 cfs pumping plant will be located at the end of the Main Canal modifications to deliver flows to the Drexler Service Area via the new Drexler Pipeline.
- **Removal of Existing Meridian Diversion/Pumping Plant.** The existing diversion/pumping facility will be removed after the new pumping plant is constructed.
- **Removal of Existing Drexler Pumping Plant.** The existing pumping facility will be removed after the new pumping plant is constructed.

2.4 Proposed Project/Action Specifics

2.4.1 New Meridian Diversion/Pumping Plant

The Meridian Diversion/Pumping Plant would consist of a new 135 cfs diversion and pumping plant that would be installed immediately upstream of the existing Meridian Diversion on an approximately 10 acre site. The pumping plant would be located on the land-side of the levee.

2.4.1.1 Meridian Diversion Fish Screen

The retractable cylindrical fish screen with brush cleaning system would consist of two 20-foot long, 60-inch-diameter cylindrical screens. The total capacity of the screens would be 135 cfs. Pile-supported retrieval tracks would that parallel the riverside levee face would be installed for screen removal during periodic maintenance or in the irrigation off-season. The pile-supported tracks would allow the screens to be removed out of the water via a motorized hoist and cable system.

The screens would be designed to have a minimum of 3 feet of submergence during low river levels (Water Surface Elevation 32.6 feet). When in operation, the screen mounts to a docking inlet. The docking inlet is covered by a trash-rack to prevent debris from entering the manifold when the screens are out of the water. This docking inlet would be part of an approximately 20-foot-long header manifold fabricated by the system manufacturer. This header manifold would connect to the 72-inch intake pipeline that runs through the levee to the pump station. The header manifold would either be supported on a concrete slab and H piles, similar to the stationary cylindrical design, or be mounted directly to the piles. A platform would be constructed at the top of the tracks to provide access to the screens when in a retracted position, as well as to mount the system control panel.

The brush cleaning system would consist of cylindrical screens equipped with hydraulic motors that rotate the screen against fixed external and internal brushes.

2.4.1.2 Conveyance from River Inlet to Sump

The inlet structure would consist of two 66-inch steel tees, each with two fish screens mounted on top. The tees would be connected to a short segment of 84-inch steel pipeline. The 84-inch pipeline would then be reduced to a 72-inch steel pipeline, which would transition to a reinforced concrete pipe before passing through the levee and underneath North Meridian Road to the pump station wet-well. The fish screens, tees and the segment of 84-inch pipe would be supported by a three foot six-inch thick concrete pad supported on piles.

The layout of the screens could change to allow the motors to be spaced properly and removed from the river for inspection and maintenance. This would require tracks mounted on piles for the screens to be pulled from the river by a winch. Short lengths of pipe would convey the intake water from the individual fish screens to the 84-inch intake pipe.

2.4.1.3 Deflection Piles

If necessary, approximately 10 steel deflection piles would be installed just upstream of the fish screens in the river. The flanges on the piles would be approximately 15 inches wide and 14 inches deep, with a steel weight of 89 pounds per foot. The purpose of the deflection piles would be to protect the fish screens from large debris floating down the river. The top of the piles would be submerged a minimum of three feet as required for navigable waterways. The use of deflection piles may not be necessary with use of a retractable screen.

2.4.1.4 Gate Structure

The gate structure would provide a means for positive closure of the levee penetration by the 72-inch inlet pipeline. A sluice gate with 72-inch diameter thimbles would be mounted in a concrete structure on the water-side of the levee.

2.4.1.5 Wet Well

The pumping plant wet well structure would be constructed on the east side of the Sacramento River at the north east corner of North Meridian Road and Alameda Street near the community of Meridian. The inside dimensions of the sump are 35-feet wide by 46-feet long. The inlet pipeline would enter the sump with the pipe invert approximately 30 feet below grade). The wet well would direct the intake water to the five vertical turbine pumps.

2.4.1.6 Meridian Diversion Pumping Plant

The pumping plant would be equipped with two 16.5 cfs and three 34 cfs mixed flow pumps. The pumps would be mixed flow, vertical shaft pumps, with electric motors mounted on the concrete deck, directly above the wet well described above. The concrete deck is at approximately the same elevation as the existing surrounding grade (elevation 53.5 feet).

The pumping plant site would be surrounded by a chain link fence on the north and west sides of the site and a masonry wall on the east and south sides. The masonry wall would provide a visual barrier between the pumping plant and nearby residences. The wet well, pumping pad, pumps, air compressor, air tank, and an electrical building would be located within the fenced site. A driveway

and 15-foot access gate would allow vehicle access into the site off North Meridian Road. A three-foot gate would be located at the southeast corner of the site just off Alameda Street.

Pumps

Two 16.5 cfs and three 34 cfs mixed flow pumping units would be installed to pump the total design flow of 135 cfs into MFWC's Main Canal. At minimum speed, the low capacity pumps would be able to pump at a rate of 8.3 cfs. This provides MFWC the same pumping flexibility they have at their existing Meridian and Drexler pumping plants. The pumping plant would operate up to capacity when the Sacramento River water surface elevations vary between 32.6 and 50.3 feet.

Discharge Piping

The 16.5 cfs pumps and 34 cfs pumps would discharge into their respective 20-inch and 30-inch, above ground, pump discharge header pipes. The water would be conveyed from the discharge header into a common 54-inch, above ground, manifold pipeline. The 54-inch pipeline would drop underground just before exiting the fenced area of the pumping plant site. Underground, the pipeline would transition to a 72-inch discharge pipeline that would eventually discharge into the Main Canal near Mawson Road.

A separate 18-inch discharge would connect to the most westerly 16.5 cfs pump and would branch off and head both north and south to existing irrigation ditches. The north branch would serve the existing walnut orchard located next to the pumping plant. The south branch would serve the property located immediately south of the pumping plant on the other side of Alameda Street.

Flow Measurement

The water pumped from the Sacramento River would be measured with a 54-inch flowmeter just downstream from the pumping plant, and an 18-inch flowmeter located just west of the most westerly 16.5 cfs pump. The 54-inch flowmeter would measure the amount of water being diverted and pumped into the Main Canal. The 18-inch meter would be used to measure the water being pumped into the 18-inch waterline serving the north and south properties. The meter would be either above ground inside the pumping plant wall or housed in a concrete vault below ground. Flow measurements would be used by MFWC and Reclamation to log and report diversions.

2.4.1.7 Construction Considerations

Diversion and Fish Screen

Construction of the fish screen, intake piping and valve vault must be inside a sheet pile cofferdam to protect the site from flooding. Interlocking sheet piles would be driven into the river bottom using a vibratory or impact hammer attached to a crane. The crane would be floated to the site on a barge. The sheetpiles would be driven one at a time to form the cofferdam. This work would begin after July 1 to minimize impacts to listed aquatic species.

After completion of the cofferdam, the river bottom would be excavated to a level approximately five feet below the top of the H piles that would support the fish screen foundation. The piles

would then be driven, and a concrete tremie seal poured. These piles must be driven with an impact hammer to verify they are properly imbedded and providing required support. All this work must be done without dewatering the site. Before the concrete in the tremie seal sets, there is a danger the difference in water pressure inside and outside the cofferdam could cause the river bottom to rise; therefore, the concrete tremie seal must be in place before water inside the dam is pumped out. Prior to cofferdam dewatering, a fish rescue and salvage plan would be implemented to minimize potential construction-related effects to species present in the project area (see Appendix C). The contractor will have a contingency plan in place to prevent water contamination in the event of concrete tremie seal failure. Sump pumps inside the cofferdam would pump the river water out and then operate continuously to keep seepage from flooding the work site. Prior to cofferdam dewatering, a fish rescue and salvage plan would be implemented to minimize potential construction-related effects to species present in the project area.

The reinforced concrete support pad would then be poured above the support piles, and the screens themselves and intake piping would be mounted on the pad. The levee would be excavated at this time allowing placement of the intake to the pumping plant and the valve vault.

Alternatively, the levee could be excavated first. This would provide a way to move equipment and material to the fish screen installation site without a barge. The contractor would need to compare the cost of the additional excavation and backfill of the levee material versus the time saved by not need to work from a barge. This would also allow the contractor to install the sheet piles for the intake pipe trench construction at the same time, saving overall construction time. The levee would then be replaced with the excavated material if it meets requirements for levee use. The material would be placed in 6 inch lifts and compacted to 90% relative density in accordance with CVFPB requirements.

Pumping Plant

The proposed site for the pumping plant, on the land side of the levee, is currently a walnut orchard and several walnut trees would be removed to accommodate construction. The depth of the wet well (approximately 40 feet to the bottom of the concrete bottom slab) would require sheet piling to support the excavation and protect workers. The sheet piles would be driven by vibratory or impact methods. Sump pumps would be installed to remove groundwater and keep the excavation dry. Once the vertical walls of the wet well are in place the excavation would be backfilled and the sheet piles would be removed or abandoned in place. The pumps, piping and electrical equipment would be installed, and a perimeter fence constructed.

After placement through the levee, the 7- inch reinforced concrete pipe (RCP) intake pipe would be placed in an approximately 30-foot deep by 10-foot wide sheet pile supported trench. Material excavated from the trench would be placed adjacent to the trench and used as backfill after pipe installation. The intake pipe would also be placed under North Meridian Road. To accommodate its installation, North Meridian Road would be closed for approximately one month, and traffic would be detoured to Mawson Road and Burris Road to access areas north of the construction site. Following pipe installation, the trench would be backfilled and the road repaved to repair any damage done during construction activities.

The pumping plant 54-inch steel discharge pipe would be placed in a trench approximately 50-foot long by 10-foot deep. The contractor could opt to slope walls back in lieu of using sheet piles for trench support. At the end of the trench the pipe would transition to a 72-inch RCP and would be placed in the bottom of the existing canal for approximately 1,050 feet. The soil in the bottom of the canal would be wet and unusable for pipe support, so it would be removed and replaced with gravel. The discharge pipe would be placed beneath Mawson Road, which would require a road closure and detour. The closure of North Meridian Road, described above and Mawson Road would not be done at the same time to allow traffic to access areas north of Meridian.

2.4.2 Main Canal Modifications

The Proposed Project/Action would increase the capacity of approximately 15,200 lineal feet of the Main Canal to convey flows to the Drexler service area needed as a result of the consolidation of the Meridian and Drexler diversions. The current maximum capacity of the Main Canal is estimated at 120 cfs from the outlet of the existing pumping plant to Siphon 2 (State Highway 20) which is not large enough to convey the new maximum flow (135 cfs) from the proposed new Meridian Pumping Plant; therefore, the canal would be widened and relined as described in **Table 2-1**.

**TABLE 2-1
PROPOSED CANAL MODIFICATIONS**

Description	Existing Bottom Width (ft)	Proposed Bottom Width (ft)	Flow (cfs)	Velocity (ft/s)
End of 54-inch Manifold pipe to Siphon 1	6.0-6.5	6 Pipe	135	4.8
Check Structure (moved from original location before Siphon)	5.2-7.9	5.5	135	2.5
Siphon 2 to Siphon 3	1.7-3.6	5.5	120	2.9
Siphon 3 to Bend Transition	2.6-3.5	5.5	120	2.7
Bend Transition to Check Structure	2.6-3.1	5.5	70	2.0
Check Structure to Siphon 4	3.1-3.3	3.5	70	2.0
Siphon 4 to Siphon 5	2.6-3.4	3.5	70	2.2

Source: MWH Americas, Inc., 2004

The concrete lined canal would have a trapezoidal shape and side slopes of 1.5 horizontal to 1 vertical (1.5:1). The canal section would be lined with four-inch-thick un-reinforced, cast-in-place concrete. The maximum bottom width would be 5.5 feet and the minimum bottom width would be 3.5 feet depending on the capacity requirements of the reach. The new canal invert elevation would be the same as the current elevation in order to continue utilizing existing siphons wherever hydraulic capacity is available.

The close proximity of the open canal to traffic on Alameda Street between the pumping plant and Mawson Road presents a safety hazard. The 72-inch discharge pipe would be extended to Mawson

Road and backfilled to address the safety hazard. A two foot deep drainage ditch would be constructed along Alameda Street to convey surface runoff that previously discharged to the canal.

The existing canal would be demolished and widened from one side or the other depending on the needed expanded width and the availability of right-of-way. The Operations and Maintenance (O&M) road would be widened, as necessary, to a width of 12-feet. Typical construction of the canal widening would involve a backhoe moving along the O&M road to remove the existing concrete lining by breaking the lining with the bucket into pieces which could be removed and placed into dump trucks. Due to the narrow work area, one dump truck at a time would need to back in from the nearest access point. At this time, the only access points to the canal work area are from Mawson Road, Highway 20, Central Street, Blackmer Road and Summy Road. The next truck would need to wait for the previous truck to pull off the access road. The contractor may try to bring a second dump truck on the opposite side of the canal and load it while waiting for a dump truck on the near side of the canal. Or a second excavator could start at the other end of the Main Canal and load dump trucks accessing the site from Summy Road. The old concrete lining would be landfilled.

It has been estimated that approximately 550 dump truck trips will be required to remove the old concrete lining. At 15 minutes per truck, it will take 24 working hours or about 3 days to remove the concrete. If truck access can maintain that rate, it should take about 4 weeks to remove all the concrete with one excavator working.

The same backhoe used to remove concrete or a second backhoe would then excavate the sides of the canal to the required dimensions. A surveyor would need to work with the excavator operator. The soil removed would be used to widen or raise the O&M road. Where the soil along the side of the canal is not suitable for supporting the concrete lining, it would be removed and replaced.

The existing canal width varies, but is generally between 16 feet and 20 feet wide. North of the transition at Station 72+09 the canal must be widened to approximately 21.5 feet wide. South of the transition it must be widened to approximately 19.5 feet wide. The widths of the limits of work available to the contractor vary between approximately 40 feet and 50 feet. The canal is generally in the center of the limits of work with an access road on one side or the other. However, the levee on the side opposite of the access road is generally not wide enough for trucks. Small backhoes or excavators are 8 to 10 feet wide, and the access road would be too narrow in some locations to allow access. It would also not be wide enough to allow other trucks with equipment and work crews to move around the work area, so access along both sides of the canal will be needed. Therefore, the access road will need to be widened before the start of work in some locations.

Once the canal is widened, it would be lined with four inches of concrete. It is expected that the new concrete lining would be shotcrete. However, the contractor could opt to use a concrete lining machine. In either case, concrete delivery trucks with a 10 cubic yard capacity would need to access the shotcrete crew or lining machine. At an estimated rate of 400 feet per day, the lining would require 35 working days or 7 weeks. Approximately 105 cubic yards of concrete or about 10 concrete truck deliveries would be required. One concrete truck every 45 minutes would need to access the site.

Check Structures and Turnouts

Seven reinforced concrete check structures and 15 turnouts to local irrigation ditches exist at various locations along the existing Main Canal. Of the seven check structures two would remain in place, one is no longer needed and would be demolished and the remaining four would be demolished and then replaced to accommodate the canal widening. Of the 15 existing turnouts, three would be maintained in place, two are no longer needed and would be demolished, 10 would be demolished and replaced to accommodate the canal widening. One new turnout is required in a new location, so a total of 11 turnouts would be constructed. It may be necessary to install a small pump in the canal to provide the required flow through the turnout and into the irrigation ditch at the Mawson Road crossing. Turnouts would be installed within the canal and would not increase the canal footprint.

Construction of the turnouts would likely not be initiated until the completion of the old lining removal. The turnout construction could take place concurrently with canal widening. An excavator would excavate the area for the new turnout and remove the old pipe. Then forms and rebar are placed and concrete poured. The gate mechanism would be installed at the end of the job. This work should not take more than a week per structure. More than one crew may be required.

The estimated duration of construction activities during the Main Canal widening is 5 months. This includes 4 weeks for removal of old concrete, 8 weeks for canal widening and turnout construction, and 8 weeks for canal lining.

Siphons

Two siphons (Siphon 1 and Siphon 3) would be replaced as part of the canal modifications. Siphon 1 under Mawson Road would be removed and replaced with the 72-inch diameter RCP which is part of the Pumping Plant discharge piping. The replacement of Siphon 1 would require a closure of Mawson Road to facilitate the pipe installation. Mawson Road would be restored and repaved following the pipe installation.

Siphon 3 would be replaced by a 72-inch diameter RCP. Replacement of Siphon 3 would require a shutdown and replacement of Central Road and would be subject to Sutter County Public Works' design standards. Siphon 3 would be lengthened to 200 feet (is currently 44-feet long) to extend it past a home on Central road that is situated next to the canal.

The remaining siphons (2, 4, and 5) provide adequate capacity and would be left in-place. Upstream and downstream transitions at each siphon would be constructed of four-inch thick cast-in-place concrete.

2.4.3 Drexler Re-Lift Pumping Plant

The Drexler Re-Lift Pumping Plant would be installed on the main canal, just upstream of the existing Siphon 5 and Pump #10. The purpose of the pumping plant would be to divert 35 cfs from the main canal to the Drexler service area. The existing Drexler Diversion would be abandoned. Water would be pumped up to a new turnout structure via the Drexler Pipeline

installed under Phase 1. This pipeline consists of approximately 6,500 feet of 36-inch pipe of and a turnout structure. From the turnout structure, the water would gravity flow to the original Drexler canal outfall via approximately 600 feet of 36-inch pipe.

The pumping plant would include a 14-foot wide by 32-foot long forebay that would draw water off the Main Canal to two vertical turbine pumps. The forebay would be 10 feet deep and would be divided into two individual bays by a concrete wall with the pumps set at the end of each bay. The pump motors and discharge piping would be supported above a concrete slab that also forms the roof of the forebay. The individual pump discharge pipes would connect to a below ground 36-inch pipeline that would tie into the beginning of the Drexler Pipeline about 200 feet south of the Re-Lift Pumping Plant. An existing drainage ditch that parallels the Main Canal to the west would be filled to allow the construction of the pumping plant, and a new 24-inch storm drain would convey drainage from the ditch to the existing Reclamation District 70 canal to the south. The site construction also includes a 50-foot long by 21-foot wide concrete spillway in the O&M road opposite the Re-Lift Plant location. A 36 inch flow meter would be located in a below ground vault or sited above ground on the concrete pad.

Construction of the wet well and the overflow spillway must be done when the Main Canal is empty. However, the relocation of the drain from the seep to the ditch west of Summy Road and the connection to the Drexler Pipeline could be done during summer months.

2.4.4 Drexler Pipeline Extension

The Drexler Pipeline was connected to an existing 18-inch corrugated metal pipe (CMP) that discharges to an existing outlet box. The connection to the CMP was made with a concrete collar that would likely leak when under pressure. An alternative to replace the CMP and outlet box is being considered to provide a permanent connection and improve pump hydraulics.

A 24 inch branch of the Drexler Pipeline could be extended by approximately 500 feet to connect to a canal. This would improve pumping hydraulics by by-passing 3,000 feet of pipe and 3,000 feet of canals. Service to the Drexler Service Area would be improved and pumping costs would be reduced.

2.4.5 Removal of Existing Meridian and Drexler Diversions

Once the New Meridian Diversion/Pumping Plant and Drexler Relift pumping plant are constructed and operational, the existing Meridian and Drexler Diversion/Pumping Plants would be removed. At a minimum, removal of these facilities would include the removal of the pumps, equipment platforms, electrical equipment, gauging stations, pile supports to required level, and river side-piping. It would also include the excavation of the levee so the discharge pipe through the levee could be removed. The replacement levee section would be constructed to USACE and CVFPB requirements. Sheet pile cofferdams would likely be required to protect the work in the levee and landside flooding.

Removal of the existing diversions would require a large crane sited on the top of the levee or on a barge in the river. As the pumps, piping and support structures are cut into manageable sections,

they would be lifted and removed to a stockpile on the landside and hauled away by trucks. Some of the equipment such as the pumps could be reused, but most of the scrap would be landfilled. The contractor would attempt to pull the support piles out of the river, but most likely they would be cut three feet below river bottom and abandoned, in accordance with CVFPB requirements. The concrete vaults would be difficult and costly to remove. If CVFPB requires removal, the vaults would need to be demolished with jackhammers or a wrecking ball. The debris would then need to be removed from the river bank and bottom with a backhoe and hauled to a landfill.

Removal of the pipes passing through the levee would require excavation of the levee by backhoe down to and from around the pipe. A sheet pile cofferdam would be constructed to protect the construct site and the landside of the levee from flooding. CVFPB requires excavations in the levee to have trench walls sloped back at 1.5 to 1.0 side slopes. This means the trench would be the trench would be approximately 80 feet wide at the top. If the pipe sections are welded together, it would need to be cut into sections with a cutting torch. A crane would then lift the sections out of the trench to trucks for recycling or landfilling. The soil removed to uncover the pipe would be stockpiled at a nearby staging area. If the soil meets minimum requirements for use in a levee, it would be hauled back, placed in six-inch lifts and compacted to 90 percent relative density, in accordance with CVFPB requirements. The levee would be restored to pre-existing grades.

2.4.6 Grimes Canal Modifications

Under Phase 1 the existing unlined canal was widened and the banks were raised to accommodate a change in the how the canal is used. Previously, the canal flowed from south to north because the old diversion was at the south end of the canal. With the relocation of the New Grimes Diversion to the north end of the canal, the water would flow from north to south resulting in a higher water surface along most of the canal. New check structures and turnouts were also installed under Phase 1, and about 1,080 feet of the canal was lined with concrete. Under Phase 2, it is proposed that the remaining 2,500 linear feet of canal be lined with a 4 inches of concrete (shotcrete). The canal was widened under Phase 1, so the only work necessary is to remove and silt in the bottom of the canal and apply the shotcrete. The proposed Phase 2 Grimes Canal modifications are an optional component of the Phase 2 Proposed Project/Action; implementation of this component will be determined at a later date based on available funding.

2.5 Construction Phase

The specific routes to transport equipment, dispose excavated materials, or to obtain imported fill and other materials would likely vary for each project component. Because a number of construction materials sources are located in the surrounding area and urban centers, the selected routes use a combination of highways (e.g., Interstate-5 (I-5), State Route (SR)-99, SR-20, and SR-45), arterials and designated truck routes in the project vicinity. Construction worker trips are assumed to originate from the major urban areas in the project region and nearby communities primarily within Sutter County, Sacramento County, and Yolo County.

2.5.1 Staging Areas

Main staging areas would be located in an easily accessible area. Arrangements would be made between the contractor and property owner for all stored construction and equipment materials. Temporary staging of raw materials could occur in existing rights-of-way when short-term storage is needed. Site preparation for staging areas would incorporate appropriate measures to prevent unnecessary vegetation removal. Ingress and egress roads would be covered with rock base at a minimum to prevent off-tracking of dirt.

Main staging areas would be large enough to safely store heavy equipment, work crew vehicles, long-term storage of construction materials, and job site trailer(s). The long-term staging area(s) would be used for storage of construction equipment and materials, as a reporting location for workers, and as the location of the job site trailer and parking area for vehicles and equipment.

The contractor would be responsible for securing the job site with temporary chain link fencing or other fencing acceptable to the project engineer. Power to the job site will be provided by existing electrical utilities, if needed.

2.5.2 Affected Roadways

The roadways identified in **Table 2-2** will be affected during construction. All roadways would be restored to original condition or better and subject to Sutter County Public Works' design standards.

**TABLE 2-2
AFFECTED ROADWAY SEGMENTS**

Segment	Anticipated Level of Disruption
North Meridian Road	Temporary closure and detour (6 months)
Mawson Road	Temporary closure; Detour route (1 month)
Burris Road	Temporary closure; Detour route (1 month)
Central Road	Temporary closure and detour (1 month)

2.5.3 Construction Considerations

Construction activities would comply with the requirements set by the Central Valley Regional Water Quality Control Board (RWQCB) to minimize construction-related impacts to water quality. In addition, silt screens and/or silt fences would be used where construction activities could possibly cause sediment to enter the river. All water-side construction activities, with the exception of riprap installation, would be confined within a sheet-pile cofferdam, which would be put in place and removed during the "dry" season from July 1 to October 1, although this could be extended to November 1 with NMFS approval. In addition, canal modifications would occur between October 1 and April 30 to avoid disruption to the irrigation delivery schedule and growing season.

