MERCED IRRIGATION DISTRICT
WATER & POWER

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Draft Initial Study/Proposed Mitigated Negative Declaration

Merced Irrigation District's Merced River Instream and Off-Channel Habitat Rehabilitation Project

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Prepared For: Merced Irrigation District

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List of Acronyms

AFRP	Anadromous Fish Restoration Program
BACI	before-after-control-impact
BMPs	Best Management Practices
CalEEMod	California Emissions Estimator Model
CDC	California Department of Conservation
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CV	Central Valley
CCV	California Central Valley
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CFS	Cramer Fish Sciences
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	United States Army Corps of Engineers
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control
CWA	Clean Water Act
dbh	diameter at breast height
DO	dissolved oxygen
DOI	Department of the Interior
DPS	distinct population segment
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EA	Environmental Assessment
ECs	Environmental Commitments
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERPP	Ecosystem Restoration Program Plan
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FERC	Federal Energy Regulatory Commission
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
HAPC	Habitat Areas of Particular Concern
IS	Initial Study
ISRAP	Invasive Species Risk Assessment and Planning
MBTA	Migratory Bird Treaty Act
MRSHEP	Merced River Salmon Habitat Enhancement Project
MSA	Magnuson-Stevens Fishery Conservation and Management Act

NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrogen Oxides
NPDES	National Pollution Discharge Elimination System
NTU	Nephelometric turbidity unit(s)
OHWM	Ordinary High-Water Mark
PBF	Physical and Biological Features
ROG	reactive organic gases
SHIRA	Spawning Habitat Integrated Rehabilitation Approach
SHPO	State Historic Preservation Office
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO_x	sulfur oxides
SWPPP	Stormwater Pollution Prevention Plan
TGBA	Turlock Groundwater Basin Association
tpy	tons per year
USC	United States Code
USFWS	United States Fish and Wildlife Service
VELB	Valley Elderberry Longhorn Beetle
WSE	Water Surface Elevation

1 Project Information

1.1 Project Title

Merced Irrigation District's Merced River Instream and Off-Channel Habitat Rehabilitation Project

1.2 Lead Agency name and Address

Merced Irrigation District
744 W. 20th Street
Merced, CA 95340

1.3 Contact Person and Phone Number

Bryan Kelly, PE
Deputy General Manager, Water Resources
(209) 354-2810

1.4 Project Location

The proposed project site is on undeveloped property on the lower Merced River, about 12 miles north north-east of the City of Merced, and accessible via Merced Falls Road, at latitude 37°31'4.98" N, longitude -120°22'48.66" W. The survey area occurs within Section 12, Township 5 South, and Range 14 East, Mount Diablo Baseline and Meridian in the "Snelling, CA" U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (quad). The project site is at river mile (RM) 51, approximately 0.3 river miles downstream of Crocker-Huffman Diversion Dam (RM 51.3). See **Figure 1**, Project Location.

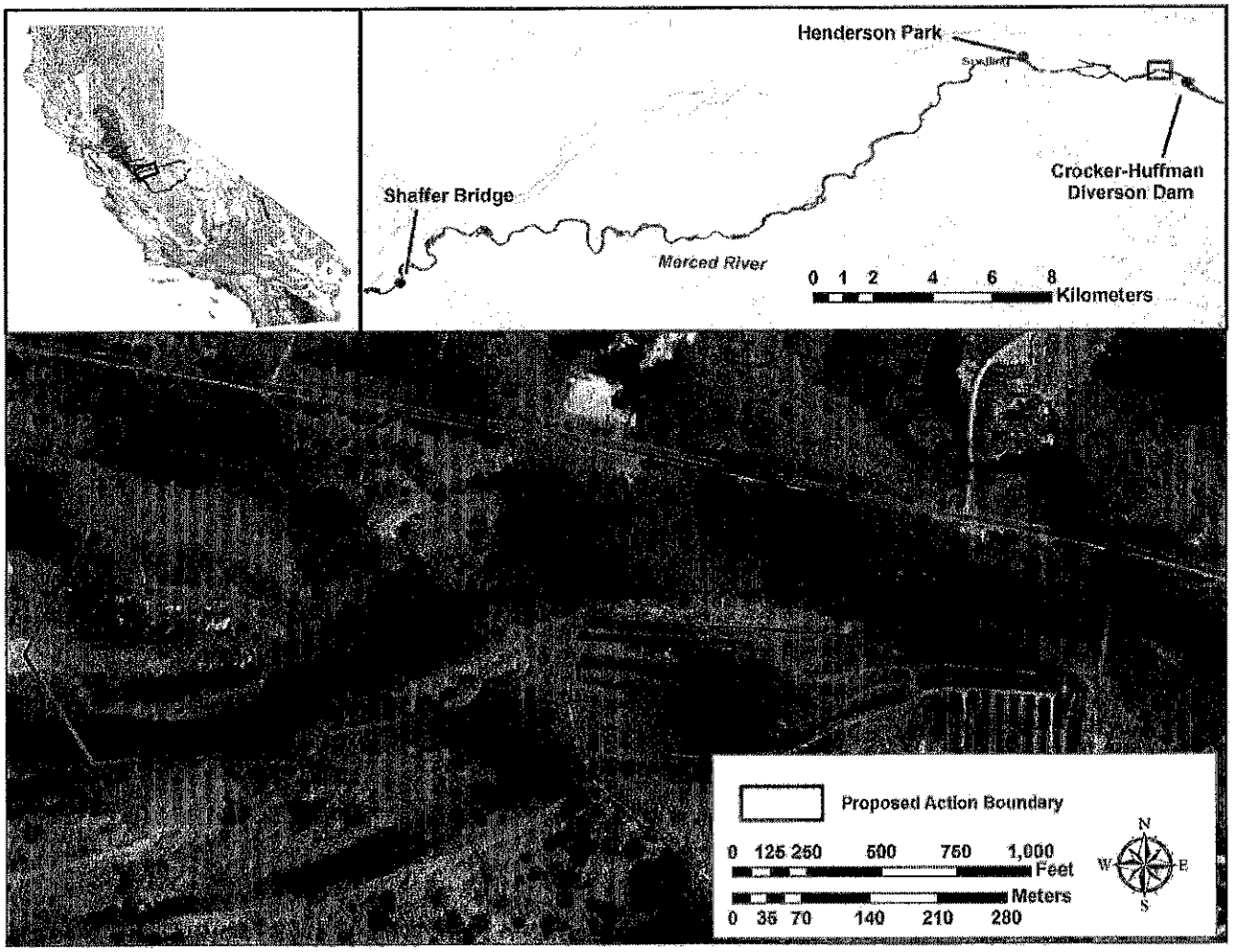

Figure 1. Project location

1.5 General Plan Designation

Agricultural

1.6 Zoning

General Agricultural, Residential

1.7 Description of Project

See Section 2, Project Description.

1.8 Surrounding Land Use and Setting

The Merced River is a tributary to the San Joaquin River in California.

The project site is located on undeveloped property on the lower Merced River (**Figure 1**). The site is accessible via Merced Falls Road. An estimated 26.7 acres of riparian and upland habitat and 12 acres of river channel are available for rehabilitation and enhancement. Currently, the site consists of an oversized river channel in the context of the existing regulated flow regime. The

channel is constrained by dredger tailings along both banks that disconnect historic floodplains from the main channel.

1.9 Other Public Agencies Whose Approval is Required (for example, permits, financing approval, or participation agreement)

Merced ID has consulted with the following regarding the Project:

- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers (Corps)
- National Marine Fisheries Service
- State Historic Preservation Office

Merced ID is also coordinating the Project with the State Water Resources Control Board, the State Lands Commission, the California Department of Fish and Wildlife, and the Central Valley Flood Protection Board.

1.9.1 Federal Permits

National Environmental Policy Act

An Environmental Assessment (EA) was prepared pursuant to regulations implementing the National Environmental Policy Act (NEPA) (42 USC 4321 et seq.). NEPA provides a commitment that Federal agencies would consider environmental effects of their actions. The EA provides information regarding the No-Action Alternative, the Project, and their environmental impacts. If, after certain key permits are obtained and the final EA is released, the Project is found to have no significant environmental effects, a Finding of No Significant Impact (FONSI) will be filed.

Clean Water Act (33 U.S.C. § 1251 et seq.)

Section 401 of the Clean Water Act (33 U.S.C. § 1341) requires any applicant for an individual Corps dredge and fill discharge permit (see Section 404, below) to first obtain certification from the state that the activity associated with dredging or filling will comply with applicable state effluent and water quality standards. This certification must be approved or waived prior to the issuance of a permit for dredging and filling.