All construction contracts would specify staging areas for heavy equipment on the land-side of the Sacramento River so that spills of oil, grease, or other petroleum by-products would not be discharged in the Sacramento River. All machinery would be properly maintained and cleaned to prevent spills and leaks. Any spills and leaks from equipment would be reported immediately and cleaned up in accordance with applicable local, state, and/or federal regulations.

Construction contracts would note the location of staging areas for stockpiling material and would be required to maintain Storm Water Pollution Prevention Plan (SWPP) Best Management Practices (BMPs) to prevent the migration of material off site.

2.6 Actions Contributing to MSCS Goals

The MSCS contains a list of conservation goals for each species and NCCPA community evaluated in the MSCS. The three alternative goals for species are recovery (“R”), contribute to recovery (“r”), and maintain (“m”). The goal of “recovery” was assigned to those species whose recovery is dependent on restoration of the Delta and Suisan Bay/Marsh ecosystems and for which CALFED could reasonably be expected to undertake all or most of the actions necessary to recover the species. Recovery is achieved when the decline of a species is arrested or reversed, threats to the species are neutralized, and the species long-term survival in nature is assured. The goal “contribute to recovery” was assigned to species for which CALFED Actions affect only a limited portion of the species range and/or have limited effects on the species. To achieve the goal of contributing to a species recovery, CALFED is expected to undertake some of the actions under its control and within its scope that are necessary to recover the species. When a species has a recovery plan, CALFED may implement both plan measures that are within the CALFED Solution Area and some measures that are outside the Solution Area. For species without a recovery plan, CALFED will need to implement specific measures that will benefit the species. The goal “maintain” was assigned to species expected to be affected minimally by CALFED Actions. For this category, CALFED will avoid, minimize, and compensate for any adverse effects to the species commensurate with the level of effect on the species. Actions may not actually contribute to the recovery of the species; however, at a minimum, they will be expected to not contribute toward the need to list the species or degrade the status of a listed species. CALFED also will, to the extent practicable, improve habitat conditions for these species.

The CALFED Ecosystem Restoration Program (ERP) has adopted the CALFED MSCS goals related addressing “recovery”, “contribute to recovery”, and “maintain” for MSCS covered species as described above. The ERP has also adopted the MSCS conservation measures and would build upon those measures during the process of completing ERP studies and actions. The ERP focuses on measures to enhance NCCPA communities and has a goal related to the need to “enhance and/or conserve biotic communities” (“E”). A final ERP goal is to “maintain and/or enhance harvested species” (“H”), which relates to commercial/recreational use of native and non-native biological resources. The MFWC Project will fulfill the following milestone of the CALFED ERP to the benefit of all MSCS “R” and “r” covered fish:

- Install positive barrier fish screens on all diversions greater than 250 cfs in all Ecological Management Zones (EMZs) and 25% of all smaller unscreened diversions in the Sacramento River Basin.

2.7 Conservation Measures

The CALFED MSCS presents the basis for conservation measures developed to address CALFED Actions overall, as outlined in the Programmatic CALFED EIS/EIR. The CALFED MSCS follows the two-tiered approach to FESA, CESA, and NCCPA compliance initiated by the CALFED Programmatic EIS/EIR and MSCS. The MSCS provides the CALFED programmatic compliance with FESA, CESA, and NCCPA while this MFWC ASIP provides the project-level compliance with these acts. As such, this ASIP represents the project-level biological assessment for initiating consultation with USFWS and NOAA-Fisheries under the Section 7 of the FESA and the project-level NCCPA compliance.

The conservation measures summarized in **Table 2-3** are from a USFWS Programmatic Biological Opinion and will be incorporated into the Project Description. Conservation measures, as defined in this ASIP, include avoidance and minimization, compensation, and mitigation measures for giant garter snake. The following tables list the CALFED MSCS species specific conservation goals and measures, and habitat conservation measures for NCCPA habitats.

- The contractor shall use vibrational pile driving to the greatest extent feasible. If percussive pile driving is necessary, its use shall be minimized to the maximum extent possible and comply with the following *Interim Criteria for Injury of Fish to Pile Driving Operations* (Popper et al. 2006):
 - The Sound Exposure Level (SEL) shall not exceed 187 dB (re: 1 $\mu\text{Pa}^2 \cdot \text{sec}$) in any single strike, measured at a distance of 32.8 ft from the source;
 - The peak sound pressure level should not exceed 208 dB (re: 1 $\mu\text{Pa}_{\text{peak}}$) in any single strike, measured at a distance of 32.8 ft from the source.
- Pump(s) used for dewatering the cofferdam during Phase 2 construction will be screened according to NMFS fish screening criteria for anadromous salmonids (NMFS 1997). After installation of the cofferdam and any time the cofferdam is flooded during construction, a fish rescue and salvage plan will be implemented to minimize potential construction-related effects to species present in the project area (see Appendix C). A qualified biologist will be on-site during such pumping activities to ensure that any fish that may be present within the construction area are relocated to suitable habitat near the project area.
- During construction operations, the number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles shall observe a 20-mile-per-hour speed limit within construction areas, except on County roads and on State and Federal highways. This is particularly important during periods when the snake may be sunning or moving on roadways. All heavy equipment, vehicles, and supplies will be stored at the designated staging area at the end of each work period.

- During construction operations, stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas and exclusive of the Environmentally Sensitive Areas (ESAs). The applicant will ensure contamination of habitat does not occur during such operations. All workers will be informed of the importance of preventing spills and appropriate measures to take should a spill occur.
- At most 24-hours prior to the commencement of construction activities, the ESA shall be surveyed for giant garter snakes by a USFWS-approved biologist. The biologist will provide the USFWS with a written report that adequately documents the monitoring efforts within 24-hours of commencement of construction activities. The project area shall be re-inspected by the monitoring biologist whenever a lapse in construction activity of two weeks or greater has occurred.
- Construction activity within giant garter snake habitat (*e.g.* aquatic, upland, and rice habitat) shall be conducted between May 1 and October 1. This is the active period for the snake and direct mortality is lessened, because snakes are expected to actively move and avoid danger. If it appears that construction activity may go beyond October 1, the project proponents shall contact the USFWS as soon as possible, but not later than September 15 of the year in question, to determine if additional measures are necessary to minimize take. Construction activities within 200 feet from the banks of snake aquatic habitat will be avoided during the snake's inactive season. **If this is not feasible, the Project Proponent must consult with USFWS to determine measures to avoid impacts to giant garter snake.**
- A USFWS-approved biologist shall inspect construction-related activities at the ESA to ensure that no unauthorized take of federally listed species or destruction of their habitat occurs. The biologist shall be available for monitoring throughout all phases of construction that may result in adverse effects to the giant garter snake. This includes clearing and grubbing activities and installation of exclusion fence in giant garter snake upland habitat. Furthermore, the biologist shall have the authority through communication with the resident engineer to stop construction activities in the immediate area if a giant garter snake is encountered during construction until appropriate corrective measures have been completed or until the snake is determined to be unharmed. Snakes encountered during construction activities shall be allowed to move away from the area on their own volition. The biologist shall notify the USFWS immediately if any listed species are found on-site, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take of listed species to the USFWS immediately by telephone at 916/ 414-6600 and by electronic mail or written letter addressed to the Chief, Endangered Species Division, within three (3) working days of the incident. The Service does not authorize any handling or moving of a giant garter snake by other than a USFWS-permitted biologist.
- A Worker Environmental Awareness Training Program for construction personnel shall be conducted by the USFWS-approved biologist for all construction workers, including

contractors, prior to the commencement of construction activities. The program shall provide workers with information on their responsibilities with regard to the snake, an overview of the life-history of this species, information on take prohibitions, protections afforded this animal under the Act, and an explanation of the relevant terms and conditions of this biological opinion. Written documentation of the training must be submitted to the Sacramento Fish and Wildlife Office within 30 days of the completion of training. As needed, training shall be conducted in Spanish for Spanish language speakers.

- Prior to the commencement of construction activities, high visibility fencing will be erected around the habitats of federally listed species to identify and protect these designated ESAs from encroachment of personnel and equipment. These areas will be avoided by all construction personnel. The fencing shall be inspected by the Contractor before the start of each work day and maintained by the Contractor until completion of the project. The fencing may be removed only when the construction of the project is completed. Fencing will be established in upland immediately adjacent to aquatic snake habitat and extending up to 200 feet from construction activities. Silt fencing, if properly installed, may serve as suitable snake exclusion fencing.
- Signs will be posted by the Contractor every 50 feet along the edge of the ESAs, with the following information: “This area is habitat of federally-threatened and/or endangered species, and must not be disturbed. These species are protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.” The signs should be clearly readable from a distance of 20 feet, and must be maintained by the Contractor for the duration of construction.
- Best Management Practices (BMPs), including a Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP), will be implemented to minimize effects to the snake during construction. Best management practices will be implemented to prevent sedimentation from entering ESAs and to reduce erosion, dust, noise, and other deleterious aspects of construction related activities. These BMPs may include, but are not limited to, silt fencing, temporary berms, restrictions on cleaning equipment in or near ESAs, installation of vegetative strips, and temporary sediment disposal. Runoff from dust control and hazardous materials will be retained on the construction site and prevented from flowing into the ESAs.
- Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material shall be used for erosion control and other purposes at the ESA to ensure that the giant garter snake is not trapped or becomes entangled. This limitation shall be communicated to the contractor using special provisions included in the bid solicitation package.
- To eliminate an attraction to predators of the snake, all food-related trash items, such as wrappers, cans, bottles, and food scraps, must be disposed of in closed containers and removed at the end of each workday from the entire project site.

- The Contractor shall provide documentation that aggregate, fill, or borrow material provided for the proposed project was obtained in compliance with the State Mining and Reclamation Act (SMARA). Evidence of compliance with the Act shall be demonstrated by providing the resident engineer with one of the following: 1) a letter from the USFWS stating that the use of the borrow pit will not result in the incidental take of species; 2) an incidental take permit for contractor-related activities issued by the USFWS pursuant to section 10(a)(1)(B) of the Act; 3) a biological opinion or letter concurring with a “not likely to adversely affect” determination issued by the USFWS to the Federal agency having jurisdiction over contractor-related services; 4) a letter from the USFWS concurring with the “no effect” determination for contractor-related activities; or 5) contractor submittal of information to the resident engineer indicating compliance with the SMARA and provision of County land use permits and California Environmental Quality Act (CEQA) clearance.
- After construction activities are complete, any temporary fill or construction debris shall be removed and disturbed areas restored to their pre-project conditions. An area subject to “temporary” disturbance includes any area that is disturbed during the project, but that, after project completion, will not be subject to further disturbance and has the potential to be re-vegetated. All ESA snake habitats subject to temporary ground disturbances, including storage and staging areas and temporary roads, will be restored to pre-project conditions. If appropriate, these areas shall also be re-contoured to pre-project conditions. A written report shall be submitted to the USFWS within ten (10) working days of the completion of construction at the project site and restoration of the site to pre-project conditions.
- An inspection of the site, with a photo documentation report showing pre- and post-project area photos, will be conducted and photos and a brief report will be submitted to USFWS one year from implementation of restoration to pre-project conditions.
- The Contractor shall minimize the potential for harm, harassment, and direct mortality of the snake resulting from project-related activities by implementation of the project. The Contractor shall ensure that the temporary loss of giant garter snake habitat is confined to the proposed project site.
- Aquatic habitat for the snake will be dewatered 15 days prior to the initiation of construction activities. If complete dewatering is not possible, potential snake prey (*i.e.*, fish and tadpoles) will be removed so that giant garter snakes and other wildlife are not attracted to the construction area.
- A USFWS-approved biologist shall inspect construction-related activities at the proposed project site to ensure that no unauthorized take of federally listed species or destruction of their habitat occurs. The biologist shall be available for monitoring throughout all phases of construction that may result in adverse effects to the giant garter snake. This includes clearing and grubbing and other construction activities in the areas of wetland vegetation/aquatic habitat, adjacent upland habitat, and during exclusion fence installation. Furthermore, the biologist shall have the authority through communication with the

resident engineer to stop construction activities in the immediate area if a giant garter snake is encountered during construction until appropriate corrective measures have been completed or until the snake is determined to be unharmed. Snakes encountered during construction activities shall be allowed to move away from the area on their own volition. The biologist shall notify the USFWS immediately if any listed species are found on-site, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take of listed species to the USFWS immediately by telephone at 916/ 414-6600 and by electronic mail or written letter addressed to the Chief, Endangered Species Division, within three (3) working days of the incident. The Service does not authorize any handling or moving of a giant garter snake by other than a USFWS-permitted biologist.

- Prior to the commencement of construction activities, the project proponent shall compensate for the temporary and permanent loss habitat of the giant garter snake according to the Programmatic Guidelines.

This page intentionally left blank.

**TABLE 2-3
CALFED MSCS SPECIES GOAL AND CONSERVATION MEASURES
FOR SPECIAL-STATUS SPECIES OCCURRING IN THE ACTION AREA**

Species (Scientific Name / Common Name)	Listing Status Federal/ State	MSCS Species Goal	Applicable MSCS Species Specific Conservation Measures
Fish			
<i>Acipenser medirostris</i> North American green sturgeon	FT/CSC	R	<ol style="list-style-type: none"> 1. Coordinate and maximize water supply system operations flexibility consistent with seasonal flow and water temperature needs of the green sturgeon; pursue opportunities to operate new and existing diversions to avoid and minimize adverse effects on green sturgeon, and, to the extent consistent with CALFED objectives, locate the diversion points to avoid the primary distribution of green sturgeon. 2. For all construction activities, limit construction to windows of minimal species vulnerability and implement best management practices (BMPs), including a stormwater pollution prevention plan (SWPPP), toxic materials control and spill response plan, and vegetation protection plan. 3. CALFED actions that have impacts on shallow water habitat will protect and restore in-kind habitat, including habitat features that minimize colonization by undesirable non-native species. 4. Avoid or minimize restrictions on the upward movement of green sturgeon to suitable spawning habitat. 5. Implement applicable conservation measures to avoid, minimize, and compensate for impacts on green sturgeon listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures", Table D-19, "Anadromous Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures".
<i>Oncorhynchus mykiss</i> Central Valley steelhead	FT/--	R	<ol style="list-style-type: none"> 1. Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Central Valley steelhead listed in MSCS Attachment D, "Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures", Table D-19, "Anadromous Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures". 2. For all in-channel and near-channel construction activities, implement construction BMPs (such as erosion and sediment control measures) and conservation measures in the 404 NWP, GPs, and PL84-99 USACE flood relief BOs: <ol style="list-style-type: none"> a. Avoid or minimize channel modifications during time periods when steelhead are vulnerable to the direct and indirect adverse effects of construction activities. b. Avoid or minimize channel modifications in important natal, rearing, and migratory habitats that may result in habitat degradation and diminished habitat connectivity. c. Avoid, minimize, and compensate for all adverse impacts on instream, shallow-water,

**TABLE 2-3
CALFED MSCS SPECIES GOAL AND CONSERVATION MEASURES
FOR SPECIAL-STATUS SPECIES OCCURRING IN THE ACTION AREA**

Species (Scientific Name / Common Name)	Listing Status Federal/ State	MSCS Species Goal	Applicable MSCS Species Specific Conservation Measures
<i>Oncorhynchus tshawytscha</i> Central Valley spring-run Chinook salmon	FT/CT	R	<p>riparian, and shaded riverine aquatic habitats resulting from CALFED Actions, including bank protection of in-channel islands, construction of attached berms, and levee program actions.</p> <p>d. Compensate for adverse impacts on habitats by in-kind, onsite replacement of habitats and their functional values. Compensation shall result in a net increase in the extent and connectivity of these habitats for migrating, rearing, and spawning steelhead.</p> <p>3. Implementation of offsite, out-of-kind mitigation that reestablishes access to historical steelhead spawning and rearing habitat may be considered appropriate compensation:</p> <p>a. Remove or modify artificial barriers and diversion structures.</p> <p>4. Fish screens shall be installed in accordance with NMFS/DFG fish screening criteria on any new diversions, consolidated diversions, or on the intake of any existing diversions as a compensation measure.</p> <p>5. Fully adhere to the terms and conditions of all applicable CESA and FESA biological opinions and permits for CVP and SWP operations.</p> <p>6. Implement construction BMPs including stormwater pollution prevention plans, toxic materials control and spill response plans, vegetation protection plans, and restrictions on materials used in channel and on levee embankments:</p> <p>a. All materials that are used for construction of in-channel structures must meet applicable State and federal water quality criteria. Avoid or minimize the use of such materials that are deleterious to aquatic organisms.</p>
			<p>1. Implement applicable conservation measures to avoid, minimize, and compensate for impacts on Central Valley spring-run Chinook salmon listed in MSCS Attachment D, Table D-19.</p> <p>2. For all in-channel and near-channel construction activities, implement construction BMPs (such as erosion and sediment control measures) and conservation measures in the 404 NWP, GPs, and PL84-99 USACE flood relief BOs:</p> <p>a. Avoid or minimize channel modifications during time periods when spring-run Chinook are vulnerable to the direct and indirect adverse effects of construction activities.</p> <p>b. Avoid or minimize channel modifications in important natal, rearing, and migratory habitats</p>

**TABLE 2-3
CALFED MSCS SPECIES GOAL AND CONSERVATION MEASURES
FOR SPECIAL-STATUS SPECIES OCCURRING IN THE ACTION AREA**

Species (Scientific Name / Common Name)	Listing Status Federal/ State	MSCS Species Goal	Applicable MSCS Species Specific Conservation Measures
			<p>that may result in habitat degradation and diminished habitat connectivity.</p> <p>c. Avoid, minimize, and compensate for all adverse impacts on instream, shallow-water, riparian, and shaded riverine aquatic habitats resulting from CALFED Actions, including bank protection of in-channel islands, construction of attached berms, and levee program actions.</p> <p>d. Compensate for adverse impacts on habitats by in-kind, onsite replacement of habitats and their functional values. Compensation shall result in a net increase in the extent and connectivity of these habitats for migrating, rearing, and spawning spring-run Chinook salmon.</p> <p>3. Implementation of offsite, out-of-kind mitigation that reestablishes access to historical spring-run Chinook salmon spawning and rearing habitat may be considered appropriate compensation:</p> <p>a. Remove or modify artificial barriers and diversion structures.</p> <p>4. Fish screens shall be installed in accordance with NMFS/DFG fish screening criteria on any new diversions, consolidated diversions, or on the intake of any existing diversion that is either enlarged, modified, relocated, or for which the season of use is changed as a result of a CALFED action within the range of spring-run Chinook salmon. CALFED may also install fish screens on existing diversions as a compensation measure.</p> <p>5. Fully adhere to all terms and conditions in all applicable CESA and FESA biological opinions and permits for CVP and SWP operations.</p> <p>6. Implement construction BMPs including stormwater pollution prevention plans, toxic materials control and spill response plans, vegetation protection plans, and restrictions on materials used in channel and on levee embankments:</p> <p>a. All materials that are used for construction of in-channel structures must meet applicable State and federal water quality criteria. Avoid or minimize the use of such materials that are deleterious to aquatic organisms.</p>
<i>Oncorhynchus tshawytscha</i>	FE/CE	R	1. Implement applicable conservation measures to avoid, minimize, and compensate for impacts on

**TABLE 2-3
CALFED MSCS SPECIES GOAL AND CONSERVATION MEASURES
FOR SPECIAL-STATUS SPECIES OCCURRING IN THE ACTION AREA**

Species (Scientific Name / Common Name)	Listing Status Federal/ State	MSCS Species Goal	Applicable MSCS Species Specific Conservation Measures
Sacramento River winter-run Chinook salmon			<p>Sacramento River winter-run Chinook salmon listed in MSCS Attachment D, Table D-19.</p> <ol style="list-style-type: none"> 2. For all in-channel and near-channel construction activities, implement construction BMPs (such as erosion and sediment control measures) and conservation measures in the 404 NWP, GPs, and PL84-99 USACE flood relief BOs: <ol style="list-style-type: none"> a. Avoid or minimize channel modifications during time periods when winter-run Chinook are vulnerable to the direct and indirect adverse effects of construction activities. b. Avoid or minimize channel modifications in important natal, rearing, and migratory habitats that may result in habitat degradation and diminished habitat connectivity. c. Avoid, minimize, and compensate for all adverse impacts on instream, shallow-water, riparian, and shaded riverine aquatic habitats resulting from CALFED Actions, including bank protection of in-channel islands, construction of attached berms, and levee program actions. d. Compensate for adverse impacts on habitats by in-kind, onsite replacement of habitats and their functional values. Compensation shall result in a net increase in the extent and connectivity of these habitats for migrating, rearing, and spawning spring-run Chinook salmon. 3. Implementation of offsite, out-of-kind mitigation that reestablishes access to historical winter-run Chinook salmon spawning and rearing habitat may be considered appropriate compensation: <ol style="list-style-type: none"> a. Remove or modify artificial barriers and diversion structures. 4. Fish screens shall be installed in accordance with NMFS/DFG fish screening criteria on any new diversions, consolidated diversions, or on the intake of any existing diversion that is either enlarged, modified, relocated, or for which the season of use is changed as a result of a CALFED action within the range of spring-run Chinook salmon. CALFED may also install fish screens on existing diversions as a compensation measure. 5. Fully adhere to all terms and conditions in all applicable CESA and FESA biological opinions and permits for CVP and SWP operations. 6. Implement construction BMPs including stormwater pollution prevention plans, toxic materials control and spill response plans, vegetation protection plans, and restrictions on materials used in channel and on levee embankments:

**TABLE 2-3
CALFED MSCS SPECIES GOAL AND CONSERVATION MEASURES
FOR SPECIAL-STATUS SPECIES OCCURRING IN THE ACTION AREA**

Species (Scientific Name / Common Name)	Listing Status Federal/ State	MSCS Species Goal	Applicable MSCS Species Specific Conservation Measures	
			a.	All materials that are used for construction of in-channel structures must meet applicable State and federal water quality criteria. Avoid or minimize the use of such materials that are deleterious to aquatic organisms.
Reptiles				
Thamnophis gigas Giant garter snake	FT/CT	r	1.	Conduct surveys to determine the occupancy and distribution of the species within suitable habitat that CALFED actions could affect.
			2.	Restore potentially occupied habitat that would be temporarily degraded by CALFED actions onsite immediately following project completion.
Birds				
Athene cunicularia Western burrowing owl	--/CSC	m	1.	Restore or enhance 1-2 acres of suitable nesting habitat for each acre of occupied nesting habitat that is converted to unsuitable nesting habitat as a result of CALFED actions.
			2.	To the extent consistent with ERP objectives, design and manage grassland and agricultural land habitat restorations and enhancements to provide suitable foraging habitat conditions.
			3.	Avoid or minimize disturbances that could be associated with implementing CALFED actions near active nest sites during the nesting period (March-August).
			4.	To the extent consistent with ERP objectives, manage restored or enhanced habitats to maintain desirable rodent populations and minimize impacts associated with rodent control.
Branta hutchinsii leucopareia	FD/--/--	m	1.	To the extent consistent with ERP objectives, direct proposed actions for improving agricultural habitats

¹ Note that the Service does not have a 'protocol-level survey' for the giant garter snake to determine presence/absence. Determination of species presence is based on habitat characteristics, the most current information about the extant range of the species, surrounding locality records, and the biology and ecology of the snake, and not on presence/absence surveys, which are not effective for this cryptic and evasive species.