The State Water Quality Control Board, through the Central Valley Regional Water Quality Control Board, is responsible for issuing water quality certifications, or waivers thereof, pursuant to Section 401 of the Clean Water Act.
A Section 401 Water Quality Certification will be obtained for the Project prior to implementation.

Section 402 of the Clean Water Act (33 U.S.C. § 1341) establishes the NPDS to regulate point source discharges of pollutants into waters of the United States. A NPDES permit sets specific discharge limits for point sources discharging pollutants into waters of the United States and establishes monitoring and reporting requirements, as well as special conditions.

A SWPPP has been drafted and a NPDES permit shall be obtained for the Project prior to implementation.

Section 404 of the Clean Water Act (33 U.S.C. § 1344) authorizes the Corps to issue permits to regulate the discharge of "dredged or fill materials into waters of the United States". An application for a Letter of Permission for the restoration of wetland and riverine habitats has been submitted to the Corps for the Project.

Endangered Species Act (16 U.S.C. § 1531 et seq.)
Section 7 of the Endangered Species Act (ESA) requires Federal agencies, in consultation with the Secretary of the Interior and/or Commerce, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species.

In addition to Section 7 requirements, Section 9 of the ESA prohibits the taking of endangered species of fish and wildlife. Take is broadly defined as those activities that "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect [a protected species], or attempt to engage in any such conduct." An activity can be in violation of take prohibitions even if the activity is unintentional or accidental. Significant modification or degradation of occupied habitat for listed species, or activities that prevent or significantly impair essential behavioral patterns, including breeding, feeding, or sheltering, are also considered "take" under the ESA. Section 10 provides exceptions to section 9 take prohibitions. The United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) can issue permits to take listed species for scientific purposes, or to enhance the propagation or survival of a listed species. The USFWS and NMFS can also issue permits to take listed species incidental to otherwise legal activity. The Secretary of Commerce, acting through NMFS, is involved with projects that may affect marine or anadromous fish species listed under the ESA. All other species listed under the ESA are under USFWS jurisdiction.

Biological assessments have been developed for the Project for USFWS and NMFS to determine impacts to special status species. A Concurrence Letter has been obtained from USFWS and a Biological Opinion shall be obtained from NMFS prior to implementation of the Project.

Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.)
The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the United States and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Unless permitted by regulations, the Act provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Subject to limitations in the Act, the Secretary of the Interior may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing, possessing, selling, purchasing, shipping, transporting or exporting of any migratory bird, part, nest or egg will be allowed, having regard for temperature zones, distribution, abundance, economic value, breeding habits and migratory flight patterns.

The Project will comply with the Migratory Bird Treaty Act. Migratory birds will be protected by implementation of specific EC's, including pre-construction surveys and impact avoidance measures that are part of the Project.

Executive Order 11312 – Invasive Species

Executive Order 11312 directs all Federal agencies to prevent and control introduction of invasive nonnative species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. Executive Order 11312 established a National Invasive Species Council made up of Federal agencies and departments and a supporting Invasive Species Advisory Committee composed of State, local, and private entities. The National Invasive Species Council and the Invasive Species Advisory Committee oversee and facilitate implementation of the executive order, including preparation of a National Invasive Species Management Plan.

A National Invasive Species Management Plan shall be developed prior to Project implementation.

Executive Order 11990 – Protection of Wetlands

Executive Order 11990 requires Federal agencies to follow avoidance, mitigation, and preservation procedures with public input before proposing new construction in wetlands.

The IS has identified that the rehabilitation actions would not result in the net loss of any wetlands. Implementation of the Project could enhance wetlands or increase their area, and is in compliance with Executive Order 11990. The Initial Study for the Project, including the wetland delineation report, shall be available for public review during the California Environmental Quality Act (CEQA) review process.

Executive Order 11988 – Floodplain Management

Executive Order 11988 requires that all Federal agencies take action to reduce the risk of flood loss, to rehabilitate and preserve the natural and beneficial values served by floodplains, and to minimize the impact of floods on human safety, health, and welfare.

The Project Area is within the 100-year floodplain. The Project supports the preservation and enhancement of the natural and beneficial values of floodplains and is in compliance with Executive Order 11988.

Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.)

The Fish and Wildlife Coordination Act requires that the federal Lead Agency consult with fish and wildlife agencies (federal and state) on all water development projects that could affect biological resources. The amendments enacted in 1946 require consultation with the Service and State fish and wildlife agencies "whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency under Federal permit or license". Consultation is to be undertaken for the purpose of "preventing the loss of and damage to wildlife resources".

Formal consultation with USFWS and NMFS has been initiated for this project to ensure that the Project complies with the Fish and Wildlife Coordination Act.

Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.)

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the primary law governing marine fisheries management in United States federal waters. The Act was first enacted in 1976 and amended in 1996. Pacific coast salmon species are subject to the MSA. Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or Projects that may adversely affect essential fish habitat (EFH). The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity". Adverse effects means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of or injury to benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH wide impacts, including individual, cumulative, or synergistic consequences of actions (50 Code of Federal Regulations (CFR) 600.810).

Formal consultation with NMFS included the preparation of an Essential Fish Habitat Assessment, and compliance with the Magnuson-Stevens Fishery Conservation and Management Act will be accomplished through the Section 7 NMFS Biological Opinion for the Project.

National Historic Preservation Act (Title 54 USC § 306108)

The National Historic Preservation Act of 1966, as amended (Title 54 USC § 306108), requires that federal agencies give the Advisory Council on Historic Preservation an opportunity to comment on the effects of an undertaking on historic properties, properties that are eligible for inclusion in the National Register. The 36 CFR Part 800 regulations implement Section 106 of the National Historic Preservation Act.

Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of federal undertakings on historic properties, properties determined eligible for inclusion in the National Register. Compliance with Section 106 follows a series of steps that are designed to identify interested parties, determine the area of potential effects, conduct cultural resource inventories, determine if historic properties are present within the area of potential effects, and assess effects on any identified historic properties.

A cultural resource assessment has been developed for the Project (Appendix A) and the State Historic Preservation Office has issued a letter of concurrence.

Rivers and Harbors Act of 1899 (33 U.S.C. § 403), as Amended

Under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), the Corps regulates work in, over, or under, excavation of material from, or deposition of material into, navigable waters. Navigable waters of the United States are defined as those waters subject to the ebb and flow of the tide shoreward to the mean high-water mark, and those that are currently used, have been used in the past, or may be susceptible to use, to transport interstate or foreign commerce.

A wetland delineation report has been developed for the Project. An application for a Letter of Permission for the restoration of wetland and riverine habitats has been submitted to the Corps for the Project.

Indian Trust Assets, Indian Sacred Sites on Federal Land-Executive Order 13007, and American Indian Religious Freedom Act of 1978

These laws are designed to protect Indian Trust Assets, accommodate access and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites, and protect and preserve the observance of traditional Native American religions, respectively. The Project and its associated EC's would not violate these protections.

1.9.2 State Permits

California Endangered Species Act, California Fish and Game Code 2081 and 2090

The California Endangered Species Act (CESA) allows CDFW the ability to authorize, by means of an incidental take permit, incidental take of state-listed threatened, endangered or candidate species if certain conditions are met. However, no CESA listed species have the potential to be affected by the Project therefore, a CESA incidental take permit is not required for the Project.

Fish and Game Code Section 1600 et. seq., Streambed Alteration Agreement

California Department of Fish and Wildlife has regulatory authority with regard to activities occurring in streams and/or lakes that could adversely affect any fish or wildlife resource, pursuant to Fish and Game Code Section 1600 et seq. Authorization is required for Projects prior to any activities that could substantially divert, obstruct, result in deposition of any debris or waste, or change the natural flow of the river, stream, or lake, or use material from a stream or lake.

Central Valley Flood Protection Board Encroachment Permit

The Flood Protection Board issues permits to maintain the integrity and safety of flood control project levees and floodways that were constructed according to flood control plans adopted by the Board of the State Legislature.

State Lands Commission Land Use Lease

The State Lands Commission has jurisdiction and management control over those public lands received by the state upon its admission to the United States in 1850 that generally include all ungranted tidelands and submerged lands and beds of navigable rivers, streams, lakes, bays estuaries, inlets, and straits.

San Joaquin Valley Air Pollution Control District

The San Joaquin Valley Air Pollution Control District requires that all portable equipment registrations are obtained for all equipment. Portable equipment used for the Project would be registered by the contractor.

2 Project Description

2.1 Project Background

The goal of Merced Irrigation District (Merced ID)'s Merced River proposed Instream and Off-Channel Channel Habitat Rehabilitation Project (Project) is to improve salmonid spawning and rearing habitat, particularly during drought conditions. The purpose of this Initial Study (IS) is to address specific impacts that may result from implementing the Project. This document relies on various regional studies and published reports that address in detail the effects or impacts associated with the Project. The Project is consistent with the larger programmatic view on environmental management and rehabilitation shared by several state and federal resource agencies.