**TABLE 2-3
CALFED MSCS SPECIES GOAL AND CONSERVATION MEASURES
FOR SPECIAL-STATUS SPECIES OCCURRING IN THE ACTION AREA**

Species (Scientific Name / Common Name)	Listing Status Federal/ State	MSCS Species Goal	Applicable MSCS Species Specific Conservation Measures
Cackling (=Aleutian Canada) goose			for wildlife to protecting and improving traditional wintering habitat.
<i>Buteo swainsoni</i> Swainson's hawk	--/CT/--	r	<ol style="list-style-type: none"> Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that CALFED actions could affect to determine the presence and distribution of the species. Avoid or minimize actions near locations that support high densities of nesting pairs that could adversely affect high value foraging and nesting habitat. Avoid or minimize actions within 5 miles of active nest sites that could result in disturbance during the breeding period (April-September). To the extent consistent with CALFED objectives, adhere to DFG Region II mitigation guidelines for avoiding or minimizing impacts of actions of the Swainson's hawk.
<i>Pandion haliaetus</i> osprey	--/--/--	m	<ol style="list-style-type: none"> Before implementing CALFED actions that could result in the loss nesting structures or disturbance to nesting pairs, conduct surveys to determine the presence and distribution of active nest sites along the Sacramento River and other major tributaries to the Bay-Delta. Avoid or minimize disturbances that could be associated with implementing CALFED actions near active nest sites during the nesting period (March-August). Avoid or minimize CALFED actions that could result in the degradation or loss of nesting structures.
<i>Riparia riparia</i> Bank swallow	--/CT/--	r	<ol style="list-style-type: none"> Before implementing actions that could result in take or the loss or degradation of occupied habitat, conduct surveys in suitable habitat within portions of the species' range that CALFED actions could affect to determine the presence and distribution of the species. Avoid or minimize actions that could adversely affect known colonies or unoccupied river reaches with eroding banks composed of soils that would provide suitable nesting substrate. Avoid actions near active colonies from April through August.

**TABLE 2-4
CALFED MSCS CONSERVATION MEASURES FOR NCCPA NATURAL COMMUNITIES OCCURRING IN THE ACTION AREA**

NCCPA Natural Community	Applicable MSCS Conservation Measures
Valley Riverine Aquatic Habitat	<ol style="list-style-type: none"> 1. Avoid or minimize disturbance to existing shaded riverine aquatic overhead cover. 2. Restore or enhance 1-3 times the linear footage of affected shaded riverine aquatic overhead cover near where impacts are incurred. 3. To the extent practicable, include project design features that allow for onsite reestablishment and long-term maintenance of shaded riverine aquatic overhead cover following project construction. 4. Avoid or minimize implementing actions during the periods evaluated species are present and could be affected by the actions.
Valley/Foothill Riparian Habitat	<ol style="list-style-type: none"> 1. Avoid or minimize disturbance to existing habitat. 2. Restore or enhance 2-5 acres of additional in-kind habitat for every acre of affected habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of habitat. 3. To the extent practicable, include project design features that allow for onsite reestablishment and long-term maintenance of riparian vegetation following project construction. 4. Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by the actions.
Anadromous Fish Group	<ol style="list-style-type: none"> 1. Implement measures on an emergency basis during extended droughts to protect water supplies dedicated to meet Delta inflow and outflow criteria deemed essential in maintaining anadromous fish populations. Such measures would be implemented infrequently and would be used only to readjust water supplies to levels expected without this set of CALFED actions. Measures may include additional supplies, or emergency provisions that would reduce other water supply demands. Another measure is initially to implement the actions to the extent feasible to determine potential effects on seasonal and critical-year water supplies and develop a long-term water management plan that includes this and other actions to minimize effects of reallocation in other seasons and critical years. 2. Avoid or minimize in-channel construction activities during periods when anadromous fish species are present in high abundance or when life stages are present that are most susceptible to adverse effects associated with implementing actions. 3. To the extent consistent with CALFED objectives, confine additional winter pumping for flooding agricultural lands to times and areas of channels with low densities of anadromous fish. 4. To the extent consistent with CALFED objectives, place consolidated intakes in areas with minimal numbers of juvenile anadromous fish. 5. To the extent consistent with CALFED objectives, include project design features that allow for onsite reestablishment and long-term maintenance of aquatic, wetland, and riparian habitat following project construction. 6. Reductions in unnatural inputs of organic carbon could be replaced with increased natural organic inputs such as from restored tidal wetlands and riparian habitats. 7. Water transfers should be conducted so as not to increase exports during times of the year when anadromous fish are more vulnerable to damage or loss at project facilities or when their habitat may be adversely affected. 8. Design and operate proposed new diversions from the Sacramento River to minimize adverse effects on migrating anadromous fish, to avoid blocking upstream migration of fish to the Sacramento River, and to improve habitat conditions for anadromous fish.

**TABLE 2-4
CALFED MSCS CONSERVATION MEASURES FOR NCCPA NATURAL COMMUNITIES OCCURRING IN THE ACTION AREA**

NCCPA Natural Community	Applicable MSCS Conservation Measures
Estuarine Fish Group	<ol style="list-style-type: none"> 1. Implement measures on an emergency basis during extended droughts to protect water supplies dedicated to meet Delta inflow and outflow criteria deemed essential in maintaining anadromous fish populations. Such measures would be implemented infrequently and would be used only to readjust water supplies to levels expected without this set of CALFED actions. Measures may include additional supplies, or emergency provisions that would reduce other water supply demands. Another measure is initially to implement the actions to the extent feasible to determine potential effects on seasonal and critical-year water supplies and develop a long-term water management plan that includes this and other actions to minimize effects of reallocation in other seasons and critical years. 2. To the extent consistent with CALFED objectives, construct and operate in-channel barriers and restrictions to provide sufficient leeway to adjust hydraulics in various channels to ensure fish are not being drawn in greater numbers or proportions toward the pumps or being affected by poor water quality. Implement monitoring and testing necessary to design, construct, and operate barriers and restrictions. Develop and implement procedures and operating criteria for barrier systems to protect fish. Implement monitoring and testing necessary to ensure against excessive movement of fish toward the south-Delta pumping plants. 3. Avoid or minimize in-channel construction activities during periods estuarine fish species would be most susceptible to adverse effects that could be associated with implementing proposed actions. 4. Avoid or minimize implementing proposed actions in occupied habitat areas that could have a substantial adverse effect on the distribution or abundance estuarine fish species. 5. To the extent practicable, confine additional pumping to times and area to channels with minimal concentrations of fish. 6. Install screens on new diversions to avoid entrainment of juvenile and adult estuarine fish. 7. Include project design features that allow for onsite reestablishment and long-term maintenance of aquatic, wetland, and riparian habitat following project construction. 8. Reductions in unnatural inputs of organic carbon could be replaced with increased natural organic inputs such as from restored tidal wetlands and riparian habitats. 9. Water transfers should be conducted in a manner that avoids increased exports during periods when estuarine fish are more vulnerable to damage or loss at project facilities. 10. Design and operate proposed new diversions from the Sacramento River to minimize adverse effects on migrating native estuarine fishes, to avoid blocking upstream migration of fish to the Sacramento River, and to improve habitat conditions for native estuarine fish.

CHAPTER 3

Environmental Baseline

The following chapter presents species accounts for species assessed in detail in this ASIP. The species addressed in this ASIP are those special-status species that may be affected or whose habitat may be affected by the Proposed Project/Action.

Species selected for detailed analysis include those federal- and/or state-listed species, candidate species, and/or species of special concern covered by the CALFED MSCS and potentially affected by the Proposed Project/Action. The following table shows these selected species which are addressed in detail in the ASIP.

Designated Critical Habitat and delineated Essential Fish Habitat in the Action Area are also discussed.

**TABLE 3-1
SPECIES, CRITICAL HABITAT, AND ESSENTIAL FISH HABITAT
ADDRESSED IN DETAIL IN THIS ASIP**

Species
<ul style="list-style-type: none"> North American green sturgeon (Southern DPS) (<i>Acipenser medirostris</i>) Central Valley steelhead (<i>Oncorhynchus mykiss</i>) Central Valley spring-run Chinook (<i>Oncorhynchus tshawytscha</i>) Sacramento River winter-run Chinook (<i>Oncorhynchus tshawytscha</i>) Giant garter snake (<i>Thamnophis gigas</i>) Western burrowing owl (<i>Athene cunicularia</i>) Cackling (=Aleutian Canada) goose (<i>Branta hutchinsii leucopareia</i>) Swainson's hawk (<i>Buteo swainsoni</i>) Osprey (<i>Pandion haliaetus</i>) Bank swallow (<i>Riparia riparia</i>)
Critical Habitat
<ul style="list-style-type: none"> North American green sturgeon (Southern DPS) Critical Habitat Central Valley steelhead Critical Habitat Central Valley spring-run Chinook salmon Critical Habitat Sacramento River winter-run Chinook salmon Critical Habitat
Essential Fish Habitat
<ul style="list-style-type: none"> Pacific salmon Essential Fish Habitat

3.1 Baseline Conditions for Species

The stretch of the Sacramento River that includes the Action Area is part of a migratory corridor for adult Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead, and provides migration and rearing habitat for juveniles of these species. A large proportion of all Federally listed Central Valley salmonids are expected to utilize aquatic habitat within the Sacramento River in the Action Area. The Sacramento River also functions as a migratory and holding corridor for adult and rearing and migratory habitat for juvenile Southern DPS of North American green sturgeon. The entire population of migrating adults and emigrating juvenile winter-, and Central Valley spring-run Chinook salmon, and a majority of Central Valley steelhead, must pass by/through the Action Area. The following section provides life history information for these special-status species with potentially affected by the Proposed Project/Action.

3.1.1 North American Green Sturgeon

On April 7, 2006, NMFS listed the Southern Distinct Population Segment (DPS) of the North American green sturgeon as threatened. Final Critical Habitat for the green sturgeon was designated on October 9, 2009. Sturgeon are an anadromous fish species, spending the majority of their life in marine waters and then moving into freshwater throughout the fall and winter to spawn in the spring. Upon hatching the young green sturgeon develop in the fresh water and are known to return to the ocean within one to four years (COSEWIC 2004). Historically, green sturgeon was found in the lower reaches of the San Joaquin River and Delta. Today, they occur in the upper Sacramento River and tributaries to the Sacramento River including the Feather, Yuba and American Rivers. Green sturgeon is frequently caught along the coast, but is present in limited numbers in the estuaries (COSEWIC 2004).

The green sturgeon has diverse habitat needs ranging from freshwater streams, rivers, estuarine habitat as well as marine waters depending upon their life stage. The specific habitat requirements for green sturgeon are poorly understood but are thought to resemble those of white sturgeon. Green sturgeon spawning is thought to occur in deep pools in areas of large cobbles, but can range from clean sand to bedrock in turbulent river mainstems. The larger eggs and higher growth rates of developing green sturgeon in comparison to white sturgeon suggest that a higher oxygen demand may be required for proper embryonic development. Therefore, green sturgeon may subsequently require colder, cleaner water for spawning relative to white sturgeon (COSEWIC 2004).

The spawning population of the Southern DPS of North American green sturgeon is currently restricted to the Sacramento River below Keswick Dam. This population is composed of a single breeding population which must pass by/through the Action Area. Adults migrate upstream by/through the Action Area primarily between March and June (Adams *et al.* 2002), and small groups of juveniles have been captured at various locations on the Sacramento River as well in the Delta (downstream of Sacramento) during all months of the year (IEP Database, Borthwick *et al.* 1999). Therefore, within the Action Area, green sturgeon are likely to occur within the riverine aquatic habitat of the Sacramento River year-round (**Figure 2-1** and **Figure 2-2**).

3.1.2 Central Valley Steelhead

The Sacramento and San Joaquin Rivers offer the only migration route to the drainages of the Sierra Nevada and southern Cascade mountain ranges for steelhead. Information on migration and spawning tendencies of steelhead is difficult to determine due to the low abundance of spawners and the high flows and turbid waters occurring during winter spawning periods. NMFS reports limited data on the recent abundance of this ESU, but its present total run size based dam counts, hatchery returns, and past spawning surveys is probably less than 10,000 fish (NMFS 1996). The most widespread run type of steelhead is in the winter (ocean-maturing) steelhead. Winter steelhead occur in essentially all coastal rivers in California, while summer steelhead are far less common. In California, both winter and summer steelhead generally begin spawning in December. Spawning occurs December through April in the Sacramento River main stem and tributaries. Eggs are buried by the females in the loose gravel, usually at the lower end of a pool. Newly hatched larvae (alevins) initially stay in the gravel nesting area until their yolk sacs are absorbed (about two weeks) and then move into adjacent shallow and quiet pools. Juvenile steelhead remain in freshwater streams from one to three years before entering the ocean. Downstream migration predominantly occurs during fall and spring. Generally, steelhead will return to their natal streams in one to three years.

Adult steelhead typically migrate upstream within the Sacramento River during the winter (November - January) to spawning areas upstream of the proposed diversion locations and juvenile smolts migrate downstream during the spring (March – May). Steelhead inhabit the upper Sacramento River and occur seasonally in the vicinity of the proposed diversion locations. The proportion of steelhead in this DPS that migrate through the Action Area is unknown; however, because of the relatively large amount of suitable habitat in the Sacramento River relative to the San Joaquin River, the proportion of steelhead is probably high. At the Proposed diversion locations, there is limited quality juvenile rearing habitat (aquatic riverine habitat) in the Sacramento River – the vegetation along the shore and on the levee bank consists of ruderal vegetation, and on the levee, the vegetation is maintained annually by burning. Riparian vegetation both upstream and downstream of the proposed diversions, and at the existing Grimes and Drexler Diversions, provide suitable shaded riverine aquatic likely to be suitable rearing habitat. However, when the majority of juvenile steelhead emigrate as yearlings, they are assumed to be primarily utilizing the center of the channel rather than the shoreline.

Adult steelhead may be present in the Action Area from June through March, with the peak occurring between August and October (Bailey 1954, Hallock *et al.* 1957). Juvenile steelhead emigrate through the Sacramento River from late fall to spring. Given the timing of migrations and emigrations of adults and juveniles, Central Valley steelhead may be expected to occur in the Sacramento River near and within the Action Area from June through March.

3.1.3 Central Valley Spring-Run Chinook Salmon

Chinook salmon runs (fall-run, late fall-run, winter-run, and spring-run) are named for the time of season that upstream spawning migration occurs, and are defined by the combined timing of adult migration, the amount of time juveniles reside in a stream, and the time of year the smolts migrate

out to sea. Timing of adult upstream migration varies within individual runs depending upon the region (Yoshiyama 1998). Central Valley spring-run Chinook enter the Sacramento River system from March to July, and spawning occurs from late August through early October (Yoshiyama 1998). Due to the longer period of time between upstream migration and spawning, spring-run Chinook must hold out in the cold temperatures of mountain headwaters to avoid excessive summertime temperatures of the valley and foothills. Spring-run ascent to mountain elevations can only be accomplished if there are no obstructions within the drainage system preventing passage.

Life histories (migration, holding, spawning, rearing, and juvenile emigration) of Chinook salmon vary within the separate runs, but essential habitat requirements including substrate, temperature, dissolved oxygen, stream flow, and water quality are consistent throughout the runs. Chinook salmon require a water temperature from 43° to 56° F to successfully spawn (Boles 1988). Spawning can occur in habitats ranging from small tributaries to large river beds, and generally requires coarse gravel riffles. Chinook salmon eggs incubate in the gravel for approximately 35 to 50 days, depending on the temperature. The newly emerged fry remain in the gravel until most of the yolk sac is absorbed.

Successful rearing of juvenile Chinook requires cool streams/rivers with significant vegetative cover providing shade for protection from predation. Emigration strategies within the Sacramento-San Joaquin system can vary depending on the time of emergence. Spring-run emigration timing is dependent upon the tributaries of origin, and can occur through the period of November through June. Based upon Butte Creek research conducted by CDFG, over 95% of spring-run emigrate as fry/young-of-the-year. Only a small portion of the population will over-summer emigrating the subsequent fall as yearlings (McReynolds et al. 2006).

Adult Central Valley spring-run Chinook salmon are expected on the Sacramento River between March and July (Myers *et al.* 1998, Good *et al.* 2005). Peak presence is believed to be during February and March (CDFG 1998). In the Sacramento River, juveniles may begin migrating downstream almost immediately following emergence from the gravel with most emigration occurring from December through March (Moyle *et al.* 1989, Vogel and Marine 1991). Snider and Titus (2000) observed that up to 69 percent of spring-run Chinook salmon emigrate during the first migration phase between November and early January. The remainder of the Central Valley spring-run Chinook salmon emigrate during subsequent phases that extend into early June. The exact composition of the age structure is not known, although populations from Mill and Deer Creek primarily emigrate as yearlings (Colleen Harvey-Arrison, CDFG, pers. comm., 2004), and populations from Butte Creek primarily emigrate as fry (Ward *et al.* 2002). Younger juveniles are found closer to the shoreline than older individuals (Healey 1991).

Given the timing of migrations and emigrations of adults and juveniles, Central Valley spring-run Chinook may be expected to occur in the Sacramento River near and within the Action Area from November through June.

3.1.4 Sacramento River Winter-Run Chinook Salmon

Winter-run Chinook salmon generally begin migrating upstream from December through February and hold-over in the Sacramento River system for a couple of months before peak spawning occurs between May and July (Groot, p. 319, 1998). Temperatures must be suitable for the winter-run to hold over. Winter-run Chinook emigration to the Delta has been known to occur from November through April, after only four to seven months of river life (Groot, p. 319, 1998). Juveniles may exhibit a sustained residence in the middle or lower Sacramento River or Upper Delta prior to seaward migration. Juvenile Sacramento River winter-run Chinook salmon migration patterns in the Sacramento River can best be described by temporal migration characteristics found by the USFWS in beach seine captures along the lower Sacramento River between Sacramento and Princeton. Beach seining samples the shoreline rather than the center of the channel, as is often the case in rotary screw traps and trawls, and is considered the most accurate sampling effort in predicting the near shore presence of juvenile salmonids. In the Sacramento River, between Princeton and Sacramento, juveniles are expected between September and mid-April, with highest densities between December and March. Rotary screw trap work at Knights Landing on the Sacramento River by Snider and Titus (2000) captured juveniles between August and April, with heaviest densities observed first during November and December, and second during January through March. The largest captures occurred during periods of sustained high flow, generally greater than 20,000 cfs.

Adult winter-run typically migrate to spawning areas upstream of the proposed diversion locations, and occur seasonally in the vicinity of the proposed diversion locations. Adult Sacramento River winter-run Chinook salmon are expected to be present in the Sacramento River near and within the Action Area between November and June (Myers *et al.* 1998, Good *et al.* 2005) as they migrate to spawning grounds. Juveniles are expected to occur within the Sacramento River near and within the Action Area from September through April. Suitable winter-run Chinook rearing habitat occurs in the vicinity of the existing diversions, although at the locations of the Proposed new diversions, rearing habitat is absent.

3.1.5 Giant Garter Snake

Giant garter snake preys primarily on aquatic species such as fish and amphibians; both native and introduced species are taken. Generally active from April through September, the giant garter snake breeds from March into May, and again briefly in September. Young are brooded internally by females, who give birth to 10 to 46 (average is 23) live young from late July into September. Young disperse into dense cover and reabsorb their yolk sacs, then begin feeding on their own. They reach sexual maturity in three to five years. From early October to April, the giant garter snake takes refuge in winter retreats and is generally not active (USFWS 1999).

The giant garter snake is endemic to wetlands of California's Central Valley. This snake inhabits irrigation and drainage canals, rice lands, marshes, sloughs, ponds, small lakes, low-gradient streams, and adjacent uplands. The snake requires enough water during their active season to maintain high densities of prey; emergent wetland vegetation for cover and foraging; and adjacent uplands and openings in streamside vegetation for basking sites. Higher uplands are used for

cover and refuge from floodwaters during their non-active season. The giant garter snake is typically absent from wetlands with sand, gravel, or rock substrates, and from riparian woodlands.

The giant garter snake population was probably always disjunct, with a southern population occurring from the vicinity Buena Vista Lake in Kern County to Merced County, and a northern population occurring from San Joaquin County to Butte County. To the east and west, the populations were probably confined by the foothills of the Sierra Nevada Mountains and the Coast Ranges. There are 13 separate populations presently recognized by the USFWS, coinciding with historic flood basins and tributary streams in the Central Valley (USFWS 1999). These populations are discontinuously distributed from the Fresno area in the south to Butte Creek in the north. Dispersal corridors do not exist between the populations.

Several giant garter snakes records are listed in or near the Action Area. Some records are not location-specific, including one record that identifies an observation in the Grimes U.S. Geological Survey quadrangle, in which portions of the proposed project facilities are located, including the Drexler re-lift pumping plant. The Grimes quadrangle record is dated 2002 (CDFG 2012a).

No giant garter snakes were observed during field reconnaissance for this project; however, given the cryptic and evasive nature of this species, determination of presence more often relies on the habitat characteristics, the most current information about the extant range of the species, surrounding locality records, and the biology and ecology of the giant garter snake.

Agricultural land use within the region generally provides suitable giant garter snake habitat, with abundant rice fields and associated irrigation ditches, rodent burrows for upland refugia, and open upland areas for basking. Within the Action Area, there are several types of drainage ditches that border various types of crops (including rice). The availability of emergent or aquatic vegetation for cover and basking sites varies with each ditch, season, and the operations of MFWC within a given year. A description of the potential giant garter snake habitat within the Action Area is provided below and is depicted in **Figure 3-1**. Within the Action Area, all habitats within 200 feet of suitable giant garter snake aquatic habitat are considered upland habitat for the snake, except for upland areas that are unvegetated, heavily disturbed (such as road, and non-rice cultivated fields), or covered by a walled structure such as a building.

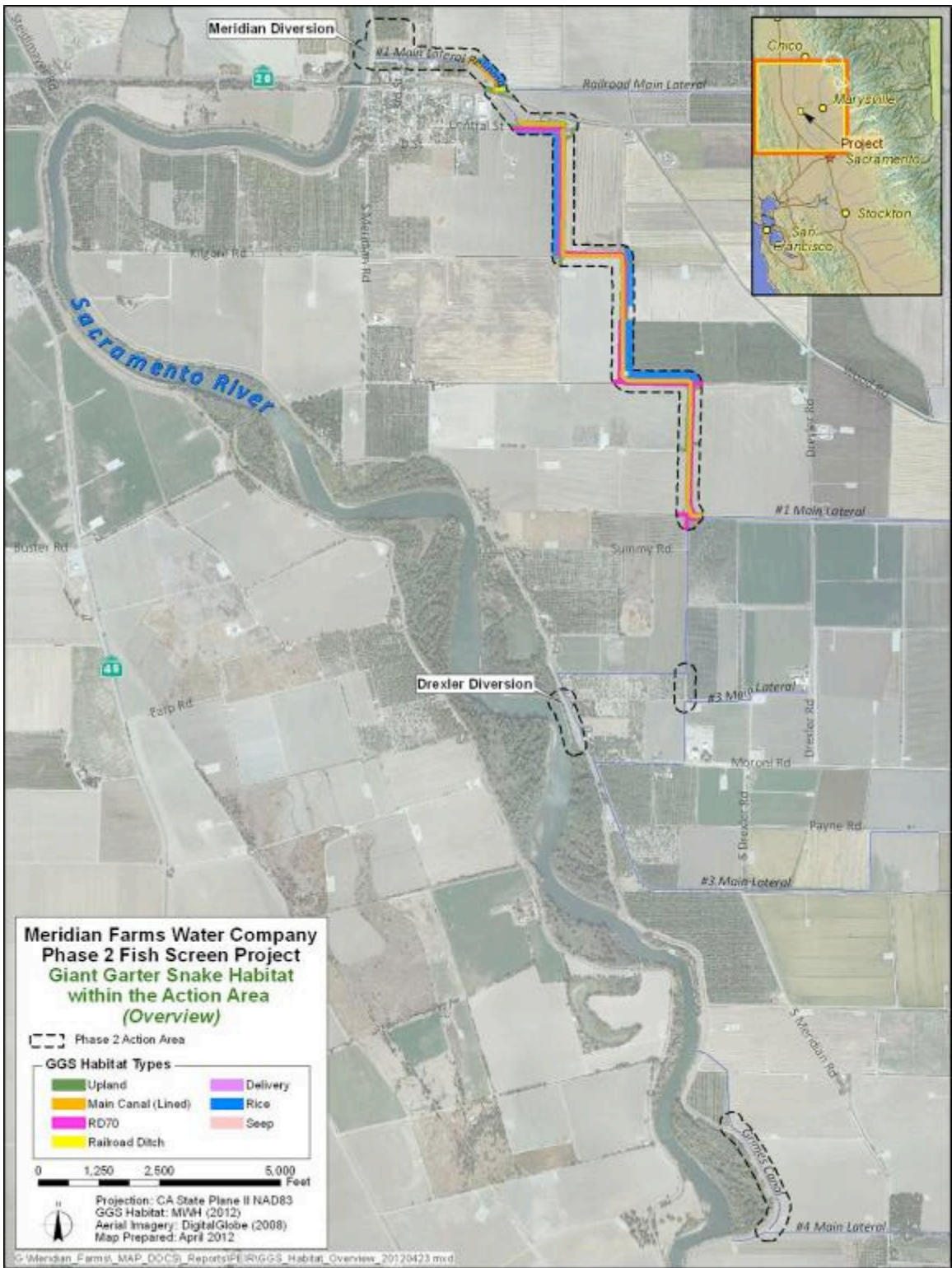


Figure 3-1. Giant Garter Snake Habitat in the Action Area

Aquatic Habitat

Rice Fields

Rice is a common crop grown within the Proposed Project/Action Area, and there are rice fields within the MFWC Service Area. In 2011 the Action Area intersected portions of eight rice fields. At the time this document was prepared, 2012 rice field locations in the Action Area were similar to those planted in 2011. Because rice fields are inundated through the spring and summer, during the giant garter snake's active period, and because rice provides suitable vegetative cover, rice fields within the Action Area provide suitable habitat for the giant garter snake.

Irrigation Drains, Ditches, and Canals

There are several types of conveyances within the Action Area, ranging from wide, concrete-lined canals for irrigation delivery to relatively shallow, unstructured seep ditches used to collect minor drainage from fields. As previously mentioned, the giant garter snake's specific habitat requirements include the presence of aquatic habitat during its active period, the availability of aquatic vegetative cover, basking sites, and prey during the active period, and the availability of upland refugia (generally within 200 feet of suitable aquatic habitat) during the inactive period. Each type of ditch may provide some, all, or none of the required elements that define giant garter snake habitat, depending on MFWC maintenance and operations, as well as the individual farmer's agricultural practices, including which crops are grown in the fields. Following field visits to the site, analysis of collected data, and informal consultation with USFWS biologists, it was determined that the only ditches that are suitable aquatic habitat for giant garter snake are select drains belonging to Reclamation District 70, and portions of the Main Canal that are within 200 feet of suitable aquatic habitat. These drains are described in further detail in this chapter. In addition, the other types of conveyances are also described to document why they were excluded as suitable giant garter snake habitat under current conditions. **Photos 3, 4, 5, 6, 8 and 9** in **Appendix B** show ditches within the Action Area with unsuitable habitat, and **Photo 7** in **Appendix B** shows a portion of the Reclamation District 70 canal considered suitable giant garter snake aquatic habitat. A summary of suitable aquatic habitat for giant garter snake is included in **Table 3-2**.

Reclamation District 70 Drains

Some of the Reclamation District 70 drains (Reclamation Drains) are suitable aquatic habitat for giant garter snake, as they provide all the criteria necessary to support giant garter snake during its active and inactive periods. The Reclamation Drains are larger drainage ditches that follow along and adjacent to the Main Canal and are used by MFWC for water delivery or drainage. The locations of the Reclamation drains within the Action Area are shown in **Figure 2-1** and **Figure 2-2**. See **Photo 7** in Appendix A taken near the proposed Drexler re-lift pumping plant site. These are unlined ditches up to 30 feet wide and five to six feet deep, and are typically vegetated with common tule (*Scirpus acutus*) and cattail (*Typha latifolia*). The Reclamation District maintains the drains for vegetation removal by burning and/or baling, on average approximately every three to five years, depending on how much the drain is used and whether or not siltation washes in from adjacent fields. Some drains may go without maintenance for longer periods if they do not

receive significant drainage flows or siltation. The Reclamation Drains in the Action Area were last maintained approximately three years ago.

Reclamation Drains in the Action Area typically hold at least a small amount of water year round (as little as 1 to 2" deep), and may hold water to a depth of several feet during the irrigation season of approximately May through September. They can therefore presumably support aquatic invertebrates, amphibians, and small fish species.

Main Canal

The aquatic habitat of the Main Canal is not suitable for giant garter snake, except for where it is 200 feet or less from otherwise suitable giant garter snake aquatic habitat, be it a Reclamation Drain, natural suitable wetlands, or rice field. The Main Canal is a concrete-lined ditch for the majority of its alignment. It is used to convey and deliver water from the Meridian Diversion/Pumping Plant south to the central portion of the MFWC Service Area during the spring and summer. The Main Canal in the Action Area begins at the Meridian Diversion to its intersection with Summy Road as shown in **Figure 2-1** and **Figure 2-2**. Approximately 12 feet wide and 6 feet deep, the Main Canal typically does not support vegetation along its banks. Ruderal vegetation may grow along the unlined freeboard of the canal or along unlined portions of the canal, but this vegetation is regularly removed several times during the spring and summer. Control methods include application of herbicide three times per year and mowing three times per year. Although an aquatic grass grows within portions of the Main Canal during the summer, it is sparsely distributed and does not provide adequate structure or cover for giant garter snake. During the fall and winter, the Main Canal is no longer used for conveyance and remains dry until the next spring. Portions of the Main Canal are shown in **Photos 3, 4, 5, 6** and **8** in **Appendix B**.

Another concrete-lined ditch in the northern portion of the Action Area, called the "Railroad Ditch" has the same characteristics as the Main Canal and does not provide suitable aquatic habitat for giant garter snake because it does not provide the necessary cover. It is located within 200 feet of suitable aquatic habitat, however (rice field), and could therefore be used by the snake.

Water Delivery Ditches

Ditches used for water delivery are generally not considered suitable aquatic habitat for giant garter snake due to the lack of emergent aquatic vegetation for cover and basking, and/or lack of consistent water within the ditches during the snake's active period. However, some delivery ditches within 200 feet or less from suitable giant garter snake aquatic habitat may be used by the snake. In addition to the Main Canal, these smaller (3-4 feet wide), unlined, earthen ditches are used to deliver irrigation water throughout the MFWC Service Area. Within the Action Area, these delivery ditches are located along the conveyance improvements in the Proposed Project/Action. Similar to the Main Canal, the delivery ditches receive regular maintenance to remove all vegetation that grows within the ditches and along its banks. The vegetation removal occurs several times during the spring and summer – usually at least once and up to six times per year, depending on how often the maintenance is needed. Control methods include herbicide treatment, burning, and/or baling. These delivery ditches convey water at specified times during

the spring and summer months and are controlled by MFWC operations. A few ditches hold water throughout the growing season, but the majority of the delivery ditches only hold water for one week during each month during the growing season while MFWC delivers water to its clients. Therefore, although there may be water in these ditches during the snake's active period, it is not of sufficient duration to support giant garter snake aquatic habitat.

Seep Ditches

Seep ditches within the Action Area generally do not provide suitable aquatic habitat for giant garter snake, except where they are sufficiently wet, vegetated, unmaintained and/or in proximity to other aquatic habitat, including rice fields. Seep ditches, if not in a condition to be aquatic habitat for giant garter snake, are upland habitat for the snake if they are within 200 feet of suitable giant garter snake aquatic habitat. These earthen, unlined ditches are on the edges of crop fields and serve to drain excess moisture from the fields (**Photo 8, Appendix B**). Seep ditches are dug by farmers within their fields; therefore, the maintenance and even existence of these ditches is up to the farmers' discretion. These ditches are on average three to four feet wide and are located throughout the Action Area. Unmaintained seep ditches support ruderal species such as Johnsongrass, prickly lettuce, and Italian thistle up to three feet tall. Because these ditches are not used for water delivery or large-flow drainage, they do not consistently hold water during the spring and summer unless they are adjacent to a rice field, for which the entire field is flooded. The ditches only receive rainwater in the winter, during the giant garter snake's inactive period. The only places where the ditches might be inundated during the snake's active period are where these ditches are located adjacent to rice fields, which are flooded during the spring and summer.

Upland Habitat

Within the Action Area, upland areas mapped as potential giant garter snake habitat included vegetated areas on the margins of fields and waterways. Unvegetated roadways and cultivated (non-rice) fields were not considered suitable upland habitat for the giant garter snake. Upland refugia for the giant garter snake exist primarily as burrows made by small burrowing mammals such as ground squirrels and gophers. Upland burrows up to 200 feet from aquatic habitat are considered to be suitable refugia for giant garter snake. Open areas within 200 feet from aquatic habitat may also provide suitable basking habitat for giant garter snake during its active season. Small mammal burrows and basking habitat vary in location and quantity, but are generally available along the upper banks of ditches and unpaved areas, along and including roads or cultivated fields (the widths vary from five to 20 feet). Earthen berms along agricultural fields may also support small mammal burrows. Few rodent burrows were observed in the study area. Although optimal habitat for giant garter snake hibernation was not observed, there is some potential for snakes to remain in the Action Area during the inactive season.

Summary of Giant Garter Snake Habitat

Table 3-2 below summarizes the potential habitats available in the Action Area for the giant garter snake. The calculations were based on mapped locations of the crop types for 2011 and the projected crop types for 2012; and the locations of the drains, ditches, and canals within the Action Area. It should be noted that a few projections for crop types in 2012 may change, as the

type of crop planted is up to the individual farmer's discretion. Reclamation Drains and rice fields were the only suitable aquatic habitat types identified in the Action Area. Other canals were mapped as aquatic habitat for the giant garter snake if they were within 200 feet of Reclamation Drains or rice fields. Upland habitats were determined to include all lands within 200 feet of suitable aquatic habitat. Although rodent burrows were not observed to be common in the Action Area, all upland habitats with rodent burrows are suitable refugia for the giant garter snake during their inactive season, and all other upland habitats without refugia may be used by the giant garter snake for basking. Cropland is also included as upland habitat, although its utility to the giant garter snake may be limited and highly variable, depending on the type of crop.

**TABLE 3-2
SUMMARY OF GIANT GARTER SNAKE HABITAT IN THE ACTION AREA**

Habitat Type	Lineal feet	Acres
AQUATIC:		38.9
Rice Fields	--	29.2
Reclamation Drains		6.0
Main Canal		3.4
Seep		0.1
Delivery Ditches		<0.1
Private drain		<0.1
Railroad Ditch		<0.1
UPLAND	--	21.3

3.1.6 Western Burrowing Owl

The western burrowing owl inhabits open grasslands and shrub lands with perches and burrows. These owls eat mainly insects, with small mammals, reptiles, and birds making up a portion of the diet as well. For cover and breeding, old rodent burrows, as well as debris piles are used. The western burrowing owl generally breeds from March through August, peaking in April and May.

In the Action Area, potential nest/burrow sites occur in unpaved and relatively undisturbed upland areas, such as along earthen berms and unpaved roads and turnouts. The relatively-exposed banks and levees of the Sacramento River and drainage canals may also provide suitable habitat.

3.1.7 Cackling (=Aleutian Canada) Goose

The cackling goose is a small, island-nesting subspecies of the Canada goose. This subspecies nests on the Aleutian Islands and winters in the Central Valley where it forages in meadows, agricultural fields, pastures, and moist grasslands near open water (lakes and ponds) and wetlands. The cackling goose was federal-listed endangered in 1967 due to a severe decline in populations. Hunting and loss of migration and wintering habitat contributed to this species' decline, although the introduction of Arctic and red foxes to the breeding islands was the main reason for population decline. However, due to reintroductions of wild geese onto fox-free islands and other conservation efforts, populations of cackling goose have recovered from approximately 6,300 individuals in 1989 to 37,000 individuals in 1999. The cackling goose was reduced to federal-listed threatened status in 1989, and finally delisted in 2001 (FR 66:54, 15642-15656, March 2001). Monitoring of goose populations will continue for 5 years after delisting, as required by the Endangered Species Act to ensure full recovery of the species. The cackling goose is still protected under the Migratory Bird Treaty Act, and is a federal species of concern.

Within the Action Area, suitable foraging habitat exists in the surrounding agricultural fields along the Sacramento River and the MFWC Service Area. Several occurrences are reported in the Meridian U.S. Geological Survey quadrangle dating between 1978 and 1987 (CDFG 2012a).

3.1.8 Swainson's Hawk

The Swainson's hawk is a migratory raptor listed as threatened by the State of California, and federally as a species of special concern. It breeds in western North America and winters for the most part in South America. It nests in trees, usually in riparian areas, but forages over pasturelands and open agricultural fields. In the Central Valley it is associated with riparian corridors adjacent to field crops and grasslands and subsists largely on small mammals, especially California vole, California ground squirrel, and large insects. Suitable foraging habitat within an energetically efficient flight distance from active Swainson's hawk nests has been found to be of great importance. Because the prey base for Swainson's hawk is highly variable from year to year, depending on cycles of agriculture, rainfall, and other natural cycles, large acreages of potential foraging habitat must be allotted per breeding pair.

The decline of the species in the Central Valley has been associated with extensive reduction of Swainson's hawk habitat. Suitable foraging habitat is present within the Action Area in agricultural fields, where populations of prey species are supported. Suitable nesting habitat occurs within the riparian woodland habitats adjacent with the Proposed Project/Action site. Large valley oak and cottonwood trees occur adjacent to the river on the bank opposite from the proposed intake structures and fish screens. Several recent occurrences (as recent as 2003) are recorded within three miles of project facilities (CDFG 2012a).

3.1.9 Osprey

The osprey is a migratory raptor that occurs in northern California from Cascade Ranges south to Lake Tahoe and along the coast south to Marin County. The osprey arrives in California around mid-March to early April and begins breeding activities until September. Ospreys use large trees, snags, and dead-topped trees in open forest habitats for cover and nesting. Nests are platforms of sticks located high above ground, sometimes reaching as much as 250 feet tall. Breeding population was estimated in 1975 at 350-400 pairs in Northern California; numbers of breeding pairs have increased in recent years (CDFG 2012b).

The osprey preys primarily on fish; sometimes mammals, birds, reptiles, amphibians, and invertebrates. This species require open, clear waters for foraging. Suitable foraging habitat includes rivers, lakes, reservoirs, bays, estuaries, and surf zones (CDFG 2012b).

In the general proposed project/Action Area there is potential for nesting along the banks of the Sacramento River. There are no CNDDDB occurrences of osprey within the MFWC service area. The nearest osprey record is from 2004 and is located approximately 10 miles northwest of the Meridian Diversion (CDFG 2012a).

3.1.10 Bank Swallow

The bank swallow is the smallest North American swallow, with a body length of about 4.75 inches. The bank swallow nests in colonies and creates nests by burrowing into vertical banks consisting of fine-texture soils. Bank swallows breed in California from April to August and spend the winter months in South America. Currently, bank swallows are locally common only in restricted portions of California where sandy, vertical bluffs or riverbanks are available for the birds to dig their burrows and nest in colonies. Most of California's remaining populations nest along the upper Sacramento River where it still meanders in a somewhat natural manner. In this alluvial plain, the river system provides suitable soil types and erosion needed for prime nesting habitat. Seventy-five percent of the State's population is concentrated on the banks of Central Valley streams, including several colonies on the Sacramento River.

Since 1900, the range of bank swallows in California has been reduced by approximately 50 percent largely attributed to habitat loss. The rip-rapping of natural stream banks is the single most serious, human-caused threat to the long-term survival of the bank swallow in California. Existing colonies and areas of potential habitat may be lost over the next several years if current planning is implemented. Rip-rap installed by the COE under the Sacramento River Bank Protection Project has already affected almost 150 miles of Sacramento River bank since 1960. Additional rip-rap proposed under this project may result in extensive loss of essential, eroding bank habitat.

On the Sacramento River, bank swallow populations continue to decline. Based on an average occupancy rate of about 45 percent of all burrows dug into river banks, an estimated population of 13,170 pairs of bank swallows nested in Sacramento River habitats in 1986. In 1998 the population reached its lowest level of 4,990 pairs and then rebounded dramatically in 1999 to 8,210 pairs regaining some habitat from which it was extirpated (in 1998) on the lower end of its Sacramento

River range. The significance of the apparent turnaround may not be known for a few years if it continues. The 1999 result may be a beginning of an expanding population boom for the species or just a momentary upswing. Further monitoring will be necessary to determine the true population trend, if any. Currently, the status of the bank swallow is still considered declining (CDFG 2000b).

The State Recovery Plan for bank swallow includes identifying habitat preserves and a return to a natural, meandering riverine ecosystem as the two primary strategies for recovering the bank swallow. A recovery planning team has cited the return to naturally functioning riparian ecosystems as the best way to preserve, recover, and conserve the many species, including the bank swallow, that are dependent on this unique ecosystem.

In the general Action Area there is potential for nesting along the banks of the Sacramento River. The CNDDDB documents several occurrences of bank swallow within the MFWC Service Area. The most recent observation is from 2004 and was recorded less than two miles from the Meridian Diversion (CDFG 2012a). The bank swallow prefers steep, open cliff-like banks for nesting. Where the proposed new intake will be located, however, the shore slopes gradually up to the levee and is largely vegetated with annual grasses.

3.2 Critical Habitat

The Action Area occurs within designated Critical Habitat for Southern DPS of the North American green sturgeon, Central Valley steelhead, Central Valley spring-run Chinook salmon, and Sacramento River winter-run Chinook salmon. Critical Habitat for threatened Central Valley steelhead and Central Valley spring-run Chinook salmon was issued by NMFS on September 2, 2005. Critical Habitat for endangered Sacramento River winter-run Chinook salmon was designated on June 16, 1993. Final Critical Habitat for the green sturgeon was designated on October 9, 2009.

The project vicinity is located within the Colusa Basin Hydrologic Unit (5520) of Critical Habitat for Central Valley steelhead and Central Valley spring-run Chinook. This unit includes the Sacramento River upstream to and including: Tisdale Bypass, Butte Creek, Butte Slough, Nelson Slough, Sacramento Slough, Sutter Bypass, Colusa Bypass, Little Chico Creek, and Little Dry Creek.

For the Sacramento winter-run Chinook, Critical Habitat is designated to include the Sacramento River from Keswick Dam, Shasta County (River Mile 302) to Chipps Island (River Mile 0) at the westward margin of the Sacramento-San Joaquin Delta, all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Suisun Bay, and Carquinez Strait, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge.

These species share similar habitat requirements. The Primary Constituent Elements (PCE's) of salmonid habitat within the Action Area include: freshwater spawning and rearing habitat; freshwater migration corridors; and estuarine areas containing adequate substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions. The Sacramento River provides freshwater habitat in the Action

Area and serves as an upstream and downstream salmonid migratory route, as well as juvenile salmonid rearing habitat.

The diversion and storage of natural flows by dams and diversion structures on Central Valley waterways have depleted streamflows and altered the natural cycles by which juvenile and adult salmonids have evolved. Changes in streamflows and diversions of water affect freshwater rearing habitat and freshwater migration corridor PCEs in the action area. Various land-use activities in the action area such as urbanization and agricultural encroachment have resulted in habitat simplification. Runoff from residential and industrial areas also contributes to water quality degradation. Urban stormwater runoff contains pesticides, oil, grease, heavy metals, polynuclear aromatic hydrocarbons, other organics and nutrients that contaminate drainage waters and destroy aquatic life necessary for salmonid survival (NMFS 1996). In addition, juvenile salmonids are exposed to increased water temperatures as a result of thermal inputs from municipal, industrial, and agricultural discharges in the action area. Accelerated predation as a result of habitat changes in the action area, such as the alteration of natural flow regimes and the installation of bank revetment structures such as dams, bridges, water diversions, and piers are likely a factor in the decline of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead.

Within the action area, the freshwater rearing and migration PCEs have been transformed from a meandering waterway lined with a dense riparian corridor, to a highly leveed system under varying degrees of control over riverine erosional processes and flooding. In the reach from Colusa downstream to Verona (RMs 143 to 80) – which includes the Action Area – levees are generally constructed near the edge of the river. Severe long-term riparian vegetation losses have occurred in this part of the Sacramento River, and there are large open gaps without the presence of important habitat features due to the high amount of riprap. Overall, more than half of the Sacramento Rivers banks in the lower 194 miles have been riprapped.

1. Freshwater Rearing Habitat

Freshwater rearing sites are those with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. Both spawning areas and migratory corridors comprise rearing habitat for juveniles, which feed and grow before and during their outmigration. Non-natal, intermittent tributaries also may be used for juvenile rearing. Rearing habitat condition is strongly affected by habitat complexity, food supply, and presence of predators of juvenile salmonids. Some complex, productive habitats with floodplains remain in the system (*e.g.*, the lower Cosumnes River, Sacramento River reaches with set-back levees [*i.e.*, primarily located upstream of the City of Colusa]). However, the channeled, leveed, and riprapped river reaches and sloughs that are common in the Sacramento-San Joaquin system typically have low habitat complexity, low abundance of food organisms, and offer little protection from either fish or avian predators. Freshwater rearing habitat also has a high conservation value as the juvenile life stage of salmonids is dependent on the function of this habitat for successful survival and recruitment. Thus, although much of the rearing habitat is in poor condition, it is important to the species.

2. Freshwater Migration Corridors

Ideal freshwater migration corridors are free of obstruction with water quantity and quality conditions and contain natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility, survival and food supply. Migratory corridors are downstream of the spawning area and include the lower Sacramento River and the Delta. These corridors allow the upstream passage of adults, and the downstream emigration of outmigrant juveniles. Migratory habitat condition is strongly affected by the presence of barriers, which can include dams, unscreened or poorly- screened diversions, and degraded water quality. For successful survival and recruitment of salmonids, freshwater migration corridors must function sufficiently to provide adequate passage. For adults, upstream passage through the Delta and the much of the Sacramento River is not a problem, but problems exist on many tributary streams, and at the RBDD. For juveniles, unscreened or inadequately screen water diversions throughout their migration corridors, and a scarcity of complex in-river cover have degraded this PCE. However, since the primary migration corridors are used by numerous populations, and are essential for connecting early rearing habitat with the ocean even the degraded reaches are considered to have a high conservation value to the species. Thus, although much of the migration corridor is in poor condition, it is important to the species.

In the Action Area and vicinity, the adjacent riparian habitat has been modified by trails (both paved and unpaved), levees, and general recreation activities. These areas may be of poor quality but still provide cover for rearing juveniles. However, at the locations of the proposed new diversions (within the Action Area) suitable salmonid rearing habitat is low, lacking riparian-shaded riverine aquatic habitat. More suitable rearing habitat exists immediately upstream and downstream from the Proposed diversions, and at the existing diversion sites which will be removed. Based on unconsolidated sediments dominating the channel substrate, it is not likely that spawning habitat exists within Action Area.

3.3 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purposes of interpreting the definition of EFH, “waters” includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means habitat required to support a sustainable fishery and a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers all habitat types used by a species throughout its life cycle. The Proposed Project/Action is located within the region identified as EFH for Pacific salmon, including Chinook salmon, in Amendment 14 of the Pacific Salmon FMP.

The Sacramento River provides freshwater habitat in the Action Area and serves as an upstream and downstream migratory route for Pacific salmon and green sturgeon, as well as juvenile

salmonid rearing habitat. Although the adjacent riparian habitat has been modified by trails (both paved and unpaved), levees, and general recreation activities, it does in some areas provide cover for rearing juveniles. However, in the vicinity of the proposed new diversion locations (within the Action Area), suitable salmonid and sturgeon rearing habitat does not occur due to low quality shaded riverine aquatic habitat. Based on unconsolidated sediments dominating channel substrate, it is not likely that spawning habitat exists within the immediate vicinity of the Action Area.

This page intentionally left blank.