Projects in the Merced River corridor have also been evaluated in the Ecosystem Restoration Program Plan (ERPP) in the CALFED Bay-Delta Program (CALFED 2000). The ERPP vision for the Merced River includes, among other things, maintaining suitable water temperatures, coarse sediment recruitment with gravel augmentation, stream channel and riparian habitat, and ecological functions and processes to improve habitat for salmonids. In the Merced River Corridor Restoration Plan, actions were recommended for defined reaches of the Merced River from Crocker-Huffman Diversion Dam downstream to the confluence with the San Joaquin River (Stillwater Sciences 2002). Recommendations for the Dredger Tailings Reach, where the Project would occur, included increasing the coarse sediment supply and removing tailings from floodplains adjacent to the river to an elevation that creates functional floodplains under the current flow regime (Stillwater Sciences 2002). In addition, recommendations of the San Joaquin River Management Plan (1995) suggest improving gravel quality to increase survival of salmonid eggs and enhance the channel and riparian corridor of the tributaries to the San Joaquin River, including the Merced River. The USFWS (1995) Working Paper on salmonid restoration in the Central Valley identified the need to restore and protect instream and riparian habitat in the Merced River to ensure the long-term sustainability of physical, chemical, and biological conditions needed to meet production goals for Chinook Salmon. The Merced River is listed as a high priority watershed in the Anadromous Fish Restoration Program (AFRP) Final Restoration Plan (USFWS 2001), and collaboration among landowners, Merced County, California Department of Fish and Wildlife (CDFW)[1], United States Fish and Wildlife Service (USFWS), and Reclamation for actions that improve watershed management to rehabilitate and protect instream and riparian habitat, including enhancing and replenishing spawning gravel, is one of the high priority restoration actions. In the Central Valley Salmonid Recovery Plan, NMFS (2014) recommends identifying and implementing floodplain and side channel rehabilitation to improve river function and increase habitat diversity as a high priority action in the Merced River. Objectives of the Project are aligned with the following AFRP goals: 1) improve habitat for all anadromous life stages through improved physical habitat; and, 2) collect fish population, health, and habitat data to facilitate evaluation of restoration actions (USFWS 2001).

This IS has been prepared to identify the environmental resources in the Project Area, analyze the effects to the environment of the Project and a No Action Alternative, and propose

[1] Formerly known as the California Department of Fish and Game (CDFG)

Environmental Commitments (ECs) to reduce any effects to less than significant levels. Central Valley Project Improvement Act.

There are a series of documents regarding the Merced River that rely on analyses conducted and recommended in the broader programmatic review (CALFED 2000), which are used to guide specific projects. The AFRP is a component of a broader program, the Central Valley Project Improvement Act (CVPIA), which supports provisions for fish and wildlife habitat restoration. The CVPIA program prepared a programmatic environmental impact statement (Reclamation 1999) and Record of Decision (ROD) (Reclamation 2001) in accordance with the National Environmental Policy Act (NEPA). A programmatic environmental document is frequently used to evaluate new programs, analyze a series of actions that are part of a larger action, or consider broad policy alternatives and programmatic mitigation measures. This document was prepared to address details and site-specific factors of the habitat rehabilitation actions in the Merced River. This IS for the Project is consistent with the CALFED and CVPIA programs, and adopts appropriate provisions of the CVPIA's ROD. This IS has been prepared to assess the impacts of the Project components as required by the State CEQA Guidelines.

2.1.1 Anadromous Fish Restoration Program (AFRP)

The CVPIA authorizes and directs the Secretary of Department of Interior (DOI), in consultation with other state and federal agencies, Native American tribes, and affected stakeholders to develop and implement a program which makes reasonable efforts to at least double natural production of anadromous fish in California Central Valley rivers and streams. Anadromous fish include Chinook Salmon, steelhead (*Oncorhynchus mykiss*), White Sturgeon (*Acipenser transmontanus*), and Green Sturgeon (*Acipenser medirostris)*. Fall-run Chinook Salmon is the primary management focus in the Merced River because of its value as a sport and commercial fishery. Further, the CVPIA requires that this program give first priority to measures that protect and restore natural channel and riparian habitat values through habitat restoration actions, modifications to Central Valley Project operations, and implementation of the supporting measures mandated by the CVPIA. The DOI approached implementation of this directive by creating the AFRP, with the USFWS assuming lead responsibility. The AFRP encourages local citizens and groups to share or take the lead in implementing restoration actions. This approach is consistent with California's Coordinated Regional Strategy to Conserve Biological Diversity (Available: http://biodiversity.ca.gov/), in which 26 state and federal agencies emphasize regional solutions to regional problems. The successful implementation of the Project would contribute to salmonid recovery goals of the Merced River.

2.1.2 Previous Environmental documentation

Salmonid rearing habitat and spawning gravel improvements for the lower Merced River have been identified as priority actions in USFWS's Working Paper (USFWS 1995) and the AFRP Final Restoration Plan (USFWS 2001); in the California Department of Water Resources' (DWR) comprehensive assessment for Chinook Salmon (DWR 1994); in several California Department of Fish and Game (CDFG) publications (CDFG 1990, 1993, 1996); and in NMFS' Central Valley Salmonid Recovery Plan (NMFS 2014) as part of the effort to improve rearing and spawning habitat for fall-run Chinook Salmon in the Merced River. In addition, the following environmental documents have addressed the issues being considered for the Project:

- **CVPIA and AFRP.** In Section 3406(b)t, the Secretary of the Interior is required to develop and implement a program that makes reasonable efforts to double natural production of anadromous fish in Central Valley rivers and streams by 2002. In response to this directive, USFWS prepared a draft plan for the AFRP and identified anadromous fish habitat deficiencies in each tributary within the Central Valley (USFWS 2001). The Merced River system was identified as High Priority with the need to "improve watershed management to restore and protect instream and riparian habitat, including consideration of restoring and replenishing spawning gravel" (USFWS 2001).
- **NMFS.** In the Central Valley Salmonid Recovery Plan, NMFS (2014) recommends as high priority recovery actions in the Merced River; 1) identify and implement floodplain and side channel rehabilitation to improve river function and increase habitat diversity; and 2) develop and implement a long-term gravel management plan to improve spawning habitat downstream of Crocker-Huffman Diversion Dam.
- **CALFED Bay-Delta Program.** This cooperative state and federal effort was established to reduce conflicts in the Delta by solving problems in ecosystem and water quality, water supply reliability, and levee and channel integrity. The goal of CALFED's ERPP is to improve and increase aquatic and terrestrial habitats and improve ecosystem functions in the Delta to support sustainable populations of diverse and valuable plant and animal species (CALFED 2000). The ERPP vision for the Merced River includes, among other things: (1) maintaining suitable water temperatures, (2) restoring coarse sediment recruitment, (3) restoring stream channel and riparian habitat and ecological functions and processes to improve habitat for fall-run Chinook Salmon, late-fall run Chinook Salmon, riparian vegetation, and wildlife resources, and (4) restoring more natural channel configuration to enhance gravel recruitment, transport, and cleansing processes.
- **CDFW.** Habitat rehabilitation is recommended in the Merced River as a fisheries management strategy in several reports, including Salmon and Steelhead Restoration and Enhancement Plan (1990), Restoring Central Valley Streams - A Plan for Action (1993), and Steelhead Restoration and Management Plan (1996), and Strategic Plan for Trout Management (2003).
- **Federal Energy Regulatory Commission (FERC).** At present, there are two Federal Energy Regulatory Commission (FERC licenses for hydroelectric projects on the Merced River, both owned and operated by Merced ID. The Merced River Hydroelectric Project, FERC Project No. 2179-043, is comprised of the New Exchequer and McSwain developments. The Merced Falls Project, FERC Project No. 2467-020, is a run of the river project located directly below and contiguous to the Merced River Hydroelectric Project. These hydroelectric projects are currently undergoing FERC relicensing.

2.1.3 Previous Salmonid Habitat Improvement Efforts

On the lower Merced River, a series of salmonid habitat improvement efforts have been completed. In 1990, the Department of Water Resources (DWR) and CDFG placed spawning gravel and boulders in a highly degraded section of the Merced River adjacent to the fish hatchery. Since this project was initiated, this reach has received varying amounts of gravel in 1996, 1997, 2000, 2003, 2006, 2011, and 2012. More recent gravel placements have been organized by the Merced Flyfishing Club, who worked with CDFG, Merced County Supervisors,

and Merced ID to purchase and place gravels in the lower Merced River adjacent to the Merced River Fish Hatchery.

The Merced River Salmon Habitat Enhancement Project (MRSHEP) included two enhancement projects. For the MRSHEP Ratzlaff project, CALFED provided about $1.6 million in 1999 to partially fill and isolate the Ratzlaff gravel pit. Approximately $2 million more was provided to this project from a fund designed to mitigate post-1986 increased fish kills at the Sacramento Delta water diversion pumps, and an additional $250,000 was contributed from AFRP, making the total cost around $4 million to isolate this pit. The MRSHEP Robinson Reach project received $4.13 million from CALFED to isolate a gravel pit and reconstruct the channel and floodplain of a 2.7 km section of shallow, braided channel into a meandering, single-thread channel with alternating riffles and pools.

The Merced River Ranch Salmonid Habitat Restoration Project was completed in 2013 by Cramer Fish Sciences, with funding from the USFWS AFRP and CDFW. This enhancement project created approximately 6 acres of seasonally inundated floodplains and side channels and 5.5 acres of instream salmonid spawning and rearing habitat. The Henderson Park Salmonid Habitat Restoration Project was completed in 2015 by Cramer Fish Sciences with funding by the USFWS AFRP. The Henderson Park project rehabilitated approximately 15 acres of seasonally inundated floodplain habitat and 7.8 acres of instream salmonid spawning and rearing habitat.

2.2 Project Summary

The overall objective of the Project is to enhance habitat for native fish species particularly during drought conditions, emphasizing spawning and rearing habitat for Central Valley (CV) fall-run Chinook Salmon. The Project aims to protect and improve riverine habitat, including benefits to fish, wildlife, vegetation, and water quality. The Project includes several components and incorporates multiple strategies including long-term habitat enhancement for CV fall-run Chinook Salmon populations in the Merced River, including augmenting appropriate spawning substrate as well as recovering side channel and floodplain habitats that support juvenile salmonid growth and survival. Enhancement actions implemented pursuant to Section 3406(b) of the CVPIA include a plan to assess the effectiveness of each action. The specific goals and objectives of the Project are to:

- Augment, rehabilitate, and enhance productive lower Merced River juvenile salmonid rearing habitat and adult spawning habitat that is resilient to drought conditions.
- Enhance juvenile salmonid access to historic floodplain habitat.
- Reduce main channel habitats potentially conducive to invasive fish species.
- Create additional flooding capacity, improving flood management in wet years.
- Address goals of existing recovery plans and work synergistically with existing habitat enhancement efforts.

In particular, spawning habitat was designed to function during base flows observed in past dry and critically dry water years for the Merced River. Similarly, seasonal rearing habitat was designed to function during critically low flows during the typical salmonid rearing period. Finally, main channel habitat is designed to reduce holding areas for invasive fish predators that may be especially detrimental to juvenile salmonid survival during critically low flow periods.

Additional information regarding the design process for this project can be found in the Basis of Design Report (Appendix B).

Off-channel habitats, which are lacking in the Merced River, are important for rearing juvenile salmonids. Juvenile fall-run Chinook Salmon emerge in early to mid-winter and are immediately susceptible to the influence of flow (Allen and Hassler 1986; Moyle et al. 2007). When present, side channel and floodplain habitats dissipate flow, providing refugia for these newly emerged fish (Swales and Levings 1989). Juvenile salmonids may migrate into off-channel habitats to exploit food resources, seek optimal temperatures, and escape unfavorable environmental conditions in the main channel such as predators and high velocities and turbidity (Swales and Levings 1989). Components of high quality juvenile salmonid rearing habitat typically include appropriate water temperatures, suitable dissolved oxygen concentrations, decreased water velocity, overhanging vegetation and suitable substrate for cover and macroinvertebrate prey production, and in-water natural wood structure.

2.2.1 Project Operation and Maintenance

The Project construction will take place in the Merced River approximately 1,500 feet below Crocker-Huffman Diversion Dam over a one to two year period. Following construction, post-project monitoring activities will take place to ensure that the site was built to design standards. After construction and revegetation are complete (see Section 2.2.2 below), the site is not expected to require ongoing maintenance.

2.2.2 Project Construction

The Project will re-grade and enhance over 7 acres of riparian and upland habitat, 1.7 acres of salmonid spawning habitat, 3.9 acres of seasonally inundated juvenile rearing habitat, and approximately 13 acres of the Merced River channel within the Project boundary (**Figure 2**).

Approximately 65,000 yd^3 (~49,696 m^3) of material will be excavated and sorted from dredger tailing piles including floodplain re-contouring and side channel creation. Pre-project sediment surveys within the Project boundary determined that the dredger tailings piles adjacent to the river channel contained large quantities of gravel and cobble that could be obtained by sorting the excavated material (Cramer Fish Sciences (CFS) unpublished data). The sorted gravel and cobble could then be used for river channel enhancement, including salmonid spawning gravel augmentation.

Table 1. Estimated area and channel length of habitats and excavation and fill volumes associated with the Project on the Merced River.

Habitat type	Excavation volume (yd^3)	Fill volume (yd^3)	Area (acres)	Channel length (ft)
Main Channel Habitat Features	---	38,500	7.8	2,400
Tailings Piles, Floodplains, and Side Channels	65,000	---	7.8 acres (3.4 acres side channels and floodplains)	2,030 (side channels and floodplains)
Upland	---	26,500		
TOTAL	**65,000**	**65,000**	**15.6**	**4,430**

Approximately 38,500 yd^3 (~29,435 m^3) of native gravel and cobble obtained by excavating and sorting dredger tailings adjacent to the river channel will be used to enhance the channel morphology within the Project boundary, including creating or enhancing gravel bars and salmonid spawning riffles. The river rock will be placed in select areas in the main channel to enhance/create 1.7 acres of salmonid spawning habitat and increase water surface elevation to facilitate inundation of the floodplain and side channels created through removal of the dredger tailings piles (**Figure 2**). The enhanced/created spawning riffles will consist of 5 – 10 inch diameter (12.7 – 25.4 centimeter [cm]) cobbles used to build up base layer and stabilize the toe of spawning riffles and ¼ – 5 inch diameter (0.6 – 12.7 cm; per AFRP specifications) gravel that will be placed 2 – 3 ft (0.6 – 0.9 m) deep.

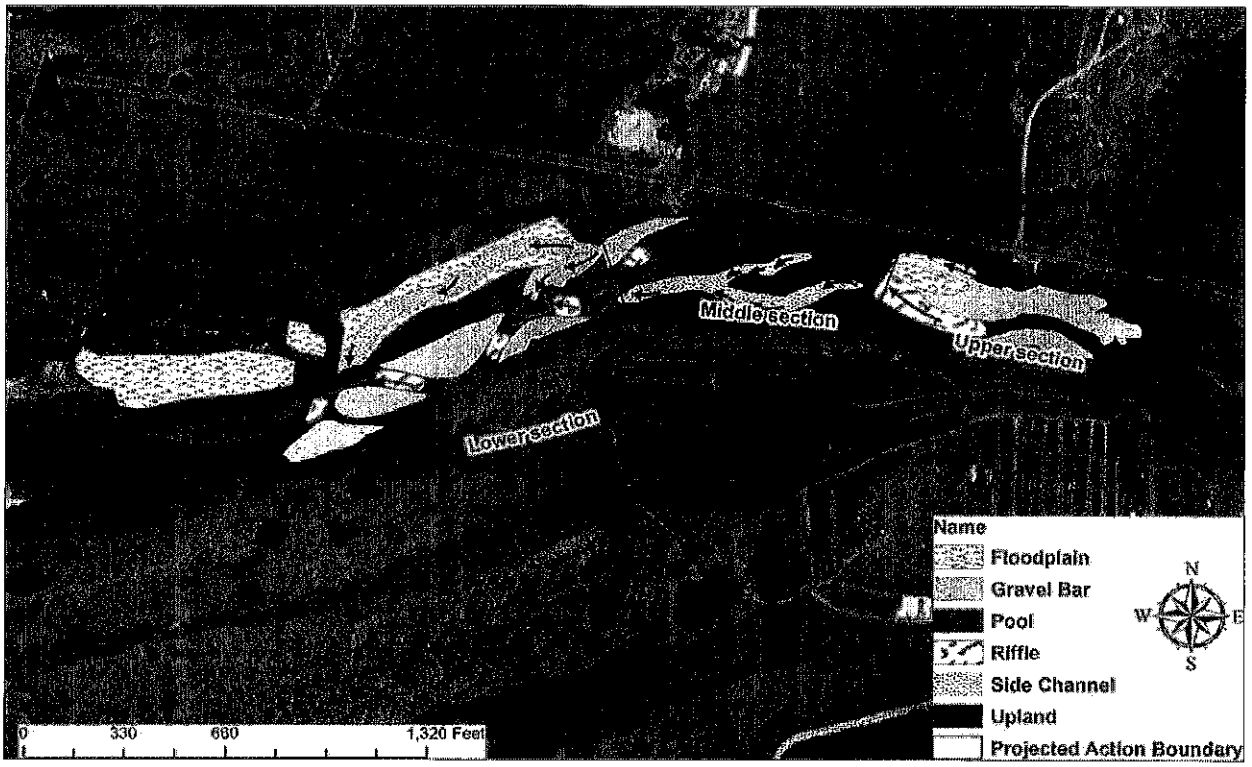

Figure 2. Project conceptual design with grading for side channels, floodplains, and gravel addition areas indicated (Source: ESA 2016).