CHAPTER 4

Effects of Proposed Project/Action on Special Status Species

This section describes the methods used to determine the potential effects of the Proposed Project/Action on special-status species potentially occurring in the Action Area. Species included in this analysis are federal- and state-listed, candidates for federal or state listing, and other species of special concern that are covered under the CALFED MSCS. These special-status species include:

- North American green sturgeon (Southern DPS) (*Acipenser medirostris*)
- Central Valley steelhead (*Oncorhynchus mykiss*)
- Central Valley spring-run Chinook (*Oncorhynchus tshawytscha*)
- Sacramento River winter-run Chinook (*Oncorhynchus tshawytscha*)
- Giant garter snake (*Thamnophis gigas*)
- Western burrowing owl (*Athene cunicularia*)
- Cackling (=Aleutian Canada) goose (*Branta canadensis leucopareia*)
- Swainson's hawk (*Buteo swainsoni*)
- Osprey (*Pandion haliaetus*)
- Bank swallow (*Riparia riparia*)

Evaluating potential effects on species within the Action Area requires an understanding of the species' life histories and life stage specific environmental requirements. Ecological and status information on these species is provided in Chapter 3, Environmental Baseline – Special-Status Species Accounts and Status in the Action Area, of this ASIP.

The analysis of effects of a particular action on a biological resource can be composed of one or more types of effects. Direct and indirect effects, interrelated and interdependent effects, and cumulative effects are defined below.

4.1 Direct and Indirect Effects

Under FESA (16 USC 1531-1544), direct effects are those that are caused by the Proposed Project/Action and occur at the time of the action. According to the USFWS and NOAA Fisheries, indirect effects:

“...are caused by or result from the proposed action, are later in time, and are reasonably certain to occur, e.g., predators may follow ORV tracks into piping plover nesting habitat and destroy nests; the people moving into the housing unit may bring cats that prey on the mice left in the adjacent habitat. Indirect effects may occur outside of the area directly affected by the action.”

4.2 Interrelated and Interdependent Effects

According to FESA, interrelated and interdependent actions are defined as follows:

Effects of the action under consultation are analyzed together with the effects of other activities that are interrelated to, or interdependent with, that action. An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation.

According to the USFWS and NOAA Fisheries, interrelated actions are those that are part of the Proposed Project/Action and depend on the Proposed Project/Action for their justification - actions that would not occur “but for” the larger action of the action under consultation (Proposed Project/Action). Interdependent actions are those that have no significant utility apart from the action that is under consideration. There are no interrelated or interdependent actions associated with MFWC’s Proposed Project/Action.

4.3 Effects on Species

4.3.1 North American Green Sturgeon, Central Valley Steelhead and Spring-Run Chinook Salmon, and Sacramento River Winter-Run Chinook Salmon

The Proposed Project/Action would involve work within the Sacramento River; therefore, the important special-status species to consider in this habitat are the threatened North American green sturgeon (Southern DPS), threatened Central Valley steelhead, and endangered Sacramento River winter-run Chinook salmon.

Construction and operation of a surface water diversion in the Sacramento River has the potential to adversely impact various salmonids, sturgeon, and other fish species and their habitats through several mechanisms, including entrainment into the water diversion, impingement on the intake screen, increased vulnerability to predation mortality, and increased levels of turbidity and suspended solids, and underwater sound pressure waves. Direct mortality of fish species may also occur during cofferdam installation and dewatering. The following table summarizes potential effects to special-status fish species occurring in the Action Area (diversion footprints plus 200 feet).

As shown in **Table 4-1**, the effects of the Proposed Project/Action on special-status fish depend on whether the fish are exposed, which life stages are exposed, how long, how often, and when the fish are exposed. It can be inferred that with increasing distance from the stressor/source of stressor the effects to an individual are diminished. For many of the stressors, fish must be within the immediate vicinity of the Action Area to be affected. For example, a fish swimming a few hundred feet upstream of a diversion is not likely be pulled by suction into the diversion; however, if that fish approached within a few feet of the diversion intake, there is a much greater probability of entrainment. The following discussion analyzes the fish response to the potential stressors, and what kind of effects to the species would result.

TABLE 4-1
SUMMARY OF SPECIAL-STATUS FISH EXPOSURE TO STRESSORS AS A RESULT OF THE PROPOSED PROJECT/ACTION

Potential Stressors:	Type of Exposure	Location of Exposure	Species (Life Stage) Exposed	Timing of Exposure	Duration of Exposure	Frequency of Exposure
Entrainment	Direct	Diversion Intake	GS (A, J); CVST (A); CVSR (A, J); SWR (A, J)	During normal operation	April to October	Constant
Impingement	Direct	Intake Screen	GS (A, J); CVST (A); CVSR (A); CVSR (A, J); SWR (A, J)	During normal operation	April to October	Constant
Increased Predation	Indirect	Local Vicinity of Diversion	All species (Both A and J stages)	Always	April to October	Constant
Increased turbidity and suspended solids	Indirect	Local Vicinity of Diversion	GS (A, J); CVST (A); CVSR (A); SWR (A)	During construction	June to October	One-time construction event
Sound pressure waves	Indirect	Vicinity of Diversion	GS (A, J); CVST (A); CVSR (A); SWR (A)	During installation of cofferdam	June to October	One-time construction event
*Stranding during dewatering	Indirect	Diversion (area within cofferdam)	GS (A, J); CVST (A); CVSR (A); SWR (A)	During installation of cofferdam	June to October	One-time construction event
*Cofferdam	Direct	Local Vicinity of Diversion	GS (A, J); CVST (A); CVSR (A); SWR (A)	During installation of cofferdam	June to October	One-time construction event

*Phase 2 only

A=Adults; J=Juveniles; GS=Green Sturgeon (Southern DPS); CVST= Central Valley Steelhead; CVSR=Central Valley Spring-run Chinook; SWR=Sacramento Winter-run Chinook

Entrainment and Impingement

All of the special-status fish species considered are at risk of being entrained or impinged by a diversion in the Sacramento River. The risk of entrainment occurs when the pumps are drawing water; for the MFWC this is from April to October every year. Similarly, impingement or death by collision or entrapment against the intake screen is a hazard to the fish when the pumps are active. However, the design criteria outlined by the Proposed Project/Action will comply with CDFG and NOAA Fisheries fish screen criteria, and will reduce potential effects from fish

entrainment and impingement substantially. Installation of the new diversions with fish screens would be a significant improvement over the current diversions which are not screened.

Increased Predation

Placement of structures within the Sacramento River, including a positive barrier fish screen, would modify local velocity and current patterns, create localized turbulence and eddies, and provide cover habitat for a variety of predatory fish species, such as striped and smallmouth bass. Structural components of the positive barrier fish screen may result in the potential for increased localized predation mortality for all special-status species considered, as well as other fish species within the river. Juvenile fish are particularly vulnerable. However, placement of the Proposed Project/Action's new diversion structures is within areas with adequate flow velocities, thereby minimizing backwater eddy effects and potential impacts to salmonids and sturgeon from predatory species. Therefore, increased predation at these diversions is likely a stressor of low magnitude.

Sound Pressure Waves

Sound pressure waves or "noise" within the water would result from installation of support piles for the diversion facilities or installation of sheet piles and beams during construction of the cofferdam. Fish may be injured or killed by the impact sounds generated by percussive pile driving. Their hearing may also be affected or their behavior altered such that it constitutes harassment or harm. The specific effects of pile driving on fish depend on a wide range of factors including the type of pile, type of hammer, fish species, environmental setting, and many other factors (Popper et al. 2006). The Proposed Project/Action may require the use of vibratory or percussion hammer methods. Both methods produce underwater sound pressure waves that can be perceived by fish; however, while vibrating hammers do not produce sound pressure levels that would result in injury or mortality to fish, they may still impact the fish. The percussion hammer, if needed for cofferdam installation, would be used on an intermittent and short duration basis. Use of the percussion hammer would be minimized to the maximum extent possible. Fish species within the Action Area and vicinity are at risk of exposure to this stressor. The fish would likely respond to this stressor by swimming away from the noise. The pile-driving activity would only occur during the June 1 to October 1 period (to November 1 with NOAA Fisheries approval), when large numbers of special-status species are less likely to occur in the Action Area.

Cofferdam Construction

The construction of the proposed Meridian Diversion fish screen facility would require placement and removal of a sheet-pile cofferdam to isolate the work site from the rest of the river. Constructing a cofferdam would have a short-term, localized impact to water quality by causing an increase in turbidity and suspended solids. Increased sedimentation may cause reduced survival of eggs or alevins, reduce primary and secondary river productivity, interfere with feedings, cause behavioral avoidance, and cause a breakdown of social organization to native species downstream of the discharge area. In addition, the dewatering of the cofferdam would strand fish and other organisms trapped within the cofferdam. The physical placement of the cofferdam into the water may also cause direct mortality to fish.

Cofferdams generally lessen the impact of construction on the surrounding environment by isolating the construction area; however, the installation of the cofferdam does cause short-term localized impacts. In order to minimize impacts to fish species, the cofferdam installation would be limited to the in-water work period, from June 1 to October 1 (to November 1 with NOAA Fisheries approval). During this time, installation of the cofferdam would have the least impact on fish species. The abandonment of the existing diversions, which would require minimal in-river work to cap and seal the existing intake pipe manifold, would also occur during the in-water work period. Any fish trapped in the cofferdam during dewatering will be salvaged, and the implementation of measures detailed in the Project Description will minimize impacts to water quality. Once it is installed, the cofferdam is not likely to be a significant stressor to fish species.

Given the overall benefit to fish as a result of the Proposed Project/Action, as well as the use of a cofferdam, the fish salvage requirement for dewatered work sites, the localized and minimal in-river disturbances, and constructing within the June 1 to October 1 in-water work period (may be extended to November 1 with NOAA approval), the Proposed Project/Action is expected to result in minimal impacts to the fisheries resources of the Sacramento River. Implementation of 2008 IS/EA Mitigation Measures BIO-19, BIO-20 and proposed Mitigation Measures BIO-A through BIO-H² would minimize potential impacts.

Measure BIO-19 (same as 2008 IS/ES Measure BIO-19): Pile Driving Activities. The contractor shall use vibrational pile driving to the greatest extent feasible. If percussive pile driving is necessary, its use shall be minimized to the maximum extent possible and comply with the following *Interim Criteria for Injury of Fish to Pile Driving Operations* (Popper et al. 2006):

- The Sound Exposure Level (SEL) shall not exceed 187 dB (re: 1 $\mu\text{Pa}^2 \cdot \text{sec}$) in any single strike, measured at a distance of 32.8 ft from the source;
- The peak sound pressure level should not exceed 208 dB (re: 1 $\mu\text{Pa}_{\text{peak}}$) in any single strike, measured at a distance of 32.8 ft from the source.

Measure BIO-20 (same as 2008 IS/ES Measure BIO-20): Dewatering. Pump(s) used for dewatering the construction site will be screened according to NMFS fish screening criteria for anadromous salmonids (NMFS 1997) approved by NMFS. A qualified biologist will be on-site during such pumping activities to ensure that any fish that may be present within the construction area are relocated to suitable habitat near the project area.

Mitigation Measure BIO-A (new measure in Phase 2 analysis): Spoil Sites. Spoil sites shall be located so they do not drain directly into the waterways. If a spoil site drains into a water body, catch basins shall be constructed to intercept sediment before it reaches the channels. Spoil sites shall be graded to reduce the potential for erosion.

² Mitigation measures BIO-A through BIO-H are identified with alphabetical letters instead of numbers to avoid confusion with mitigation measures from the 2008 IS/EA. See also Appendix A, Mitigation and Monitoring Reporting Program

Mitigation Measure BIO-B (new measure in Phase 2 analysis): Hazardous Materials.

A spill prevention plan for potentially hazardous materials shall be prepared and implemented. The plan shall include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting of any spills. If necessary, containment berms shall be constructed to prevent spilled materials from reaching the creek channels.

Mitigation Measure BIO-C (new measure in Phase 2 analysis): Storage. Equipment and materials shall be stored at least 50 feet from waterways. No debris such as trash and spoils shall be deposited within 100 feet of waterways. Staging and storage areas for equipment, materials, fuels, lubricants and solvents, shall be located outside of the stream channel and banks. Stationary equipment such as motors, pumps, generators, compressors and welders, located within or adjacent to the stream shall be positioned over drip pans. Any equipment or vehicles driven and/or operated within or adjacent to the stream shall be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life. Vehicles shall be moved away from the stream prior to refueling and lubrication.

Mitigation Measure BIO-D (new measure in Phase 2 analysis): Vehicle Maintenance.

Proper and timely maintenance for vehicles and equipment used during construction shall be provided to reduce the potential for mechanical breakdowns leading to a spill of materials into or around the creeks. Maintenance and fueling shall be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from sensitive drainages).

Mitigation Measure BIO-E (new measure in Phase 2 analysis): Dust Prevention. Water used for dust abatement, if necessary, shall be acquired from an authorized off-site source. Water shall be a clean water source in accordance with California Valley RWQCB Construction Storm Water Program and/or as authorized under a separate National Pollutant Discharge Elimination System (NPDES) permit.

Mitigation Measure BIO-F (new measure in Phase 2 analysis): Daily Monitoring. A qualified biological monitor shall be on site during in-water construction activities. The biological monitor shall be authorized to halt construction if impacts to special-status salmonid species are evident.

Mitigation Measure BIO-G (new measure in Phase 2 analysis): Riparian Habitat.

Current riparian vegetation shall be retained to extent feasible.

Mitigation Measure BIO-H (new measure in Phase 2 analysis): Fish Rescue Plan. A fish rescue plan shall be prepared by MFWC prior to the implementation of the project and provided for review and comment to NMFS, USFWS and CDFG as appropriate. A qualified fisheries biologist will design and conduct a fish rescue and relocation effort to collect fish from the area within the cofferdam involving the capture and return of those fish to suitable habitat within the Sacramento River. To ensure compliance, a fisheries biologist shall provide observation during initial dewatering activities within the cofferdam.

Following the fish rescue effort, a report shall be prepared by the fisheries biologist and submitted to NMFS within 30 days.

There is potential for “incidental take” of special-status fish associated with installation of the cofferdam, and the Proposed Project/Action may affect and is likely to adversely affect special status fish species.

4.3.2 Giant Garter Snake

The effects to giant garter snake habitat are those areas of habitat that would be permanently and/or temporarily affected by the activity within a Work Area. The Work Area is defined to include the construction footprint of all the diversion and pumping plant facilities, the conveyance facility improvements, and the Drexler Relift station. In addition to the footprints of all facilities, the Work Area includes construction easements and potential staging areas where construction activity may occur. Habitat conditions for giant garter snake are largely dependent upon agricultural practices within the Action Area. The projected cropping pattern for 2012 is expected to be similar to that in 2011 and was used to determine available habitat to giant garter snake. However, because cropping patterns may change season to season, the estimated future availability of habitat for and the estimated effects to the giant garter snake are tentative.

Phase 2 includes the construction of the New Meridian Diversion/Pumping Plant, Main Canal Modifications, Drexler Relift, removal of the existing Meridian and Drexler Diversions, and the expansion of the Drexler Pipeline as well. The defined Work Area will avoid Reclamation Drains and rice fields that are suitable aquatic habitat for the giant garter snake. Effects to potential giant garter snake aquatic habitat during the inactive season occur only in the Main Canal. The Main Canal provides marginal habitat for the giant garter snake, with the only suitable habitat value being as a possible movement corridor between other drains and rice fields. Widening the Main Canal would increase the amount of potential aquatic habitat, but it would also mean a subsequent permanent loss of potential upland habitat for the giant garter snake. This modification to the canal was not considered to result in any adverse effects to the giant garter snake. Therefore no compensation is proposed for the temporary loss of aquatic habitat resulting from the proposed action.

Construction activities associated with the Main Canal modifications (3.4 acres) and the construction of the Drexler Re-lift Pumping Plant (0.05 acre) would potentially temporarily impact 6.4 acres of giant garter snake upland habitat (**Table 4-2, Figure 4-1**). In order to construct the Drexler Re-lift Pumping Plant, an existing drainage ditch would be replaced with a new 24-inch storm drain to allow for placement of a concrete pad. Construction of the pumping plant, storm drain, and spillway would result in permanent effects to approximately 2,512 square feet (0.05 acre) of giant garter snake upland habitat (**Figure 4-2**). An additional minimal area of the Reclamation District 70 canal would be disturbed temporarily when the storm drain is connected. The total permanent impacts are <0.1 acre.

**TABLE 4-2
SUMMARY OF GIANT GARTER SNAKE
IMPACTS**

Habitat Type	Acres
Upland Temporary	6.4
Aquatic Permanent	<0.1
Upland Permanent	<0.1

Because the operation of the Main Canal is essential for MFWC water delivery in the spring and summer, the Proposed Project/Action improvements to the Main Canal must occur during the fall and winter (October 1st through April 30th), during the giant garter snake inactive period of October 1st to May 1st. Upland giant garter snake habitat in the Action Area is primarily composed of frequently disturbed agricultural lands and relatively shallow canal berms with few evident rodent burrows. These areas are not optimal habitat for giant garter snake hibernation; however, there is some potential for snakes to remain in the Action Area during the inactive season. Construction activities, either permanent or temporary in nature, from October 1 to May 1 are assumed to likely result in take (injury or death) of giant garter snakes that may be hibernating in the area, rather than harm and harassment. Therefore, the applicant proposes restoration and 1:1 replacement of 6.4 acres of upland habitat through the purchase of conservation credits from a Service-approved giant garter snake bank. Permanent impacts related to construction of the pumping plant and associated structures are very minimal (0.05 acre) and would occur during the GGS active period; therefore, no additional compensation measures are proposed.

The level of compensation specified for temporary impacts associated with the modifications of the Main Canal is comparable to the requirements for level 2 mitigation outlined in the *Programmatic Formal Consultation for the U.S. Army of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California* (USFWS 1997). The Programmatic 404 Consultation specifies level 2 mitigation for projects that have less than 20 acres of temporary disturbance during two active GGS seasons. Although the work on the Main Canal is expected to occur within one calendar year, it cannot be conducted during the GGS active season; therefore, the disturbance could be considered similar to impacts spanning more than one active GGS season.

Compensation will be purchased prior to ground-disturbing activities. Replacement habitat will include both upland and aquatic habitat components.

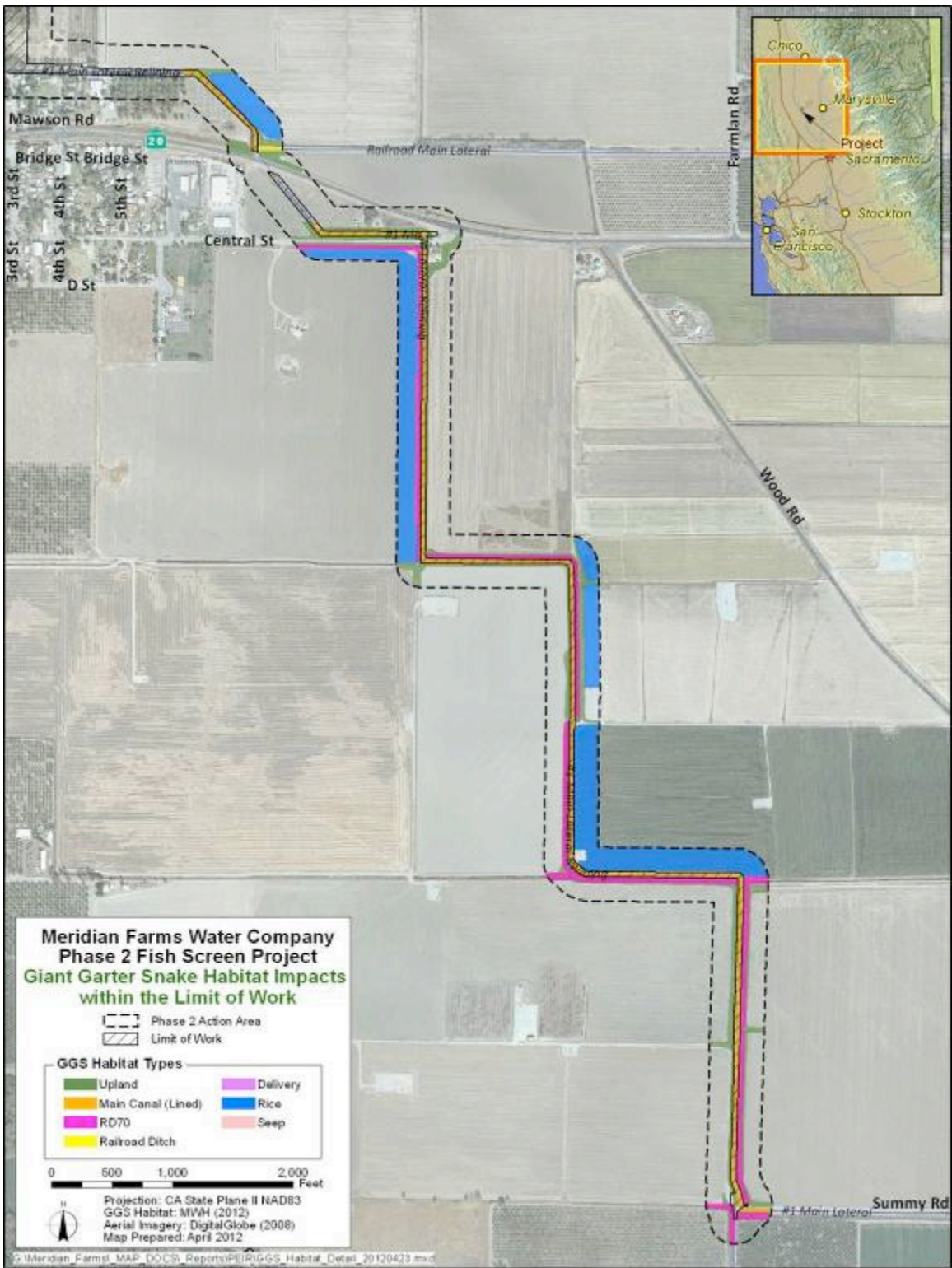


Figure 4-1. Location of Temporary Giant Garter Snake Habitat Impacts in the Limit of Work Area

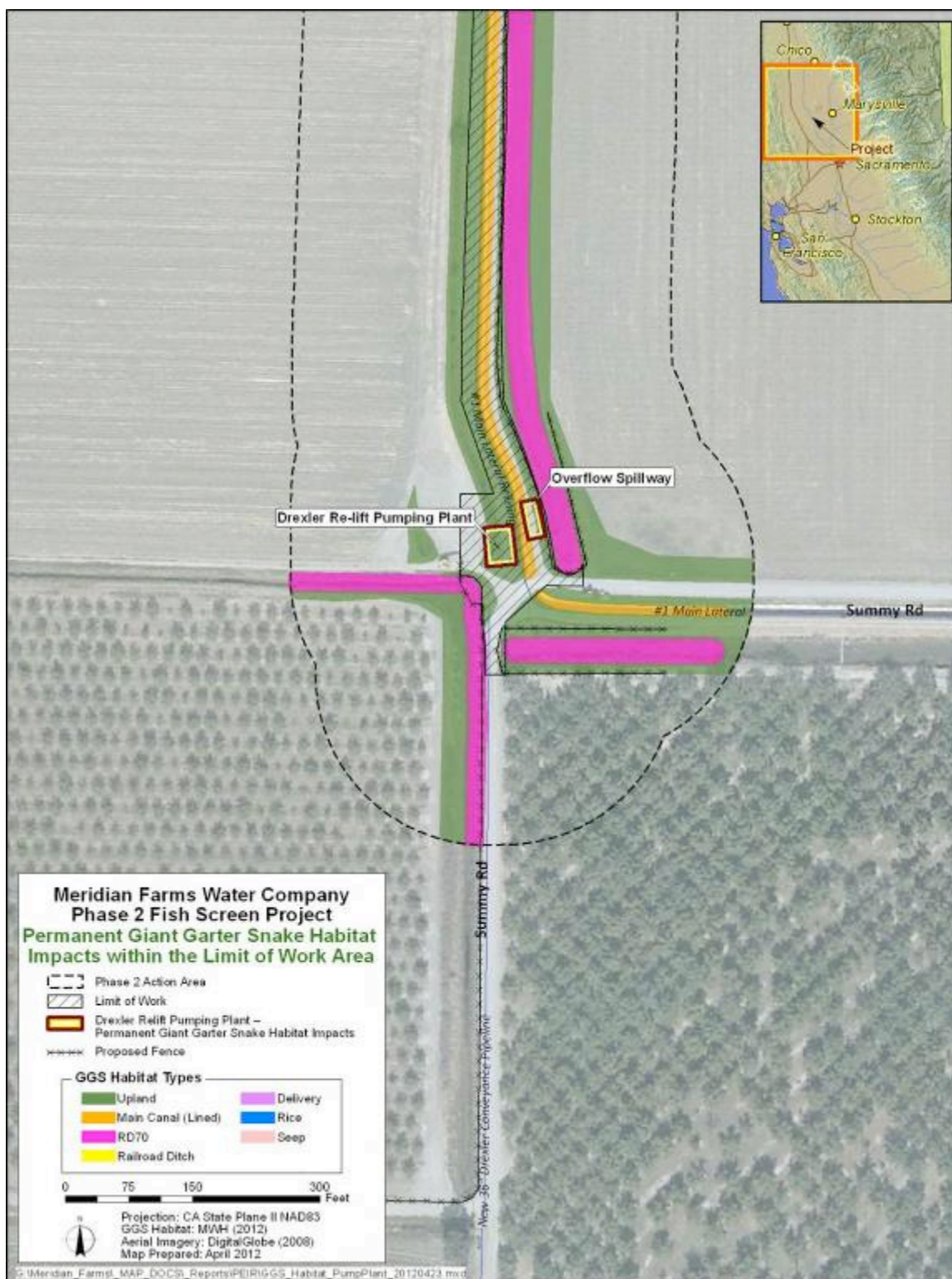


Figure 4-2. Location of Permanent Giant Garter Snake Habitat Impacts in the Limit of Work Area – Drexler Relift Pumping Plant

Implementation of mitigation measures and fulfillment of habitat compensation for construction activities occurring during the October 1 to May 1 period would avoid potentially significant impacts to giant garter snake. The specific 2008 IS/EA Mitigation Measures (BIO-1, BIO-4, BIO-6 through BIO-14, and BIO-17) and modified 2008 IS/EA Mitigation Measures (BIO-2, BIO-3, BIO-16, and BIO-18) related to GGS are presented below.