The Project will require the operation of construction equipment (e.g., rubber-tired front-end loaders, excavators, and articulated haulers, etc.) in the Project boundary. Gravel and cobble will be deposited in-stream and placed by rubber-tired front-end loaders (Caterpillar 950 Loader). To minimize any potential negative effects on salmonids, in-stream gravel placement activities will occur during summer/early-fall (15 July to 15 October) when flows are low (approximately 200 cubic feet per second (cfs)) and active salmonid spawning is not occurring. Construction will occur over two seasons and will require approximately 16 weeks per season, with in-stream construction requiring approximately 10 to 20 days per season. Work will occur Monday – Friday from 7:00 am to 5:00 pm to ensure minimal disturbance to local landowners.

An approximate 4.9 acre perched floodplain area on the north side of the river will be re-graded by 1-10 ft (0.3 – 3.0 m) in elevation, allowing it to inundate at flows greater than 1,000 cfs. Side

channels, totaling 2.3 acres and 2,000 ft (610 m) will be created on the reclaimed floodplain (**Figure 2**). The floodplain and side channel excavation will require no in-channel work, as construction will occur when flows are lower than the features are designed to inundate.

The strategy for instream gravel replenishment is based on an understanding of the existing channel bed topography (CFS unpublished data) and is intended to re-create channel bedforms to enhance salmonid spawning. Gravel will be placed using designs from the Spawning Habitat Integrated Rehabilitation Approach (SHIRA) developed by the University of California at Davis (Wheaton et al. 2004 a, b; Pasternack 2008; Sawyer et al. 2009), and general rearing habitat components.

2.2.2.1 Staging

Staging areas will be located in upland areas, on existing gravel pullouts adjacent to Merced Falls Rd or in barren, flat cobble areas, as shown in **Figure 2.** The potential staging areas cover a total of 0.5 acres. Existing roads will be used as much as possible to access the staging and restoration activity areas. Short temporary access road(s) may need to be constructed to access locations for restoration activities from existing staging areas or gravel roads. The potential temporary access roads cover a total of 0.15 acres. All access and staging areas will be clearly marked with flagging, fencing, and/or signs. Prior to commencing restoration activities the contractor will determine all staging areas and access routes.

2.2.2.2 Revegetation

Native trees, such as Fremont Cottonwood (*Populus fremontii*), oak (*Quercus* spp.), and willow (*Salix* spp.) with a diameter at breast height (dbh) of at least 12 in (15.2 cm) will be protected with 30 ft (9.1 m), 10 ft (3 m) and 10 ft (3 m) buffers, respectively. To compensate for riparian shrub and tree removal during Project implementation, the plans will identify tree and shrub species that will be planted, how, where, and when they will be planted, and measures taken, with a goal of 70% survival of planted trees. If data indicates survival is less than 70%, reason for poor survival would be evaluated and addressed, and more native vegetation would be planted.

Trees removed during construction activities will be used within the created floodplains and side channels as large woody material habitat elements. The trees will be strategically placed in the floodplains and side channels to provide cover and habitat complexity for rearing juvenile salmonids. Juvenile salmonids use large woody material for cover (Shrivell 1990, Beechie et al. 2005, Nagayama et al. 2009). Juvenile salmonid abundance has been observed to be greater in reaches which contain large woody material than reaches without (Inoue and Nakano 1998, Miyakoshi et al. 2002, Roni and Quinn 2001, Nagayama et al. 2009).

After floodplain grading and gravel augmentation activities have been completed the disturbed areas will be revegetated with native riparian plants. Planting will occur in late November, the beginning of the winter storm season, to maximize survival rates. Exotic species present in the riparian area, including Himalayan Blackberry (*Rubus armeniacus*), Yellow Starthistle (*Centaurea solstitialis*) and Milk Thistle (*Silybum marianum*), will be eradicated where possible. A detailed monitoring program will document existing conditions, revegetation efforts, and the effectiveness of revegetation in terms of vigor and survival (CFS 2018).

2.2.2.3 Time Frame

Construction is expected to start 15 July of each year and be completed by 15 November of each year through 2019 to 2020, or possibly longer. No in-stream work would occur after 15 October to avoid impacting spawning Chinook Salmon. Replanting would commence at the beginning of the rainy season, which would presumably begin in late November (through February).

Construction activities would primarily take place during normal working hours, 7:00 am to 5:00 pm, Monday through Friday.

2.2.3 Best Management Practices (BMPs)

The Project includes the following Best Management Practices (BMPs) to minimize adverse environmental effects. BMPs that shall be included in the Project include, at a minimum, the following: 1) water quality; 2) air quality and traffic; and, 3) vegetation, fish and wildlife. In this section, a general approach to minimizing these impacts is discussed; specific EC's are described in specific sections and listed in the Mitigation Monitoring and Report Program (MMRP; Appendix C).

2.2.3.1 Water Quality

Construction activities would occur in the main channel of the Merced River. All equipment working within the river corridor would be inspected daily for fuel, lubrication, and coolant leaks; and for leak potentials (e.g., cracked hoses, loose filling caps, stripped drain plugs); and, all equipment used for the Project would be free of leaks. Vehicles or equipment would be washed and/or cleaned only at approved offsite areas. All equipment would be steam cleaned prior to working within the stream channel to remove contaminants that may enter the river and adjacent lands. All equipment would be fueled and lubricated in a designated staging area located outside the stream channel or banks, wetlands, and riparian corridors.

A Stormwater Pollution Prevention Plan (SWPPP), including a Spill Prevention and Response Plan, would be developed as part of the BMP plan for the Project. All pertinent staff would be trained and familiarized with these plans. Copies of the plans and appropriate spill prevention equipment referenced in them would be made available onsite and staff would be trained in its use. Spill prevention kits would be in close proximity to construction areas, and workers would be trained in their proper use.

The Project would comply with Section 401 of the Clean Water Act and certification would be obtained for all activities to control and monitor sediment entering the main river channel during construction. To minimize risk from additional fine sediments, all trucks and equipment would be cleaned. Stream bank impacts would be isolated and minimized to reduce bank sloughing. Banks would be stabilized, as needed, with the appropriate erosion control method following Project activities.

2.2.3.2 Air Quality and Traffic

Basic Air Quality Control Measures would be implemented at the Project boundary, including, but not limited to, watering dirt roads and construction areas. Construction equipment would be limited to operating from 7 am to 5 pm.

2.2.3.3 Vegetation, Fish and Wildlife

All reasonable and prudent measures in the concurrence letter and biological opinion issued for the Project by the USFWS and NMFS would be followed. Pre-project wildlife surveys would be conducted by a qualified biologist no more than 30 days prior to start of construction activities. Nesting birds and raptors are protected under the MBTA and California Fish and Game Code and may be present within the Project Area. Several bat species of special concern may also be present. Trees and shrubs within the Project Area may provide nesting and roosting habitat for songbirds, raptors and/or bats. If tree removal is unavoidable, it would occur during the non-breeding season (mid-September through January), as possible. Any trees that must be removed during breeding season would be examined thoroughly for nests and roosts by a qualified biologist prior to removal. If other construction activities must occur during the potential breeding season (February through mid-September) surveys for active nests and/or roosts would be conducted by a qualified biologist no more than 10 days prior to the start of construction. A minimum no disturbance buffer would be delineated around active nests until the breeding season has ended or until a qualified biologist has determined that the birds/bats have fledged and are no longer reliant upon the nest or parental care for survival. The radius of the buffer will depend on the species; see EC's below for additional details.

Pre-project vegetation monitoring surveys were conducted within the Project boundary in the late spring/early summer of 2010, 2012, 2013, 2014, 2016 (Vaghti and CFS 2016), as this location was a control site for vegetation monitoring associated with the Henderson Park and Merced River Ranch projects (Sellheim et al. 2016). No special status plants were identified within the Project Area during these vegetation surveys. If any special status plants are observed in subsequent surveys they would be avoided through use of appropriately sized buffers.

Pre-project elderberry plant surveys were conducted to assess impacts to the Valley Elderberry Longhorn Beetle (VELB, *Desmocerus californicus* ssp. *dimorphus*), and surveyors identified 678 elderberry (*Sambucus* spp.) shrubs with stem diameter greater than 1 inch at ground level within the Project footprint (7). Complete avoidance may be assumed when there is at least a 20-ft (6 m) buffer around the drip line of an elderberry plant (USFWS 2017). No elderberries were identified as having to be transplanted to a different location to complete the Project as designed, and a 20-ft buffer would be marked prior to construction using construction stanchions and flagging.

All equipment entering the water would be steam cleaned before it is used elsewhere to minimize the chance of introducing New Zealand mud snails to other water bodies. Additional measures may be taken at the recommendation of CDFW.

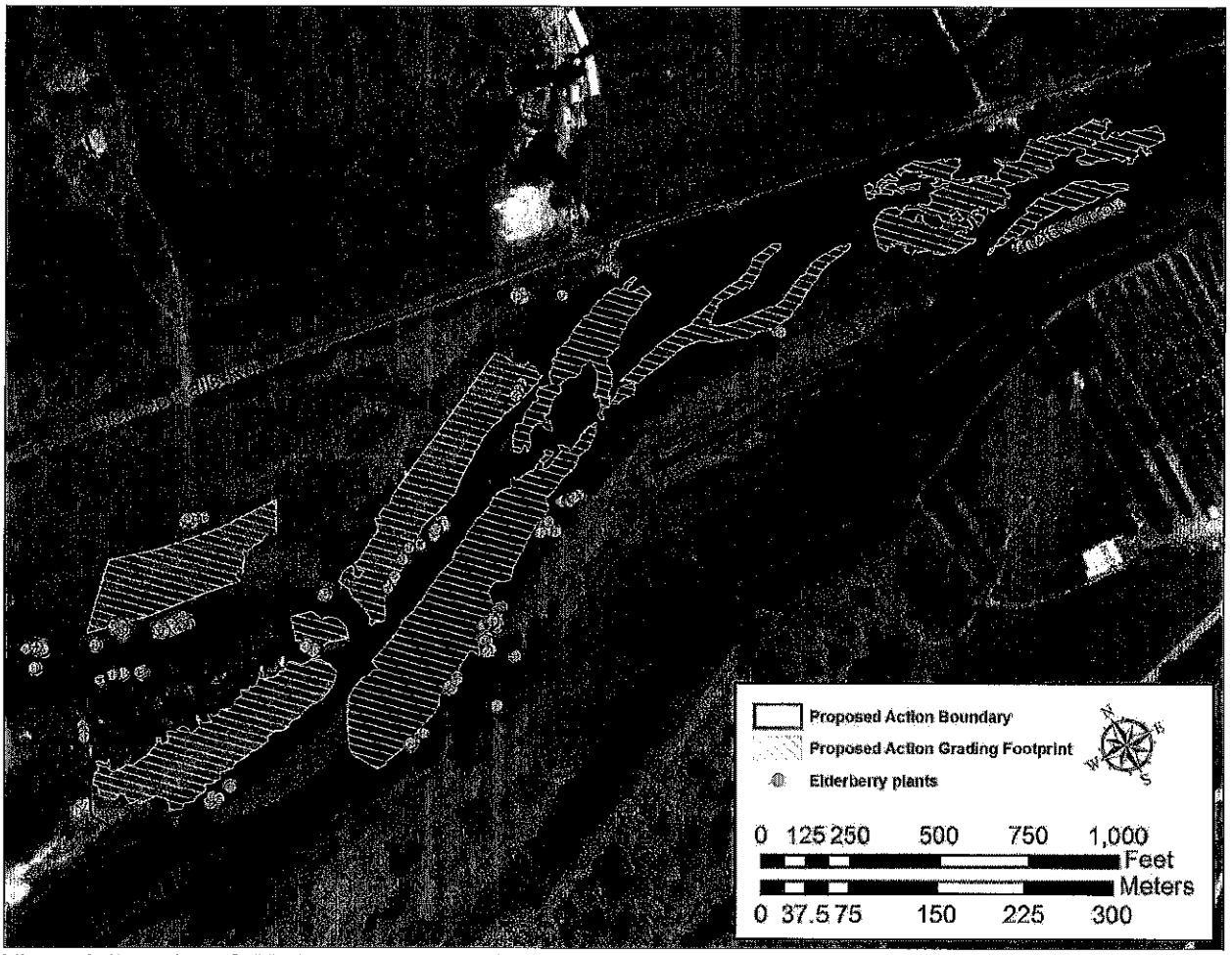

Figure 3. Location of elderberry plants relative to the Project boundary and grading footprint.

2.2.3.4 Post-Construction Erosion Control Measures

Following surface grading, the Project boundary would be relatively level with a very slight slope from upstream to downstream and with positive drainage into a side channel or the main channel. A native grass seed mix would be spread over disturbed areas containing fine sediment. Native riparian trees and shrubs would be planted in select locations, particularly in locations which have been disturbed by construction activities. Additional erosion control measures, such as fiber rolls, would be installed as needed to areas if slopes exceed a ratio of 1:4.

2.2.3.5 Revegetation of Disturbed Area

A revegetation management plan will be prepared for the Project to: 1) reduce impacts to existing native trees and other riparian vegetation due to rehabilitation activities, 2) provide EC's for any mature native trees are negatively impacted, and 3) detail the Project implementation BMPs to ensure site stability and erosion control, including the use of a native seed mixture. After grading activities have been completed, disturbed areas that contain fine sediment would be seeded with a certified organic and weed-free native grass seed mixture including the species blue wildrye (*Elymus glaucus*), California brome (*Bromus carinatus*), small fescue (*Vulpia microstachys*), and creeping wildrye (*Leymus triticoides*). Native trees would be marked with flagging and fenced if close to Project Area to prevent disturbance. Existing native trees with a diameter of at least 6 in (15.2 cm) would be protected with appropriately sized buffers, to the

extent possible. There would be no impacts on heritage size trees (i.e., greater than 16 inch [40.6 cm] dbh). Native riparian tree and shrub species, such as Fremont Cottonwood, willow, and elderberry would be planted in selected areas to compensate for the removal of riparian shrubs and trees during Project implementation and the replacement of non-native vegetation.

To mitigate for any loss of native trees impacted by Project implementation, the contractor would follow the guidelines below:

- Oaks having a dbh of three to five inches would be replaced in-kind, at a ratio of 3:1, and planted during the winter dormancy period in the nearest suitable location to the area where they were removed. Oaks with a dbh greater than five inches would be replaced in kind at a ratio of 5:1.
- Riparian trees (i.e., willow, cottonwood, sycamore, alder, ash, etc.) would be replaced in-kind, at a ratio of 3:1, and planted during the winter dormancy period in the nearest suitable location to the area where they were removed.

Measures would be taken to ensure a minimum performance criteria of 70% survival of planted trees. Irrigation would not be used, but the combination of lowering the existing ground level and the return of frequent inundation to the floodplain is expected to promote growth of native riparian species (Sellheim et al. 2016). Frequent inundation of the floodplain and side channel habitats created by the Project would support recruitment and survival of vegetation within the Project Area. Numerous plant taxa are expected to colonize newly created floodplain and secondary channels including obligate wetland species (*Azolla filiculoides*, *Juncus acuminatus*, *Cephalanthus occidentalis*, and *Typha* sp.), facultative wetland species (*Euthamia occidentalis*, *Gnaphalium palustre*, *Rorripa* sp., *Cyperus strigosus*, *Eleocharis* sp., *Polypogon* sp., *Populus fremontii*, *Salix exigua*, *Salix goodinggii*, *Salix laevigata*), facultative upland species (*Centaurea solstitialis*, *Hypochaeris* sp., *Madia elegans*, *Brassica* sp., *Melilotus alba*, *Erodium* sp., *Oxalis* sp., *Bromus carinatus*, *B. diandrus*, *B. hordeaceus*, *Elymus glaucas*, *Sorghum* sp. *Vitis californicus*), and obligate upland species (*Epilobium brachycarpum*, *Avena* sp.) (Sellheim et al. 2016).

2.2.4 Project Monitoring

A detailed Monitoring Plan has been developed for the Project, with the primary goal of defining the current state of the system before rehabilitation and determining whether the implemented Project had the desired effect on target species and overall system health (CFS 2018). The Monitoring Plan is intended to be a working document, and would be further refined with input from USFWS AFRP, NMFS, CDFW, the Corps, and other Merced River stakeholders, as appropriate.