Measure BIO-1 (same as 2008 IS/ES Measure BIO-1): Traffic Routing, and Movement.

During construction operations, the number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles shall observe a 20-mile-per-hour speed limit within construction areas, except on County roads and on State and Federal highways. This is particularly important during periods when the snake may be sunning or moving on roadways. All heavy equipment, vehicles, and supplies will be stored at the designated staging area at the end of each work period.

Measure BIO-2 (modified from Measure BIO-2 in the 2008 IS/ES): Staging Areas.

During construction operations, stockpiling of construction materials, portable equipment, vehicles, and supplies will be restricted to the designated construction staging areas and exclusive of the Environmentally Sensitive Areas (ESAs). A clear and solid barrier fence, such as a combination of exclusionary and silt fencing, will be installed along the boundaries of the staging area to prevent contamination of ESAs during such operations.

Measure BIO-3 (modified from Measure BIO-3 in the 2008 IS/ES): Pre-construction

Surveys. No more than 24-hours prior to the commencement of construction activities, a USFWS-approved biologist shall survey areas deemed suitable giant garter snake habitat for the presence of giant garter snakes. The biologist will provide the USFWS with a written report that adequately documents the methodology and results of the pre-construction survey within three days of the survey. These areas shall be re-inspected by the biologist whenever a lapse in construction activity of two and removed at the end of each workday from the entire project site.

Measure BIO-4 (same as 2008 IS/ES Measure BIO-4): Timing of Construction.

Construction activity on the Main Canal must occur during the snake's inactive period in order to avoid interrupting deliveries during the growing season. All other construction activities within giant garter snake habitat (*e.g.* aquatic, upland, and rice habitat) shall be conducted between May 1 and October 1 whenever possible. This is the active period for the snake and direct mortality is lessened, because snakes are expected to actively move and avoid danger. If it appears that construction activity may go beyond October 1, the project proponents shall contact the USFWS as soon as possible, but not later than September 15 of the year in question, to determine if additional measures are necessary to minimize take. Construction activities within 200 feet from the banks of snake aquatic habitat will be avoided during the snake's inactive season. **If this is not feasible, the Project Proponent must consult with USFWS to determine measures to avoid impacts to giant garter snake.**

Measure BIO-6 (same as 2008 IS/ES Measure BIO-6): Worker Awareness Training. A Worker Environmental Awareness Training Program for construction personnel shall be conducted by the USFWS-approved biologist for all construction workers, including contractors, prior to the commencement of construction activities. The program shall provide workers with information on their responsibilities with regard to the snake, an overview of the life-history of this species, information on take prohibitions, protections afforded this animal under the Act, and an explanation of the relevant terms and conditions of this biological opinion. Written documentation of the training must be submitted to the Sacramento Fish and Wildlife Office within 30 days of the completion of training. As needed, training shall be conducted in Spanish for Spanish language speakers.

Measure BIO-7 (same as 2008 IS/ES Measure BIO-7): Install Snake Exclusion Fencing. Prior to the commencement of construction activities, high visibility fencing will be erected around the habitats of federally listed species to identify and protect these designated ESAs from encroachment of personnel and equipment. These areas will be avoided by all construction personnel. The fencing shall be inspected by the Contractor before the start of each work day and maintained by the Contractor until completion of the project. The fencing may be removed only when the construction of the project is completed. Fencing will be established in upland immediately adjacent to aquatic snake habitat and extending up to 200 feet from construction activities. Silt fencing, if properly installed, may serve as suitable snake exclusion fencing.

Measure BIO-8 (same as 2008 IS/ES Measure BIO-8): Provide Adequate Signage. Signs will be posted by the Contractor every 50 feet along the edge of the ESAs, with the following information: "This area is habitat of federally-threatened and/or endangered species, and must not be disturbed. These species are protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained by the Contractor for the duration of construction.

Measure BIO-9 (same as 2008 IS/ES Measure BIO-9): Implement BMPs. Best Management Practices (BMPs), including a Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP), will be implemented to minimize effects to the snake during construction. Best management practices will be implemented to prevent sedimentation from entering ESAs and to reduce erosion, dust, noise, and other deleterious aspects of construction related activities. These BMPs may include, but are not limited to, silt fencing, temporary berms, restrictions on cleaning equipment in or near ESAs, installation of vegetative strips, and temporary sediment disposal. Runoff from dust control and hazardous materials will be retained on the construction site and prevented from flowing into the ESAs.

Measure BIO-10 (same as 2008 IS/ES Measure BIO-10): Erosion Control Materials. Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material shall be used for erosion control and other purposes at the ESA to ensure that the giant garter snake is not trapped or becomes entangled. This limitation shall be communicated to the contractor using special provisions included in the bid solicitation package.

Measure BIO-11 (same as 2008 IS/ES Measure BIO-11): Properly Dispose of Garbage.

To eliminate an attraction to predators of the snake, all food-related trash items, such as wrappers, cans, bottles, and food scraps, must be disposed of in closed containers and removed at the end of each workday from the entire project site.

Measure BIO-12 (same as 2008 IS/ES Measure BIO-12): Use Approved Aggregate, Fill, or Borrow Materials. The Contractor shall provide documentation that aggregate, fill, or borrow material provided for the proposed project was obtained in compliance with the State Mining and Reclamation Act (SMARA). Evidence of compliance with the Act shall be demonstrated by providing the resident engineer with one of the following: 1) a letter from the USFWS stating that the use of the borrow pit will not result in the incidental take of species; 2) an incidental take permit for contractor-related activities issued by the USFWS pursuant to section 10(a)(1)(B) of the Act; 3) a biological opinion or letter concurring with a “not likely to adversely affect” determination issued by the USFWS to the Federal agency having jurisdiction over contractor-related services; 4) a letter from the USFWS concurring with the “no effect” determination for contractor-related activities; or 5) contractor submittal of information to the resident engineer indicating compliance with the SMARA and provision of County land use permits and California Environmental Quality Act (CEQA) clearance.

Measure BIO-13 (same as 2008 IS/ES Measure BIO-13): Restore Temporarily Affected Habitat. After construction activities are complete, any temporary fill or construction debris shall be removed and disturbed areas restored to their pre-project conditions. An area subject to “temporary” disturbance includes any area that is disturbed during the project, but that, after project completion, will not be subject to further disturbance and has the potential to be re-vegetated. All ESA snake habitats subject to temporary ground disturbances, including storage and staging areas and temporary roads, will be restored to pre-project conditions. If appropriate, these areas shall also be re-contoured to pre-project conditions. A written report shall be submitted to the USFWS within ten (10) working days of the completion of construction at the project site and restoration of the site to pre-project conditions.

Measure BIO-14 (same as 2008 IS/ES Measure BIO-14): Post-construction Monitoring.

An inspection of the site, with a photo documentation report showing pre- and post-project area photos, will be conducted and photos and a brief report will be submitted to USFWS one year from implementation of restoration to pre-project conditions.

Measure BIO-16 (modified from Measure BIO-16 in the 2008 IS/ES): De-watering Giant Garter Snake Habitat. During the giant garter snake active period (May 1-September 31), giant garter snake aquatic habitat may be dewatered starting on April 15. Any dewatered habitat must remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling the dewatered habitat.

Measure BIO-17 (same as 2008 IS/ES Measure BIO-17): Giant Garter Snake Monitoring During Construction. A USFWS-approved biologist shall inspect construction-related activities at the proposed project site to ensure that no unauthorized take of federally listed species or destruction of their habitat occurs. The biologist shall be available for monitoring throughout all phases of construction that may result in adverse effects to the

giant garter snake. This includes clearing and grubbing and other construction activities in the areas of wetland vegetation/aquatic habitat, adjacent upland habitat, and during exclusion fence installation. Furthermore, the biologist shall have the authority through communication with the resident engineer to stop construction activities in the immediate area if a giant garter snake is encountered during construction until appropriate corrective measures have been completed or until the snake is determined to be unharmed. Snakes encountered during construction activities shall be allowed to move away from the area on their own volition. The biologist shall notify the USFWS immediately if any listed species are found on-site, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found. The biologist shall be required to report any take of listed species to the USFWS immediately by telephone at 916/ 414-6600 and by electronic mail or written letter addressed to the Chief, Endangered Species Division, within three (3) working days of the incident. The Service does not authorize any handling or moving of a giant garter snake by other than USFWS-permitted biologist.

Measure BIO-18 (modified from Measure BIO-18 in the 2008 IS/ES): Compensation.

Compensation for temporary and permanent impacts to GGS habitat is the responsibility of MFWC. Temporary impacts shall be restored to pre-project conditions. Areas subject to temporary impacts shall be limited to one season (the calendar year period between May 1 and October 1) and be restored within two seasons. In addition, GGS habitats temporarily disturbed during the inactive season (3.4 acres of aquatic habitat and 6.4 acres of upland habitat) will be replaced at a level of 1:1 by purchasing credits in a USFWS-approved mitigation bank prior to project construction.

4.3.3 Swainson's Hawk

No known Swainson's hawk nesting habitat is proposed to be modified or eliminated by the Proposed Project/Action. Suitable nesting habitat is found adjacent to the Sacramento River within the valley riparian habitat. Habitat in this area includes riparian woodlands with large diameter (i.e., greater than 30 inches diameter at breast height) valley oak (*Quercus lobata*), cottonwood (*Populus fremontii*) and black willow (*Salix goodingii*). These overstory trees provide moderate to high (i.e., greater than 50%) canopy closure in this area.

This riparian habitat will not be impacted by project activities. A few domestic trees and one isolated valley oak will be removed as a result of the Project Action. Minimal disturbances to potential foraging habitat (i.e., annual grassland and agricultural areas) will be temporary and are not expected to impact this species based on the overall regional abundance of these habitat types. This species is listed as threatened by the State of California. With numerous records of Swainson's hawk nests occurring within one mile of the project site along the Sacramento River (CDFG 2012a) there is a moderate to high potential this area may be used by this species for nesting. To compensate potential disturbance and to avoid active nest sites, the following conservation measures are proposed:

Measure BIO-22 (modified from Measure BIO-22 in the 2008 IS/ES): Swainson's Hawk Nest Survey, Nesting Raptors and Other Nesting Bird Survey. For any construction activities that will occur between March 1 and August 31 of any given year, the applicant

shall conduct preconstruction surveys in suitable nesting habitat within 0.5 mile of the construction area for nesting raptors. Surveys shall be conducted by a qualified biologist. In addition, all trees slated for removal during the nesting season shall be surveyed by a qualified biologist no more than 48-hours before removal to ensure that no nesting birds are occupying the tree.

If active nests are found during the survey, the applicant shall implement appropriate mitigation measures to ensure that the species will not be adversely affected, which will include establishing a no-work buffer zone as, approved by CDFG, around the active nest. The no-work buffer may vary depending on species and site specific conditions as approved by CDFG. Appropriate mitigation measures include delaying construction activities until a qualified biologist determines that juveniles have fledged the nest(s), or establishing a “no construction” zone buffer around the nest.

The results of the survey shall be documented in a letter report that is distributed to the CDFG. These measures would ensure compliance with the Migratory Bird Treaty Act and California Department of Fish and Game Code 3503.5.

Measure BIO-23: Riparian Habitat Exclusion (modified from Measure BIO-23 in the 2008 IS/ES). Where construction work occurs adjacent to riparian habitat (i.e., at the existing Drexler Diversion and Pumping Plant and the Grimes Canal modifications), there shall be no encroachment by construction equipment or personnel into existing riparian habitat areas located along the Sacramento River. Storage or parking of equipment shall be restricted within 100 feet of riparian habitat.

4.3.4 Osprey

Osprey nesting period and habitat requirement are similar to the Swainson’s hawk; therefore, the same conservation measures would be implemented for osprey as are listed above. There are fewer records of osprey in the study area, and the species is less likely to occur than Swainson’s hawk.

4.3.5 Western Burrowing Owl

The western burrowing owl is a year-round resident in the Central Valley, and may nest along the levee bank where the proposed screened intake is located, and along the edges of cropland along the pipeline alignment. The burrowing owl may use the surrounding cropland for foraging as well. No cropland is proposed to be modified or eliminated by the Proposed Project/Action, however noise and construction activities associated with the proposed project/action may potentially disturb nesting burrowing owls in the vicinity. If burrowing owl nests occur within the construction footprint along the levee, or along the pipeline alignment near cropland, implementation of the proposed project/action may result in the destruction of nesting birds or an active nest, which may reduce the success of this species and potentially affect the stability of the local population. To avoid potential disturbances to nesting and foraging habitat, the following conservation measures are proposed:

Mitigation Measure BIO-I (new measure in Phase 2 analysis): Pre-construction surveys for burrowing owls shall be conducted by a qualified biologist as approved by CDFG within 30-days prior to the start of work activities where land construction is planned in known or suitable habitat. If construction activities are delayed for more than 30 days after the initial preconstruction surveys, then a new preconstruction survey shall be required. All surveys shall be conducted in accordance with the CDFG/California Burrowing Owl Consortium survey protocols. This survey can be conducted concurrently with Mitigation Measure BIO-22.

If burrowing owls are discovered in the proposed project site vicinity during construction, the onsite biologist shall be notified immediately. Occupied burrows should not be disturbed during the nesting season (February 1 through August 31) unless a qualified biologist approved by the CDFG verifies through non-invasive methods that either: (1) the birds have not begun egg-laying and incubation; or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.

If this criteria is not met, occupied burrows during the nesting season will be avoided by establishment of a no-work buffer of 250-foot around the occupied/active burrow. Where maintenance of a 250-foot no-work buffer zone is not practical, the applicant shall consult with the CDFG to determine appropriate avoidance measures. Burrows occupied during the breeding season (February 1 to August 31) will be closely monitored by the biologist until the young fledge/leave the nest. The onsite biologist shall have the authority to stop work if it is determined that construction related activities are disturbing the owls.

If criterion 1 or 2 above are met and as approved by CDFG, the biologist shall undertake passive relocation techniques by installing one-way doors in active and suitable burrows allowing owls to escape but not re-enter. Owls should be excluded from the immediate impact zone and within a 160-foot buffer zone by having one-way doors placed over the entrance to prevent owls from inhabiting those burrows.

After nesting season ends (August 31) and the burrow is deemed unoccupied by the biologist, passive relocation techniques shall take place. Construction activities may occur once a qualified biologist has deemed the burrows are unoccupied.

4.3.6 Cackling (=Aleutian Canada) Goose

The cackling goose winters in the Central Valley, and may use the cropland in the proposed project/action vicinity for foraging or cover. No potential foraging habitat is proposed to be modified or eliminated by the Proposed Project/Action, however noise and construction activities associated with the proposed project/action may potentially disturb geese that may use the surrounding croplands. This disturbance may cause the geese to avoid foraging in the croplands in the vicinity and forage elsewhere. Due to the abundance of agriculture in the area it is unlikely that the geese would be subject to starvation or predation due to temporary disturbance from the proposed project/action. Potential disturbances to foraging habitat would be compensated by implementation of Mitigation Measure BIO-22 (see Section 4.3.3).

4.3.7 Bank Swallow

Although the bank swallow is known to nest along the Sacramento River, the immediate Action Area does not provide suitable nesting habitat for bank swallow. The gradual grassy slope of the riverbank that would be affected by the proposed screened intake is not suitable for nesting. The bank swallow may occur both upstream and downstream from the Action Area, however, and may potentially be disturbed by construction activities related to the Proposed Project/Action. Disturbance to nesting bank swallows may cause abandonment or failure of the nest, reduced productivity, and possibly a decline of the local population.

To avoid potential disturbances to nearby breeding bank swallows, implementation of modified 2008 IS/EA Mitigation Measure BIO-22 is proposed (see Section 4.3.3).

4.4 Effects on Critical Habitat

Construction activities associated with both phases of the Proposed Project/Action would result in temporary disturbances – including increased turbidity and sedimentation, cofferdam installation, and dewatering – to designated Critical Habitat for Central Valley steelhead, Central Valley spring-run Chinook salmon, and Sacramento River winter-run Chinook salmon. These potential effects are mitigated through measures incorporated in the project (see Chapter 2). Furthermore, the proposed fish screens would permanently alter designated Critical Habitat within the Action Area. However, the overall benefit of the Proposed Project on fish species outweighs the minor modifications to designated Critical Habitat.

4.5 Effects on Essential Fish Habitat

Construction activities associated with both phases of the Proposed Project/Action would result in temporary disturbances, including increased turbidity and sedimentation, cofferdam installation, and dewatering, to delineated EFH for Chinook salmon. These potential effects are mitigated through measures incorporated in the project (see Chapter 2). Furthermore, the proposed fish screens would permanently alter delineated EFH within the Action Area. However, the overall benefit of the Proposed Project on fish species outweigh the minor modifications to delineated EFH.

This page intentionally left blank.

CHAPTER 5

Environmental Baseline - NCCPA Communities

NCCPA Communities includes both habitats and ecologically-based fish groups which are defined in the MSCS. Two NCCPA habitats and two fish groups occur within the Action Area, have potential to be affected by the Action, and are therefore included within this ASIP. These communities are listed below, and their MSCS definitions are included in the following sections. Valley Riverine Aquatic.

- Valley/Foothill Riparian
- Anadromous Fish Group
- Estuarine Fish Species Group

5.1 NCCPA Habitats

There are 18 NCCPA habitats evaluated in the MSCS. These habitats were evaluated based on certain criteria: the level of acceptance of habitat nomenclature within the scientific community; consistency with existing CALFED habitat nomenclature from the ERP; consistency with existing electronically-mapped habitat data; and the potential for habitat types to be affected by CALFED actions.

5.1.1 Valley Riverine Aquatic

Valley riverine aquatic habitat includes the water column of flowing streams and rivers in low-gradient channel reaches below 300 feet in elevation. These waters are not tidally-influenced and include features such as pools, riffles, runs, and unvegetated channel beds and banks, as well as sloughs, backwaters, and flood bypasses.

In the Action Area, valley riverine aquatic habitat exists in the Sacramento River. The Sacramento River riverine habitat is characterized by fresh-water aquatic and shaded riparian. Flows are relatively slow within the Action Area, exhibiting deep channel characteristics with levied banks. Channel substrate generally consists of fine sandy-loam with sparse areas imported rip-rap along the banks used to reinforce the adjacent levees. At both proposed new diversion locations the channelized river bank habitat is exposed and dominated by annual grassland, exhibiting a deep, cold and slow moving flow.

5.1.2 Valley/Foothill Riparian

Valley/foothill riparian habitat includes all successional stages of woody vegetation, commonly dominated by willow, Fremont cottonwood, valley oak, or sycamore. This habitat occurs within the current and historical floodplains of low-gradient reaches of streams and rivers generally below 300 feet in elevation.

The valley riparian and riparian forest habitats are located adjacent to the Sacramento River system as it winds south along the western boundary of the Meridian Farms Service Area, and is usually located within the flood plain and levee system. Valley riparian habitats provide food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for an abundance of wildlife. At least 50 amphibians and reptiles and 147 bird species occur in lowland riparian systems. Additionally, 55 species of mammals are known to use California's Central Valley riparian communities.

This habitat type is not within the immediate vicinity of proposed activities near or in the Sacramento River. Riparian forest habitat occurs along the opposite bank of the Meridian and Drexler diversion locations as shown in **Figure 2-2**, and a few non-contiguous patches of mixed willow riparian habitat occurs approximately 440 feet north of the proposed New Grimes Diversion.

5.2 NCCPA Fish Groups

There are two NCCPA Fish Groups which are evaluated in the MSCS: anadromous and estuarine fish species. These fishes are associated with several of the NCCPA habitats but are assessed separately because factors that support fish populations are not sufficiently addressed in the NCCPA habitats which are based on vegetation, land use, and geography. Instead, each fish group addresses the effects CALFED actions may have on factors important to fish ecology such as water flow, depth, temperature, quality, and seasonal fluctuations in stage and flow.

The fish species included in the NCCPA fish groups are those that will be most affected by CALFED actions, depend on the health of the Bay-Delta ecosystem, and are subject to existing USFWS, NOAA Fisheries, and CDFG recovery goals. The following section describes the NCCPA Fish Groups potentially affected by the Project.

5.2.1 Anadromous Fish Species

Anadromous fish are those that are born in fresh water, migrate to the ocean where they mature into adults, and return to their native fresh waters to spawn. Anadromous fish species that are included in this fish group are Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, Central California Coast steelhead ESUs, and green sturgeon. These species are associated with the following NCCPA habitat types: tidal perennial aquatic, valley riverine aquatic, montane riverine aquatic, lacustrine, saline emergent, and tidal freshwater emergent.

5.2.2 Estuarine Fish Species

Estuarine fish are those that spend most or all of their lives in euryhaline conditions, or at various salinities. Estuarine fish that are included in this fish group are the tidewater goby, delta smelt, longfin smelt, and Sacramento perch. These species are associated with the following NCCPA habitat types: tidal perennial aquatic, valley riverine aquatic, lacustrine, saline emergent, and tidal freshwater emergent.

CHAPTER 6

Effects of the Proposed Project/Action on NCCPA Communities

This chapter analyzes the direct, indirect, and cumulative effects on NCCPA communities that exist within the Action Area and that may result from implementation of both phases of the Proposed Project/Action, as well as actions related to and dependent on those actions. The Proposed Project/Action is considered to have an effect on NCCPA communities if it could result in “take” of a species, or if it would decrease the quality or extent of habitat potentially occupied by a species.

This analysis also includes a discussion of the conservation measures to avoid, minimize, and compensate for such effects, as appropriate. For descriptions of the NCCPA communities addressed in this ASIP, refer to Chapter 5.

6.1 Proposed Project/Action Effects and Conservation Measures

The following text contains an analysis of potential direct, indirect, and cumulative effects on NCCPA communities and the appropriate compensation measures:

6.1.1 Valley Riverine Aquatic

The one sensitive natural community that may be impacted by the Proposed Project/Action is the valley riverine aquatic habitat in the Sacramento River. As shown in **Figure 2-2**, the Work Area includes valley riverine aquatic habitat in the vicinity of the Meridian and Drexler diversions. Construction of the new Meridian Diversion and removal of the existing diversions would require the use of a cofferdam.