The monitoring program consists of four conceptual approaches to monitoring: 1) pre-project site description, 2) implementation, 3) effectiveness, and 4) validation (**Table 2**). Pre-project monitoring helps identify the baseline for the Project including the identification of deficiencies in ecosystem health and for detecting change over time (Roni and Quimby 2005). Implementation monitoring would determine if the Project was installed according to the design standards. Hydrology, topography/bathymetry, sediment dynamics, and vegetation would be assessed. The effectiveness monitoring would determine if the Project was effective in meeting target physical and biological objectives. A range of physical and biological traits would be

tracked before and after rehabilitation to assess ecosystem function. Pre-project monitoring is essential for effectiveness monitoring because it establishes an objective baseline of ecosystem function with which to evaluate change caused by the Project implementation. Finally, validation monitoring would be conducted to validate the underlying assumptions of the rehabilitation work and determine if rehabilitation projects, like the Project, recover productive habitat that promotes juvenile salmonid growth, adult salmonid spawning, and riparian vegetation, particularly elderberry plants, within the site. Elderberry plant recruitment success in areas within the site which are expected to be favorable for elderberry recruitment would be performed as part of validation and effectiveness monitoring. The monitoring efforts described in this plan would improve understanding of rehabilitated ecosystem function and the potential of rehabilitating off-channel rearing habitat and main channel habitat features including spawning habitat to enhance salmonid populations within streams impacted by historic dredge mining.

A before-and-after-control-impact (BACI) study design structure would be used to test the differences between the non-rehabilitated and rehabilitated sites (Green 1979). This approach is ideal for rehabilitation effectiveness monitoring because it utilizes a paired series of Control-Impact sites (in this case, "impact" is the rehabilitation treatment), subjected to a series of Before-After replicated measurements, allowing for discrimination between response to rehabilitation and stochastic environmental variability (Bernstein and Zalinski 1983; Stewart-Oaten et al. 1986; Smith 2002). Pre-project monitoring would provide baseline data on current channel extent, vegetation composition, physical and biological conditions (i.e., depth, flow, DO, invertebrates, sediment composition), presence of non-target species (i.e., birds, amphibians, etc.), and photo documentation of site conditions. The post-project monitoring would provide detailed information on physical and biological characteristics, including recruitment of native vegetation, fish use and diet composition, prey production, and various physical parameters (i.e., temperature, flow, DO) critical to habitat development.

This approach would follow previous rehabilitation actions taken on the Mokelumne, Merced, and Stanislaus rivers to rehabilitate productive adult spawning habitat and juvenile rearing habitat and monitor Project performance. The monitoring approach would include measures to ensure the implementation was successful and to document the Project's effectiveness at recovering juvenile salmonid rearing habitat by determining that essential ecosystem linkages (i.e., appropriate physical conditions, prey productivity, fish access and foraging success) are intact, and validation studies to test habitat function. The monitoring team would collaborate with landowners to address any concerns, conduct public outreach to foster support for river rehabilitation, and broadly communicate results to stakeholders, scientists, and the public. The study design would maximize information richness available to decision makers by building on previous and existing work to improve and refine rehabilitation actions, by conducting efficient monitoring, and fostering public support for river rehabilitation. Effort would be made to integrate the monitoring work with other ongoing rehabilitation projects. In the past decade, Kondolf (1995) noted an increased frequency of river rehabilitation projects, but the rarity of systematic post-project evaluation. Evaluation is essential to advance river rehabilitation science (Kondolf 1995; Roni and Quimby 2005) and document Project effectiveness. The Project team is dedicated to conducting scientifically robust rehabilitation monitoring and would define quantifiable objectives, gather and analyze baseline data and post-project data, use a hypothesis-testing approach, and use the best available science to implement, evaluate, and monitor

ecosystem function in the Project boundary. All monitoring data collected would be submitted for inclusion in the California Natural Diversity Database.

Table 2. The performance evaluation approach for the Project on the lower Merced River.

Biological and Ecological Objective	Question or Hypothesis to Evaluate	Monitoring Variables and Data Collection Approach	Evaluation Approach
Rehabilitated habitats meet physical habitat objectives for juvenile salmonid rearing	Do rehabilitated habitats meet physical parameter design requirements?	Monitor water temperature, velocity, depth, DO, turbidity, invertebrate production, fish use	Analyze data to determine if design criteria are met to 95% confidence
Rehabilitated floodplain successfully recruits native vegetation	Was recruitment of native plants successful on the rehabilitated floodplain? What factors affect success of native plants?	Monitor vegetation density and composition in the rehabilitated site; monitor physical parameters	Analyze data to determine recruitment success of native plant and relationship to physical parameters
Rehabilitated habitats provide productive rearing habitat for juvenile salmonids	Does the floodplain provide productive rearing habitat for juvenile salmonids?	Monitor fish use, diet composition, consumption rate, invertebrate density and composition, water temperature; model growth potential	Document fish foraging success; Conduct *in situ* experiments to assess modeled growth potential
Rehabilitated habitats provide productive spawning habitat for adult salmonids	Do the rehabilitated habitats provide productive spawning areas for adult salmonids?	Monitor fish use, gravel movement/scour, depth, velocity, egg survival	Document fish use

A detailed description of the biological monitoring actions related to this project is available in Appendix D.

2.2.6 Environmental Commitments

The Project shall implement appropriate Environmental Commitments (ECs) to reduce the impacts to the surrounding environment to less than significant levels. Environmental consequences for resource areas assume the measures specified will be fully implemented. The Project shall also use accepted BMPs associated with using large construction equipment in sensitive environments and flagging and/or fencing of sensitive plant species to prevent harm. The ECs are described in the appropriate sections of the Environmental Impacts checklist and are also summarized in the MMRP (Appendix C).

3 Environmental Impacts Analysis/Checklist

3.1 Environmental Factors Potentially Affected

The following checked environmental factors would be potentially affected by this project, involving at least one "Potentially Significant Impact," as indicated by the checklist on the following pages.

☐	Aesthetics	☐	Agriculture and Forestry	☐	Air Quality
☐	Biological Resources	☐	Cultural Resources	☐	Energy
☐	Geology/Soils	☐	Greenhouse Gas Emissions	☐	Hazards and Hazardous Materials
☐	Hydrology/Water Quality	☐	Land Use/Planning	☐	Mineral Resources
☐	Noise	☐	Population/Housing	☐	Public Services
☐	Recreation	☐	Transportation	☐	Tribal Cultural Resources
☐	Utilities/Service Systems	☐	Wildfire	☐	Mandatory Findings of Significance

DETERMINATION:

On the basis of this initial evaluation:

☐	I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
☒	I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
☐	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
☐	I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
☐	I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature:	**Date:** 08 MAR 2019
Printed Name: Joseph Merz	**For:**

3.2 Evaluation of Environmental Impacts

1. A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, according to a project-specific screening analysis).

2. All answers must take account of the whole action involved, including offsite as well as onsite, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3. After the lead agency has determined that a particular physical impact might occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect might be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an environmental impact report is required.

4. "Negative Declaration: Less Than Significant with Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level.

5. Earlier analyses may be used where, pursuant to the tiering, program environmental impact report, or other CEQA process, an effect has been adequately analyzed in an earlier environmental impact report or negative declaration (Section 15063(c)(3)(D)). In this case, a brief discussion should identify the following:

   a) Earlier Analysis Used. Identify and state where they are available for review.

   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures that were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans and zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7. Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.
8. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.
9. The explanation of each issue should identify the following:
   a) The significance criteria or threshold, if any, used to evaluate each question
   b) The mitigation measure identified, if any, to reduce the impact to less than significance

4 Initial Study/Environmental Impacts Checklist

I. Aesthetics	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Discussion:

a) The Project will occur at a popular public access location for kayaks, inflatable rafts, and inner tubes. The majority of the Project Area is visible to persons using the main channel of the Merced River for recreation; primarily individuals rafting or floating down past the Project Area during the summer months, with the heaviest use occurring on weekends and holidays. Generally, the floodplain and side channel rehabilitation areas would not be visible to persons rafting down the river. Temporary changes in visual resources would result during the excavation, grading, and transport of material within the Project Area in this rural area of Merced County. Construction activities would not occur on the weekends when public use is the highest and therefore, potential impacts to visual resources during Project construction would be greatest. Construction activities would also only occur during work hours (7 am to 5 pm) on weekdays. The main channel of the Merced River within the Project Area during construction activities would always be passable for rafters so will not create hazards or interfere with public use. When the Project is complete the visual resources would be improved as river users would be able to see a more natural channel configuration with extensive riparian vegetation that is less confined by channel incision. The Project is also expected to enhance the rafting experience as the number of riffles within the Project Area would be increased concurrent with the loss of deep, slow pool habitat. Because impacts would be relatively short term and temporary with construction activities not occurring on weekends which is the peak use time, impacts on visual resources are considered **less than significant**.

b) Only a small segment of the Project Area would be visible from Merced Falls Rd and limited construction activities would occur in this segment (**Figure 2**) as it is bedrock confined. The

Project would have a limited construction season, work during normal week day working hours, and only take two construction seasons to complete. No trees visible from Merced Falls Rd would be removed by the Project. With the limited amount of the Project Area visible from Merced Falls Rd and the temporary nature of the Project Area, there will be **no impacts** on scenic resources. After completion of the Project the scenic resources are expected to be improved as a more natural looking river channel would be created.

c) Temporary changes in visual resources would result during the excavation, grading, and transport of material within the site in this rural area of Merced County. Under the Project, the movement of material away from and within the Project site would only be visible in limited areas of the river adjacent to the site. Furthermore, because impacts would be relatively short term and temporary, impacts on visual resources are considered less than significant. The Project Area has limited visibility to the general public, a small section of the Project Area can be observed from Merced Falls Road. Therefore, there will be a **less than significant impact** on the existing visual character or quality of public views of the site and its surroundings.

d) The Project is designed for salmonid habitat rehabilitation that involves excavation and grading adjacent to the Merced River and substrate addition into the channel. These rehabilitation activities would not create a new source of light or glare; therefore, the Project would have **no impact** on day or nighttime views.