Approximately 0.2 acre of valley riverine aquatic habitat in the Action Area would be affected by Proposed Project/Action. However, with avoidance, minimization, and erosion control measures outlined in Chapter 2 (Project Description), impacts to the Sacramento River are considered minimal.

6.1.2 Valley Riparian

Because of the proximity of the valley riparian and cottonwood riparian habitat in the vicinity of the existing Meridian and Drexler diversion, these habitats may also be impacted by water quality effects resulting from in-water work. Both communities provide habitat for a range of terrestrial wildlife species, including several species of songbirds, small mammals, mesocarnivores, reptiles and amphibians. Incorporation of **2008 IS/EA Mitigation Measures BIO-19, BIO-20** and proposed **Mitigation Measures BIO-A through BIO-H** will ensure no disturbance and encroachment into these sensitive riparian habitat areas, thereby reducing potential effects.

6.1.3 Anadromous and Estuarine Fish Groups

Within the Action Area, effects to valley riverine aquatic habitat in the Sacramento River may subsequently affect special-status fish species from both fish groups. The Sacramento River in the vicinity of the proposed intake locations serves as a migratory corridor for the upstream migration of adult salmon and steelhead, and the downstream migration of juvenile salmon and steelhead. Other fish species in the Sacramento River near the proposed intake locations include North American green sturgeon, striped bass, threadfin shad, American shad, catfish, Sacramento pikeminnow, tule perch, sculpin, bullhead, and a variety of other resident fish species. The Sacramento River near Sacramento also provides habitat for a variety of invertebrates, including planktonic species such as copepods, and epibenthic species such as crawfish and amphipods. With avoidance, minimization, and erosion control measures outlined in Chapter 2 (Project Description), and implementation of **2008 IS/EA Mitigation Measures BIO-19, BIO-20** and proposed **Mitigation Measures BIO-A through BIO-H**, impacts to the Fish Groups in the Sacramento River will be minimized.

CHAPTER 7

Interrelated, Interdependent, and Cumulative Effects

This chapter assesses the interrelated, interdependent and cumulative effects of the Proposed Project/Action.

7.1 Interrelated and Interdependent Effects

The Proposed Project/Action is considered to be an action that is independent and has a function apart from other projects. Installation of the proposed diversion facilities would not increase water diversions or lead to any future water use not already feasible under existing baseline conditions. Thus the Proposed Project/Action is not part of a single, larger project, and therefore no interdependent or interrelated effects will occur.

7.2 Cumulative Effects

One new diversion facility will be installed and two existing facilities will be removed as part of this MFWC Project. The capacity of water diverted from the Sacramento River would not increase or decrease. These continuing baseline diversions as well as the implementation of BMP's and conservation measures will ensure no cumulative effects to water quality (water resources). The placement and design of the new permanent water diversion facilities in the Sacramento River is not likely to result in any obstruction of fishery migration and will likely decrease the mortality of emigrating juvenile fish species (in particular steelhead and Chinook salmon), thus not contributing to a cumulative effect on fishery resources.

Placement of the cofferdam and associated dewatering activities may potentially contribute to the loss of native fish trapped within the structure. However, the timing of proposed dewatering activities is likely to avoid special-status native fish species known to inhabit the Sacramento River based on known migratory requirements and the unlikely occurrence of these species in the vicinity of the Proposed Project/Action outside of migratory periods.

Existing surrounding land-use (i.e., agricultural) will continue to provide foraging opportunities for Swainson's hawk and other raptor species. With the implementation of Conservation measures for Swainson's hawk, suitable habitat will be preserved for future nesting opportunities, and thus will not contribute to a cumulative effect to Swainson's hawk and other species associated with riparian habitat.

This page intentionally left blank.

CHAPTER 8

Monitoring Needs

A list of monitoring needs from the 2008 IS/EA and Phase 2 IS/EA Mitigation Monitoring and Reporting Plan (Appendix C) are described below. Monitoring is necessary in order to monitor the effects and the implementation and effectiveness of the conservation measures. These are identified as measures that the implementing entity will undertake.

Mitigation Measure BIO-3: Pre-construction Surveys:

- 24-hours prior to the commencement of construction activities, the ESA shall be surveyed for giant garter snakes by a USFWS-approved biologist.
- The biologist will provide the USFWS with a written report that adequately documents the monitoring efforts within 24-hours of commencement of construction activities.
- The project area shall be re-inspected by the monitoring biologist whenever a lapse in construction activity of two weeks or greater has occurred.

Mitigation Measure BIO-14: Post-construction Monitoring:

- An inspection of the site, with a photo documentation report showing pre- and post-project area photos, will be conducted and photos and a brief report will be submitted to USFWS one year from implementation of restoration to pre-project conditions.

Mitigation Measure BIO-17: Giant Garter Snake Monitoring During Construction:

- A USFWS approved biologist shall inspect construction-related activities at the proposed project site to ensure that no unauthorized take of federally listed species or destruction of their habitat occurs. The biologist shall be available for monitoring throughout all phases of construction that may result in adverse effects to the giant garter snake. This includes clearing and grubbing and other construction activities in the areas of wetland vegetation/aquatic habitat, adjacent upland habitat, and during exclusion fence installation.
- The biologist shall have the authority through communication with the resident engineer to stop construction activities in the immediate area if a giant garter snake is encountered during construction until appropriate corrective measures have been completed or until the snake is determined to be unharmed. Snakes encountered during construction activities shall be allowed to move away from the area on their own volition. The biologist shall notify the USFWS immediately if any listed species are found on-site, and will submit a report, including date(s), location(s), habitat description, and any corrective measures taken to protect the species found.

- The biologist shall be required to report any take of listed species to the USFWS immediately by telephone at 916/ 414-6600 and by electronic mail or written letter addressed to the Chief, Endangered Species Division, within three (3) working days of the incident. The Service does not authorize any handling or moving of a giant garter snake by other than a USFWS-permitted biologist.

Mitigation Measure BIO-22: Swainson's Hawk Nest Survey, Nesting Raptors and Other Nesting Bird Survey:

- For any construction activities that will occur between March 1 and August 31 of any given year, the applicant shall conduct preconstruction surveys in suitable nesting habitat within 0.5 mile of the construction area for nesting raptors. Surveys shall be conducted by a qualified biologist. In addition, all trees slated for removal during the nesting season shall be surveyed by a qualified biologist no more than 48-hours before removal to ensure that no nesting birds are occupying the tree.
- If active nests are found during the survey, the applicant shall implement appropriate mitigation measures to ensure that the species will not be adversely affected, which will include establishing a no-work buffer zone as approved by the California Department of Fish and Game (CDFG), around the active nest. The no-work buffer may vary depending on species and site specific conditions as approved by CDFG. Appropriate mitigation measures include delaying construction activities until a qualified biologist determines that juveniles have fledged the nest(s), or establishing a "no construction" zone buffer around the nest.
- The results of the survey shall be documented in a letter report that is distributed to the CDFG. These measures would ensure compliance with the Migratory Bird Treaty Act and California Department of Fish and Game Code 3503.5..

Mitigation Measure BIO-H:

- Pre-construction surveys for burrowing owls shall be conducted by a qualified biologist as approved by CDFG within 30-days prior to the start of work activities where land construction is planned in known or suitable habitat. If construction activities are delayed for more than 30 days after the initial preconstruction surveys, then a new preconstruction survey shall be required. All surveys shall be conducted in accordance with the CDFG/California Burrowing Owl Consortium survey protocols. This survey can be conducted concurrently with Mitigation Measure BIO-22.

CHAPTER 9

Changed Circumstances

There are no anticipated changed circumstances that would affect implementation of the Proposed Project/Action.

This page intentionally left blank.

CHAPTER 10

Effects Determination Conclusion

The purpose of this ASIP is to review the Meridian Farms Water Company's Proposed Fish Screen Project in sufficient detail to determine to what extent the Proposed Project/Action may affect any threatened, endangered, proposed, or sensitive species within the Action Area. This chapter summarizes the environmental setting, analysis, and effects determination presented in Chapters 3 and 4.

10.1 Summary of Effects

A determination of effects based on the Proposed Project/Action on the following five species is summarized below:

- North American green sturgeon (Southern DPS) (*Acipenser medirostris*)
- Central Valley steelhead (*Oncorhynchus mykiss*)
- Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Giant garter snake (*Thamnophis gigas*)

In addition, a determination of effects based on the Proposed Project/Action on designated Critical Habitat for the following three species is summarized below:

- Central Valley steelhead (*Oncorhynchus mykiss*)
- Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*)

Furthermore, a determination of effects based on the Proposed Project/Action on delineated EFH for species is summarized below:

- Pacific salmon, specifically Chinook salmon (*Oncorhynchus tshawytscha*)

Lastly, a determination of effects based on the Proposed Project/Action on the following four NCCPA Communities is summarized below:

- Valley Riverine Aquatic Habitat
- Valley/Foothill Riparian Habitat

- Anadromous Fish Species
- Estuarine Fish Species

These species and communities have been selected from a broad list of species compiled from USFWS lists and database searches from the CNDDDB and CNPS. The five species are federal-listed. The NCCPA communities were selected from 20 communities defined in the MSCS. These species and communities have the potential to be affected by the Proposed Project/Action and are therefore included in this ASIP.

10.1.1 North American Green Sturgeon (Southern DPS)

The Proposed Project Action occurs within and adjacent to the Sacramento River which provides habitat for several special-status anadromous fish species. Based on the Proposed/Project Actions described in Chapter 2, these fish species are most likely to be affected by a decrease in water quality due to construction-related activities, underwater sound pressure effects generated by pile driving activities associated with cofferdam installation, and direct mortality as a result of cofferdam installation and dewatering. Included within the Proposed Project/Action are measures to minimize such impacts; these include following the Central Valley RWQCB regulations to minimize construction-related effects, installing silt screens to filter out sediment before water re-enters the river, installing a cofferdam to contain most construction activities in the water, minimizing sound pressure effects, screening of dewatering pumps, and relocation of individuals trapped within the dewatered cofferdam. With the implementation of these measures and with the incorporation of seasonal in-channel construction restrictions, it is unlikely that construction of the Proposed Project/Action would significantly affect green sturgeon populations. Moreover, the proposed project will result in avoidance of future entrainment of green sturgeon at the diversion sites. This is a beneficial effect is expected to outweigh the temporary construction-related effects.

There is potential for “incidental take” of special-status fish associated with installation of the cofferdam, and the Proposed Project/Action may affect and is likely to adversely affect special status fish species.

10.1.2 Central Valley Steelhead

The Project Action occurs within and adjacent to the Sacramento River which provides habitat for several special-status anadromous fish species. Based on the Proposed/Project Actions described in Chapter 2, these fish species are most likely to be affected by a decrease in water quality due to construction-related activities, underwater sound pressure effects generated by pile driving activities associated with cofferdam installation, and direct mortality as a result of cofferdam installation and dewatering. Included within the Proposed Project/Action are measures to minimize such impacts; these include following the Central Valley RWQCB regulations to minimize construction-related effects, installing silt screens to filter out sediment before water re-enters the river, and installing a cofferdam to contain most construction activities in the water, minimizing sound pressure effects, screening of dewatering pumps, and relocation of individuals trapped within the dewatered cofferdam. With the implementation of these measures and with the incorporation of seasonal in-channel construction restrictions, it is unlikely that construction of the Proposed Project/Action

would significantly affect Central Valley steelhead populations. Moreover, the proposed project will result in avoidance of future entrainment of Central Valley steelhead at the diversion sites. This is a beneficial effect is expected to outweigh the temporary construction-related effects.

There is potential for “incidental take” of special-status fish associated with installation of the cofferdam, and the Proposed Project/Action may affect and is likely to adversely affect special status fish species.

10.1.3 Central Valley Spring-Run Chinook Salmon

The Project Action occurs within and adjacent to the Sacramento River which provides habitat for several special-status anadromous fish species. Based on the Proposed/Project Actions described in Chapter 2, these fish species are most likely to be affected by a decrease in water quality due to construction-related activities, underwater sound pressure effects generated by pile driving activities associated with cofferdam installation, and direct mortality as a result of cofferdam installation and dewatering. Included within the Proposed Project/Action are measures to minimize such impacts; these include following the Central Valley RWQCB regulations to minimize construction-related effects, installing silt screens to filter out sediment before water re-enters the river, and installing a cofferdam to contain most construction activities in the water, minimizing sound pressure effects, screening of dewatering pumps, and relocation of individuals trapped within the dewatered cofferdam. With the implementation of these measures and with the incorporation of seasonal in-channel construction restrictions, it is unlikely that construction of the Proposed Project/Action would significantly affect Central Valley spring-run Chinook salmon populations. Moreover, the proposed project will result in avoidance of future entrainment of Central Valley spring-run Chinook salmon at the diversion sites. This is a beneficial effect is expected to outweigh the temporary construction-related effects.

There is potential for “incidental take” of special-status fish associated with installation of the cofferdam, and the Proposed Project/Action may affect and is likely to adversely affect special status fish species.

10.1.4 Sacramento River Winter-Run Chinook Salmon

The Project Action occurs within and adjacent to the Sacramento River which provides habitat for several special-status anadromous fish species. Based on the Proposed/Project Actions described in Chapter 2, these fish species are most likely to be affected by a decrease in water quality due to construction-related activities, underwater sound pressure effects generated by pile driving activities associated with cofferdam installation, and direct mortality as a result of cofferdam installation and dewatering. Included within the Proposed Project/Action are measures to minimize such impacts; these include following the Central Valley RWQCB regulations to minimize construction-related effects, installing silt screens to filter out sediment before water re-enters the river, and installing a cofferdam to contain most construction activities in the water, minimizing sound pressure effects, screening of dewatering pumps, and relocation of individuals trapped within the dewatered cofferdam. With the implementation of these measures and with the incorporation of seasonal in-channel construction restrictions, it is unlikely that construction of the Proposed Project/Action would significantly affect Sacramento River winter-run Chinook

salmon populations. Moreover, the proposed project will result in avoidance of future entrainment of Sacramento River winter-run Chinook salmon at the diversion sites. This is a beneficial effect is expected to outweigh the temporary construction-related effects.

There is potential for “incidental take” of special-status fish associated with installation of the cofferdam, and the Proposed Project/Action may affect and is likely to adversely affect special status fish species.

10.1.5 Giant Garter Snake

The giant garter snake has a low to moderate potential to occur in the Action Area and is an important species in the Central Valley region. The aquatic giant garter snake inhabits slow-moving waters, such as backwaters and sloughs, and requires some aquatic vegetation for basking and cover.

The anticipated effects to giant garter snake include: temporary effects to aquatic habitat resulting from the Main Canal improvements; temporary and permanent effects to upland habitat along the Main Canal improvements; permanent effects to upland habitat in association with the Drexler Relift; and possible incidental “take” during the snake’s inactive period. To avoid and minimize the anticipated effects to giant garter snake, conservation measures from the Programmatic BO will be implemented. Compensation for permanent loss of habitat in Phase 2 is anticipated at a 3:1 replacement ratio.

It is anticipated that the Proposed Project/Action ‘may affect, but is not likely to adversely affect’ the giant garter snake.

10.2 Critical Habitat

Construction activities associated with the Proposed Project/Action would result in temporary disturbances, including increased turbidity and sedimentation, cofferdam installation, and dewatering, to designated Critical Habitat for Central Valley steelhead, Central Valley spring-run Chinook salmon, and Sacramento River winter-run Chinook salmon. These potential effects are mitigated through measures incorporated in the project (see Chapter 2). Furthermore, the proposed fish screens would permanently alter designated Critical Habitat within the Action Area. However, the overall benefit of the proposed project on fish species outweighs the minor modifications to designated Critical Habitat.

Therefore, the Proposed Project/Action may affect, but is not likely to adversely affect Critical Habitat identified in this ASIP.

10.3 Essential Fish Habitat

Construction activities associated with the proposed project/action would result in temporary disturbances, including increased turbidity and sedimentation, cofferdam installation, and dewatering, to delineated EFH for Chinook salmon. These potential effects are mitigated through measures incorporated in the project (see Chapter 2). Furthermore, the proposed fish screens would permanently alter delineated EFH within the Action Area. However, the overall benefit of the Proposed Project/Action on fish species outweighs the minor modifications to delineated EFH.

Therefore, the Proposed Project/Action may affect, but is not likely to adversely affect Essential Fish Habitat identified in this ASIP.

10.4 NCCPA Communities

This section summarizes the environmental setting, analysis, and effects determination presented in Chapters 5. The NCCPA communities that may be affected by the Proposed Project/Action include Valley Riverine Aquatic and Valley/Foothill Riparian habitats, and the Anadromous and Estuarine Fish Groups, which are associated with these habitats in the Action Area. Effects to the fishes are largely related to water quality, which was addressed in the Proposed Project/Action description. Water quality control measures are included in the Proposed Project/Action, and reduce the effects to the fishes to less-than-significant levels.

Effects to the two habitats are addressed in conservation measures in Chapter 5, which include avoidance of riparian areas, and the implementation of Swainson's hawk conservation and water quality measures. With the implementation of these measures, effects to Valley Riverine Aquatic and Valley/Foothill Riparian habitats are not likely. Adverse effects to Anadromous and Estuarine Fish Groups are expected to be minor and are outweighed by the overall beneficial effects of the Proposed Project.

Therefore, both the Proposed Project/Action may affect, but is not likely to adversely affect NCCPA Communities identified in this ASIP.

This page intentionally left blank.

CHAPTER 11

References

- Adams, P.B., C.B. Grimes, J.E. Hightower, S.T. Lindley, and M.L. Moser. 2002. Status Review for the North American green sturgeon. NOAA, National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, CA. 49 p.
- Bailey ED. 1954. Time pattern of 1953–54 migration of salmon and steelhead into the upper Sacramento River. DFG unpublished report. 4 pp.
- Boles, G. 1988. Water temperature effects on Chinook salmon (*Oncorhynchus tshawytscha*) with emphasis on the Sacramento River: a literature review. Report to the California Department of Water Resources. Northern District. 43 pp.
- Borthwick, S.M., R.R. Corwin, & C.R. Liston. 1999. Investigations of fish entrainment by archimedeeds and internal helical pumps at the Red Bluff Research Pumping Plant, Sacramento California: February 1997-June 1998.
- California Bay-Delta Program (CALFED). 2001a. Guide to Regulatory Compliance.
- California Bay-Delta Program (CALFED). 2001b. Multi-Species Conservation Strategy (MSCS). CALFED Program. Sacramento, California.
- California Department of Fish and Game (CDFG). 2012a. Rarefind 3, software for the California Natural Diversity Database (CNDDDB). Queried USGS 7.5-minute quadrangles: Moulton Weir, Sanborn Slough, Pennington, Colusa, Meridian, Sutter Buttes, Arbuckle, Grimes, Tisdale Weir, Wildwood School, Dunnigan, and Kirkville, CA. Data Analysis Branch, California Department of Fish and Game. Sacramento, California. January, 2012.
- California Department of Fish and Game (CDFG). 2012b. California Wildlife Habitat Relationships (CWHR) Life History Accounts and Range Maps. Updated versions of the species information in the three-volume set "California's Wildlife" edited by Zeiner, D.C. et al 1988-1990, plus 48 additional species accounts. Available at: <http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx>
- California Department of Fish and Game (CDFG). 2011. Biogeographic Data Branch. California Natural Diversity Database. Special Animals (898 taxa). January 2011. Available at: <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf>
- California Department of Fish and Game (CDFG). 2007. Rarefind 3, software for the California Natural Diversity Database (CNDDDB). Queried USGS 7.5-minute quadrangles: Grimes,

- Kirkville, Dunnigan, Arbuckle, Colusa, Wildwood School, Tisdale Weir, Sutter Buttes, and Meridian, CA. Data Analysis Branch, California Department of Fish and Game. Sacramento, California. July, 2007.
- California Department of Fish and Game (CDFG). 2000a. Natural Community Conservation Planning Program. Online resource: <http://www.dfg.ca.gov/NCCPA/index.html>. Habitat Conservation Planning Branch. Sacramento, California.
- California Department of Fish and Game (CDFG). 2000b. California's Plants and Animals: Species Account for Bank Swallow. Online resource: http://www.dfg.ca.gov/hcpb/species/search_species.shtml. Habitat Conservation Planning Branch. Sacramento, California.
- California Department of Fish and Game (CDFG). 1998. A status review of the spring-run Chinook salmon (*Oncorhynchus tshawytscha*) in the Sacramento River drainage. Candidate Species Report 98-01. June 1998.
- California Native Plant Society (CNPS). 2012. *Inventory of Rare and Endangered Plants of California, v7-12jan 1-11-12*. Queried USGS 7.5-minute quadrangles: Moulton Weir, Sanborn Slough, Pennington, Colusa, Meridian, Sutter Buttes, Arbuckle, Grimes, Tisdale Weir, Wildwood School, Dunnigan, and Kirkville, CA. Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, California. July 17, 2012.
- California Native Plant Society (CNPS). 2007. *Inventory of Rare and Endangered Plants of California, v7-07c*. Queried USGS 7.5-minute quadrangles: Grimes, Kirkville, Dunnigan, Arbuckle, Colusa, Wildwood School, Tisdale Weir, Sutter Buttes, and Meridian, CA. Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, California. July, 2007.
- Committee on the Status of Endangered Wildlife in Canada. (COSEWIC). 2004. COSEWIC Assessment and Update Status Report on the Green Sturgeon *Acipenser medirostris* in Canada. Available on the web at: http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_green_sturgeon_e.pdf
- Good, T. P., R. S. Waples, and P. Adams, eds. 2005. Updated Status of Federally Listed ESUs of West Coast Salmon and Steelhead. U.S. Department of Commerce, NOAA Tech. Memo. NMFS-NWFSC-66.
- Groot, C.; Margolis, L., eds. 1998. Pacific salmon life histories. Vancouver, BC: University of British Columbia Press: 311-393.
- Hallock, Richard J., D. H. Fry, Jr. and Don A. LaFaunce. 1957. The use of wire fyke traps to estimate the runs of adult salmon and steelhead in the Sacramento River. Calif. Fish and Game, 43 (4) : 271-298.

- Healey, M.C. 1991. The life history of Chinook salmon (*Oncorhynchus tshawytscha*). In: Groot and Margolis, editors. Pacific salmon life histories. Vancouver, BC: University of British Columbia Press. p. 312–393.
- McReynolds, T. R., C. E. Garman, P. D. Ward, and S. L. Plemons. 2006. Butte and Big Chico Creeks Spring-Run Chinook Salmon, *Oncorhynchus tshawytscha*, Life History Investigation 2004–2005. Department of Fish and Game, Inland Fisheries Administrative Report No. 2006-4.
- Moyle, P. B., J. E. Williams, and E. D. Wikramanayake. 1989. Fish species of special concern of California. Final Report. Prepared by Department of Wildlife and Fisheries Biology, University of California, Davis for California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova.
- Myers *et al.* 1998, National Marine Fisheries Service (NMFS). 1996. *NOAA Technical Memorandum NMFS-NWFSC-27*. Northwest Fisheries Science Center-Coastal Zone and Estuarine Studies Division. Seattle, Washington.
- National Marine Fisheries Service (NMFS). 1997. *Fish screening criteria for anadromous salmonids*. Southwest Region, January.
- Popper, A. N., T. J. Carlson, A. D. Hawkins, B. L. Southall, and R. L. Gentry. 2006. Interim Criteria for Injury of Fish to Pile Driving Operations: A White Paper. May 2006.
- Snider, B. and R.G. Titus. 2000. Timing, composition, and abundance of juvenile anadromous salmonid emigration in the Sacramento River near Knights Landing, October 1996–September 1997. California Department of Fish and Game, Habitat Conservation Division, Stream Evaluation Program Technical Report No. 00-04.
- U.S. Fish and Wildlife Service (USFWS). 2012. Consultation Letter. Species List for Meridian Farms Water Company Phase 2 Fish Screen Project and Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Grimes and Meridian U.S.G.S. 7 1/2 Minute Quads you requested. Document Number: 120112010227. January 12, 2012.
- USFWS. 2007. List of Federal Endangered and Threatened Species in the Grimes, Tisdale Weir, Sutter Buttes, and Meridian, CA, USGS 7.5-minute Quadrangle. Endangered Species Program, Sacramento Fish and Wildlife Office. Sacramento, California. July, 2007.
- USFWS. 1999. Endangered Species Accounts – Giant Garter Snake. Endangered Species Program, Sacramento Fish and Wildlife Office. Sacramento, California.
- USFWS. 1997. Programmatic Formal Consultation for the U.S. Army of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California.

- Vogel, D.A. & K.R. Marine. 1991. Guide to the upper Sacramento River Chinook salmon life history. U.S. Bureau of Reclamation Central Valley Project. Prepared by CH2M Hill, Redding, CA. July 1991. 55 pp.
- Ward, P.D., T.R. McReynolds, and C.E. Garman. 2002. Butte and Big Chico Creeks spring-run Chinook salmon, *Oncorhynchus tshawytscha*, life history investigation, 2000-2001. California Department of Fish and Game, Inland Fisheries Administrative Report No. 2001-2.
- Yoshiyama, R. M., F. W. Fisher, and P. B. Moyle. 1998. Historical Abundance and Decline of Chinook Salmon in the Central Valley Region of California. North American Journal of Fisheries Management, 18:487–521.

Appendix A

Species Lists

This page intentionally left blank.



United States Department of the Interior

FISH AND WILDLIFE SERVICE



Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

January 12, 2012

Document Number: 120112010227

Cynthia Jones
MWH
806 SW Broadway, Suite 200
Portland, OR 97205

Subject: Species List for Meridian Farms Water Company Phase 2 Fish Screen Project

Dear: Ms. Jones

We are sending this official species list in response to your January 12, 2012 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be April 11, 2012.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found [here](#).

Endangered Species Division



These buttons will not appear on your list.

Revise Selection

Print this page

Print species list before going on to letter.

Make Official Letter

U.S. Fish & Wildlife Service

Sacramento Fish & Wildlife Office

**Federal Endangered and Threatened Species that Occur in
or may be Affected by Projects in the Counties and/or
U.S.G.S. 7 1/2 Minute Quads you requested**

Document Number: 120112010227

Database Last Updated: September 18, 2011

Quad Lists

Listed Species

Invertebrates

- Branchinecta conservatio
 - Conservancy fairy shrimp (E)
- Branchinecta lynchi
 - vernal pool fairy shrimp (T)
- Desmocerus californicus dimorphus
 - valley elderberry longhorn beetle (T)
- Lepidurus packardi
 - Critical habitat, vernal pool tadpole shrimp (X)
 - vernal pool tadpole shrimp (E)

Fish

- Acipenser medirostris
 - green sturgeon (T) (NMFS)
- Hypomesus transpacificus
 - delta smelt (T)
- Oncorhynchus mykiss

- Central Valley steelhead (T) (NMFS)
- Critical habitat, Central Valley steelhead (X) (NMFS)
- *Oncorhynchus tshawytscha*
 - Central Valley spring-run chinook salmon (T) (NMFS)
 - Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
 - Critical habitat, winter-run chinook salmon (X) (NMFS)
 - winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

- *Ambystoma californiense*
 - California tiger salamander, central population (T)
- *Rana draytonii*
 - California red-legged frog (T)

Reptiles

- *Thamnophis gigas*
 - giant garter snake (T)

Plants

- *Cordylanthus palmatus*
 - palmate-bracted bird's-beak (E)

Candidate Species**Birds**

- *Coccyzus americanus occidentalis*
 - Western yellow-billed cuckoo (C)

Quads Containing Listed, Proposed or Candidate Species:

MERIDIAN (545B)

GRIMES (545C)

County Lists

No county species lists requested.

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the [National Oceanic & Atmospheric Administration Fisheries Service](http://www.noaa.gov/). Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.

- (PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.
- (C) Candidate - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) Critical Habitat designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, or may be affected by projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.
- During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.
- Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.


Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. [More info](#)

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520 .

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be April 11, 2012.



Selected Elements by Scientific Name

California Department of Fish and Game

California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
<i>Agelaius tricolor</i> tricolored blackbird	ABPBXB0020	None	None	G2G3	S2	SSC
<i>Ambystoma californiense</i> California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	SSC
<i>Antrozous pallidus</i> pallid bat	AMACC10010	None	None	G5	S3	SSC
<i>Ardea alba</i> great egret	ABNGA04040	None	None	G5	S4	
<i>Ardea herodias</i> great blue heron	ABNGA04010	None	None	G5	S4	
<i>Astragalus tener var. ferrisiae</i> Ferris' milk-vetch	PDFAB0F8R3	None	None	G1T1	S1	1B.1
<i>Athene cunicularia</i> burrowing owl	ABNSB10010	None	None	G4	S2	SSC
<i>Atriplex cordulata</i> heartscale	PDCHE040B0	None	None	G2?	S2.2?	1B.2
<i>Atriplex depressa</i> brittlescale	PDCHE042L0	None	None	G2Q	S2.2	1B.2
<i>Atriplex joaquiniana</i> San Joaquin spearscale	PDCHE041F3	None	None	G2	S2	1B.2
<i>Atriplex minuscule</i> lesser saltscale	PDCHE042M0	None	None	G1	S1.1	1B.1
<i>Atriplex persistens</i> vernal pool smallscale	PDCHE042P0	None	None	G2	S2.2	1B.2
<i>Atriplex subtilis</i> subtle orache	PDCHE042T0	None	None	G2	S2.2	1B.2
<i>Branchinecta lynchi</i> vernal pool fairy shrimp	ICBRA03030	Threatened	None	G3	S2S3	
<i>Branta hutchinsii leucopareia</i> cackling (=Aleutian Canada) goose	ABNJB05035	Delisted	None	G5T4	S2	
<i>Brasenia schreberi</i> watershield	PDCAB01010	None	None	G5	S2	2.3
<i>Buteo swainsoni</i> Swainson's hawk	ABNKC19070	None	Threatened	G5	S2	
<i>California macrophylla</i> round-leaved filaree	PDGER01070	None	None	G2	S2	1B.1
<i>Castilleja rubicundula ssp. rubicundula</i> pink creamsacs	PDSCR0D482	None	None	G5T2	S2	1B.2
<i>Centromadia parryi ssp. parryi</i> pappose tarplant	PDAST4R0P2	None	None	G4T1	S1	1B.2
<i>Charadrius montanus</i> mountain plover	ABNNB03100	Proposed Threatened	None	G2	S2?	SSC



Selected Elements by Scientific Name

California Department of Fish and Game

California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
<i>Chloropyron palmatum</i> palmate-bracted bird's-beak	PDSCR0J0J0	Endangered	Endangered	G1	S1	1B.1
<i>Cicindela hirticollis abrupta</i> Sacramento Valley tiger beetle	IICOL02106	None	None	G5TH	SH	
<i>Circus cyaneus</i> northern harrier	ABNKC11010	None	None	G5	S3	SSC
<i>Coastal and Valley Freshwater Marsh</i> Coastal and Valley Freshwater Marsh	CTT52410CA	None	None	G3	S2.1	
<i>Coccyzus americanus occidentalis</i> western yellow-billed cuckoo	ABNRB02022	Candidate	Endangered	G5T3Q	S1	
<i>Cuscuta obtusiflora var. glandulosa</i> Peruvian dodder	PDCUS01111	None	None	G5T4T5	SH	2.2
<i>Desmocerus californicus dimorphus</i> valley elderberry longhorn beetle	IICOL48011	Threatened	None	G3T2	S2	
<i>Dipodomys californicus eximius</i> Marysville California kangaroo rat	AMAFD03071	None	None	G4T1	S1	SSC
<i>Emys marmorata</i> western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
<i>Great Valley Cottonwood Riparian Forest</i> Great Valley Cottonwood Riparian Forest	CTT61410CA	None	None	G2	S2.1	
<i>Great Valley Mixed Riparian Forest</i> Great Valley Mixed Riparian Forest	CTT61420CA	None	None	G2	S2.2	
<i>Great Valley Willow Scrub</i> Great Valley Willow Scrub	CTT63410CA	None	None	G3	S3.2	
<i>Grus canadensis tabida</i> greater sandhill crane	ABNMK01014	None	Threatened	G5T4	S2	FP
<i>Hibiscus lasiocarpus var. occidentalis</i> woolly rose-mallow	PDMAL0H0R3	None	None	G4	S2.2	1B.2
<i>Lasiurus blossevillii</i> western red bat	AMACC05060	None	None	G5	S3?	SSC
<i>Lasiurus cinereus</i> hoary bat	AMACC05030	None	None	G5	S4?	
<i>Lasthenia glabrata ssp. coulteri</i> Coulter's goldfields	PDAST5L0A1	None	None	G4T3	S2.1	1B.1
<i>Laterallus jamaicensis coturniculus</i> California black rail	ABNME03041	None	Threatened	G4T1	S1	FP
<i>Layia septentrionalis</i> Colusa layia	PDAST5N0F0	None	None	G2	S2.2	1B.2
<i>Lepidurus packardii</i> vernal pool tadpole shrimp	ICBRA10010	Endangered	None	G3	S2S3	
<i>Myotis ciliolabrum</i> western small-footed myotis	AMACC01140	None	None	G5	S2S3	




Selected Elements by Scientific Name
California Department of Fish and Game
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
<i>Myotis yumanensis</i> Yuma myotis	AMACC01020	None	None	G5	S4?	
<i>Navarretia leucocephala ssp. bakeri</i> Baker's navarretia	PDPLM0C0E1	None	None	G4T2	S2	1B.1
<i>Northern Hardpan Vernal Pool</i> Northern Hardpan Vernal Pool	CTT44110CA	None	None	G3	S3.1	
<i>Pandion haliaetus</i> osprey	ABNKC01010	None	None	G5	S3	WL
<i>Perognathus inornatus inornatus</i> San Joaquin pocket mouse	AMAFD01061	None	None	G4T2T3	S2S3	
<i>Plegadis chihi</i> white-faced ibis	ABNGE02020	None	None	G5	S1	WL
<i>Riparia riparia</i> bank swallow	ABPAU08010	None	Threatened	G5	S2S3	
<i>Silene verecunda ssp. verecunda</i> San Francisco campion	PDCAR0U213	None	None	G5T2	S2.2	1B.2
<i>Spea hammondi</i> western spadefoot	AAABF02020	None	None	G3	S3	SSC
<i>Spinus lawrencei</i> Lawrence's goldfinch	ABPBY06100	None	None	G3G4	S3	
<i>Thamnophis gigas</i> giant garter snake	ARADB36150	Threatened	Threatened	G2G3	S2S3	
<i>Trichocoronis wrightii var. wrightii</i> Wright's trichocoronis	PDAST9F031	None	None	G4T3	S1.1	2.1
<i>Wolffia brasiliensis</i> Brazilian watermeal	PMLEM03020	None	None	G5	S1.3	2.3

Record Count: 55



Inventory of Rare and Endangered Plants

v7-12jan 1-11-12

Status: search results - Tue, Jan. 17, 2012 20:05 c

{QUADS_123} = ~ m/Moulton Weir/i or {QUADS_123} = ~ m/Sanborn Slough/i or {QUADS_123} = ~ m/Pennington/i or {QUADS_123} = ~ m/Colusa/i or {QUADS_123} = ~ m/Meridian/i or {QUADS_123} = ~ m



































Tip: Lathyrus Astragalus returns species from both genera.[\[all tips and help.\]](#)[\[search history\]](#)

Hits 1 to 20 of 20

Requests that specify topo quads will return only Lists 1-3.

To save selected records for later study, click the ADD button.





Selections will appear in a new window.


open	save	hits	scientific	common	family	CNPS
	<input type="checkbox"/>	1	Astragalus tener var. ferrisiae	Ferris' milk-vetch	Fabaceae	List 1B.1
	<input type="checkbox"/>	1	Atriplex cordulata 	heartscale	Chenopodiaceae	List 1B.2
	<input type="checkbox"/>	1	Atriplex depressa 	brittscale	Chenopodiaceae	List 1B.2
	<input type="checkbox"/>	1	Atriplex joaquiniana 	San Joaquin spearscale	Chenopodiaceae	List 1B.2
	<input type="checkbox"/>	1	Atriplex minuscula 	lesser saltscale	Chenopodiaceae	List 1B.1
	<input type="checkbox"/>	1	Atriplex persistens 	vernal pool smallscale	Chenopodiaceae	List 1B.2
	<input type="checkbox"/>	1	Atriplex subtilis 	subtle orache	Chenopodiaceae	List 1B.2
	<input type="checkbox"/>	1	Brasenia schreberi 	watershield	Cabombaceae	List 2.3
	<input type="checkbox"/>	1	California macrophylla 	round-leaved filaree	Geraniaceae	List 1B.1
	<input type="checkbox"/>	1	Castilleja rubicundula ssp. rubicundula 	pink creamsacs	Orobanchaceae	List 1B.2
	<input type="checkbox"/>	1	Centromadia parryi ssp. parryi 	pappose tarplant	Asteraceae	List 1B.2
	<input type="checkbox"/>	1	Chloropyron palmatum	palmate-bracted bird's-beak	Orobanchaceae	List 1B.1
	<input type="checkbox"/>	1	Cuscuta obtusiflora var. glandulosa	Peruvian dodder	Convolvulaceae	List 2.2
	<input type="checkbox"/>	1	Hibiscus lasiocarpus var. occidentalis	woolly rose-mallow	Malvaceae	List 1B.2
	<input type="checkbox"/>	1	Lasthenia glabrata ssp. coulteri 	Coulter's goldfields	Asteraceae	List 1B.1
	<input type="checkbox"/>	1	Layia septentrionalis 	Colusa layia	Asteraceae	List 1B.2
	<input type="checkbox"/>	1	Navarretia leucocephala ssp. bakeri 	Baker's navarretia	Polemoniaceae	List 1B.1
	<input type="checkbox"/>	1	Silene verecunda ssp. verecunda 	San Francisco campion	Caryophyllaceae	List 1B.2
	<input type="checkbox"/>	1	Trichocoronis wrightii var. wrightii	Wright's trichocoronis	Asteraceae	List 2.1
	<input type="checkbox"/>	1	Wolffia brasiliensis	Brazilian watermeal	Lemnaceae	List 2.3

To save selected records for later study, click the ADD button.

Selections will appear in a new window.

No more hits.

powered by 

Appendix B

Photos

This page intentionally left blank.



Photo 1. Riparian vegetation at Meridian Diversion, facing south, November 7, 2011.



Photo 2. Riparian vegetation at Drexler Diversion, facing northeast, November 7, 2011.



Photo 3. Main Canal near Meridian Diversion, facing east, November 7, 2011.



Photo 4. Main Canal north of Highway 20, facing north, November 7, 2011. Canal is lined in this area, but there are some areas of cracking and missing concrete.



Photo 5. Main Canal south of Highway 20, facing northwest, November 7, 2011. Canal is lined in this area, but there are some areas of cracking and missing concrete.



Photo 6. Southern Terminus of Main Canal near Proposed Drexler Re-Lift Pumping Plant, facing north, November 7, 2011.



Photo 7. Reclamation District 70 Canal near Proposed Drexler Re-Lift Pumping Plant, facing north, November 7, 2011. Main Canal is across road on left side (not visible).



Photo 8. Proposed Drexler Re-Lift Pumping Plant, facing north, November 7, 2011. Main Canal is across road on right side of photo.

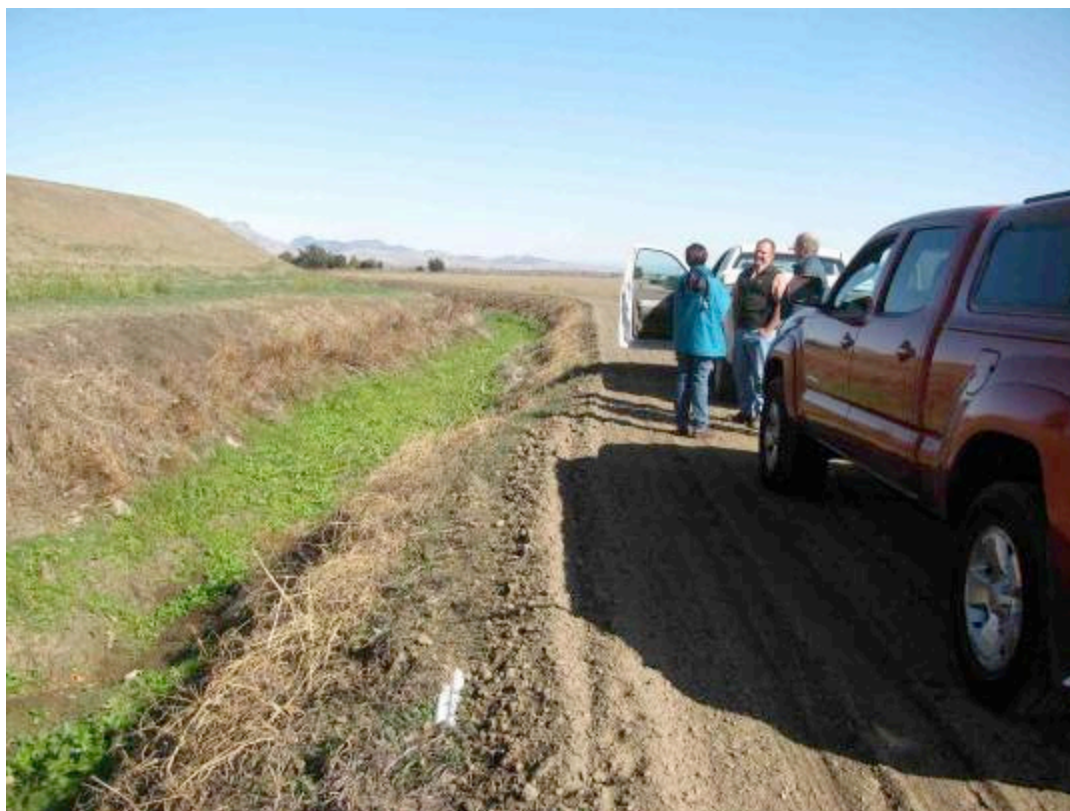


Photo 9. Grimes Canal, facing north, November 7, 2011.

Appendix C
Fish Rescue Plan

This page intentionally left blank.

PHASE 2 MERIDIAN FARMS FISH SCREEN PROJECT

Fish Rescue Plan

Prepared for:

August 2012

U.S. Bureau of Reclamation

California Department of Fish and Game

Introduction

Meridian Farms Water Company (MFWC) is located in Sutter County, between Interstate 5 and Highway 99, east of the Sacramento River and southwest of the Sutter Bypass. MFWC provides irrigation water to three distinct Service Areas encompassing approximately 9,150 acres, with an estimated annual water delivery of 35,000 acre-feet (af). MFWC diverts surface water from the Sacramento River under the provisions of a License for Diversion and Use of Water with a priority date of September 10, 1918. Presently MFWC has two unscreened diversions on the Sacramento River at Meridian and Drexler.

The primary purpose of the Meridian Farms Water Company (MFWC) Phase 2 Fish Screen Project is to prevent entrainment of migrating, at-risk, native fish species at MFWC's existing diversion facilities by replacing unscreened intakes on the Sacramento River with screened diversions. MFWC will construct new positive barrier fish screen diversions that meet CDFG and NOAA Fisheries fish screen design criteria. Positive barrier fish screens will physically prevent fish from passing through the intake; these differ from behavioral barrier fish screens which encourage fish to swim away from a structure. MFWC Phase 2 work components that would occur in the Sacramento River are construction of a new Meridian Diversion/Pumping Plant, removal of the existing Meridian Diversion/Pumping Plant, and removal of the existing Drexler Diversion/Pumping Plant.

In order to complete construction of the new diversion/pumping plant and remove the existing diversions/pumping plants, sheet pile cofferdam enclosures must be installed to create access to the work site in the Sacramento River. Fish inhabiting the work areas on the Sacramento River could potentially become trapped by construction of the cofferdam. To reduce harm, harassment and mortality of fish entrapped in the cofferdam area, the following Fish Rescue Plan will be implemented.

This Fish Rescue Plan has been developed in part, based on the informal recommendations of the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the California Department of Fish and Game (CDFG). This plan has also been developed based on the guidelines that have been approved for other intake projects, including the plan approved and used in construction of the Patterson Irrigation District Fish Screen Intake Project and the Victoria Canal Alternative Intake Project constructed by ProVen Management, Inc.

A fish rescue will be needed at the time the cofferdam is initially installed, and additionally if the cofferdam is flooded during construction and a fish rescue is determined to be feasible. All fish species that become entrapped in the cofferdam will be rescued and returned to the Sacramento River; however the primary focus of this effort is protection of special status species, specifically the following federally-listed species potentially inhabiting the project site on the Sacramento River:

- Sacramento River winter-run Chinook (federally-listed as endangered)
- Central Valley spring-run Chinook (federally-listed as threatened)

- Central Valley Steelhead (federally-listed as threatened)
- North American Green Sturgeon (federally-listed as threatened)

Fish rescue and relocation will be performed under the supervision of a qualified fishery biologist. NMFS and the CDFG shall be notified at minimum 48 hours prior to execution of fish seining. Upon completion of fish seining, the supervising fishery biologist will prepare a written report summarizing the results and documenting any rescue, relocation, and mortality that may have occurred. This report will be made available for submission to NMFS, CDFG, and USFWS.

Methods

Fish seining will be implemented following completion of the cofferdam, prior to removal of water. During cofferdam installation at least one pair of sheet piles will be left in the open position, allowing fish to exit the enclosure. The location of the open pair of sheet piles will be selected to allow maximum structural integrity of the cofferdam. With the pair of sheet piles in the open position, the area within the cofferdam enclosure will be swept using a beach seine and/or dip nets to catch and relocate or herd any fish out the opening in the cofferdam. This will be repeated several times as need and to the satisfaction of the supervising fishery biologist. The cofferdam will be closed once the supervising fishery biologist has determined that all fish are likely to have been removed. Electrofishing methods will not be allowed.

Upon closure of the cofferdam, pumps will be installed to remove impounded water from within the enclosure. Pumps used to remove impounded water will be outfitted with a mesh screen and water will be drawn down at a slow enough rate to prevent fish impingement. When the water level is drawn down to a depth of approximately two feet, a final check of the impounded area will be performed. Should any fish remain, they will be collected using nets and returned to the Sacramento River. As a final check, the area sweep will be repeated with nets until three consecutive runs yield no additional fish. At this time the fish seining operation will be complete.

Fish will be collected and placed immediately into aerated vessels of river water for holding prior to release in order to minimize handling and reduce stress. Species and life stage of all fish collected during seining will be documented prior to release. Once documented, fish will be immediately transported to a location between 200 feet and 600 feet downstream of the cofferdam and released back into the Sacramento River. Fish will be released intermittently and at random locations to prevent habituation of predatory fish. Damage or mortality of fish as a result of the seining operation will be noted and included in the supervising fishery biologist summary report.

Measures including the aeration of holding vessels, minimization of holding time, and addition of bacteria reducing chemicals will be implemented in order to reduce the stress on collected fish. All fish collected in the seining operation will be handled in accordance with local and federal law, including the Federal Endangered Species Act. Standard protocol for

fish rescue and relocation stipulates that no fish (dead or alive) is to be removed for personal use. All efforts will be made to minimize the amount of time collected fish spend out of the river. Use of anesthetics may occur during the handling of federally-listed species in order to minimize injury or possible mortality.

Handling of Dead Fish

Despite all precaution outlined in this plan, potential for fish mortality still exists. If a federally-listed fish suffers mortality, the individual shall be labeled and preserved or frozen for identification. Information regarding water temperature, location, method of take, and any other information deemed relevant will be collected and recorded. Any specimens collected will be held for pick-up by the local NMFS office in Sacramento, along with additional relevant information, including color photographs, a description of the cause of death, and the name and affiliation of the person who collected the specimen.

Reporting

After completion of fish seining operations, the supervising fishery biologist shall complete a summary report documenting the methods used, the personnel conducting the operation, the numbers of each fish species collected and relocated, an estimate of the survival of fish released, and summary information regarding any fish mortalities. This report shall be accompanied by color photographs of the seining operation and site. The report shall be made available within 30 days for distribution to interested agencies, including CDFG, NMFS, USFWS and the AFSP Program Managers.