Documentation:

California Department of Transportation (Caltrans). 2017. California Scenic Highway Mapping System. Merced County. Accessed January 31, 2019. http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/.

Mitigation:

None required.

II. Agriculture and Forest Resources	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion:

a) The Project Area is in the eastern Central Valley in northeastern Merced County. The Project Area is designated as agricultural in the Merced County General Plan (Merced County 2013). The California Department of Conservation's (CDC) Farmland Mapping and Monitoring Program designated the land within the Project Area as "Vacant or Disturbed Land" (CDC 2014). No Prime Farmland, Farmland of Statewide Importance, or Unique Farmland is located within or adjacent to the Project Area. Therefore, the Project would have **no impact**.

b) There is no land within or adjacent to the Project Area is enrolled in the Williamson Act (CDC 2016). Therefore, the Project would have **no impact**.

c) There is no forest land, timberland, or timberland zoned Timberland Production in the Project Area. Therefore, the Project would have **no impact.**

d) There is no forest land in the Project Area. Therefore, the Project would have **no impact.**

e) e) The Project does not involve the conversion of agricultural or forest land. Therefore, the Project would have **no impact.**

Documentation:

California Department of Conservation (CDC). 2014. Rural Land Mapping Edition. Merced County Important Farmland 2014. Sheet 1 of 2. Accessed 31 January 2019. ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2014/mer14_no.pdf.

CDC. 2016. Merced County Williamson Act FY 2013/2014, Sheet 1 of 2. Accessed 31 January 2019. ftp://ftp.consrv.ca.gov/pub/dlrp/wa/Merced_n_13_14_WA.pdf.

Merced County. 2013. Merced County General Plan Land Use Policy Diagram. Accessed 31 January 2019. https://www.co.merced.ca.us/DocumentCenter/View/3619/General-Plan-and-Zoning

Mitigation:

None required.

III. Air Quality	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable Air Quality Attainment Plan or Congestion Management Plan?	☐	☐	☐	☒
b) Violate any stationary source air quality standard or contribute to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Create or contribute to a non-stationary source "hot spot" (primarily carbon monoxide)?	☐	☐	☐	☒
e) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
f) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

Discussion:

a) The project does not conflict with or obstruct implementation of the San Joaquin Valley Air Quality Attainment Plan or Congestion Management Plan. There would be **no impact.**

b) The Project is within the San Joaquin Valley Air Basin. The San Joaquin Valley Unified Air Pollution Control District (Valley Air) is responsible for monitoring air quality in Merced County (SJVAPCD 2015). The Clean Air Act requires the EPA to set National Ambient Air Quality Standards to protect public health. National standards have been set for the following; ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, respirable particulate matter (particulate matter less than 10 microns in diameter; PM-10), fine particulate matter (particulate matter less than 2.5 microns in diameter; PM-2.5), and lead (**Table 3**). The air quality in the San Joaquin Valley Air Basin has been designated nonattainment by the Air Resources Board for ozone, PM-10, and PM-2.5 and by the EPA for Ozone and $PM_{2.5}$ (**Table 3 3**) (SJVAPCD 2015).

The federal Clean Air Act and the California Clean Air Act require areas that are designated nonattainment to reduce emissions until standards are met. Air quality is affected by a combination of air contaminants, meteorological conditions, and the topographical configuration of the valley. A primary factor responsible for the increase of air pollution is the increased amount of pollutants and particulate matter produced by vehicles, industrial processes, mining operations, and agricultural activities, such as burning and ground disturbance.

Table 3. Designation/classification for criteria pollutants in the San Joaquin Valley Air Basin based on federal and state standards.

Pollutant	Federal Standards	State Standards
Ozone – One Hour	No Federal Standard	Nonattainment/Severe
Ozone – Eight Hour	Nonattainment/Extreme	Nonattainment
PM 10	Attainment	Nonattainment
PM 2.5	Nonattainment	Nonattainment
Carbon Monoxide	Attainment/Unclassified	Attainment/Unclassified
Nitrogen Dioxide	Attainment/Unclassified	Attainment
Sulfur Dioxide	Attainment/Unclassified	Attainment
Lead (Particulate)	No Designation/Classification	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Visibility Reducing Particles	No Federal Standard	Unclassified
Vinyl Chloride	No Federal Standard	Attainment

The Project may cause temporary changes in air quality in the area, including the generation of dust and small particulates from the excavation and transportation of material from the floodplain grading, and operation of heavy equipment. Heavy equipment such as front-end loaders and excavators would be used to lower floodplain areas, and create or enhance side channels. Restoration activities may potentially result in localized, short-term emissions. Activities are temporary, so any changes in air quality due to the Project would be limited in duration.

Small quantities of dust may occasionally be produced and result in temporary increases in PM_{10} concentrations. Heavy equipment used during construction would include loaders, excavators, and a mobile sorting station; emissions estimates by phase compared with Valley Air emissions thresholds are summarized in **Table 4**. A water truck would be used periodically throughout the work day to reduce the dust (**EC-1 – Reduce Dust and Air Quality Impacts**). This would result in a **less than significant impact**.

c) Valley Air has established criteria for determining local air basin impact significance (SJVAPCD 2015). For the purpose of determining significance, the District's criteria for emissions of carbon monoxide is 100 tons per year (tpy), nitrogen oxides (NO_x) and reactive organic gases (ROG) are 10 tpy for each, sulfur oxides (SO_x) are 27 tpy, and PM_{10} and $PM_{2.5}$ are 15 tpy for each (**Table 4**). Project emissions that exceed the threshold limits set forth by the District are considered significant and require mitigation. Valley Air has not established a significance threshold for construction greenhouse gas (GHG) emissions. Therefore, to evaluate GHG emissions for the Project under CEQA, the Sacramento Metropolitan Air Quality Management District (SMAQMD) threshold of 1,100 metric tons (1213 tons) of CO_{2e} was adopted (ARB 2014).

Table 4. The emissions estimates of criteria pollutants for the Project in tons per year compared to the Valley Air significance thresholds and *de minimis* thresholds (SJVAPCD 2015).

	NO_x (tpy)	ROG (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Project	1.851	0.1639	0.3905	0.1978	1.1543	$2.21e^{-003}$
Valley Air Threshold	10	10	15	15	100	27
Valley Air *de minimis* Threshold	25	25	100	100	100	100

Section 176 (C) of the Clean Air Act (42 U.S.C. 7506 (C)) requires any entity of the federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable State Implementation Plan required under Section 110 (a) of the Federal Clean Air Act (42 U.S.C. 7401 [a]) before the action is otherwise approved. In this context, conformity means that such federal actions must be consistent with State Implementation Plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards and achieving expeditious attainment of those standards. Each federal agency must determine that any action proposed by the agency and subject to the regulations implementing the conformity requirements would conform to the applicable State Implementation Plan before the action is taken.

On November 30, 1993, the EPA promulgated final general conformity regulations at 40 CFR 93 Subpart B for all federal activities except those covered under transportation conformity. The general conformity regulations apply to a proposed federal action in a non-attainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutant caused by the Project equal or exceed certain *de minimis* amounts thus requiring the federal agency to make a determination of general conformity.

The emissions estimates for criteria pollutants from the Project were estimated using California Emissions Estimator Model (CalEEMOD) (CAPCOA 2017). Rehabilitation activities may potentially result in localized, short-term emissions. Emissions may include hydrocarbons, nitrogen oxides, sulfur oxides, carbon monoxide, and particulate matter. Activities are temporary, so any changes in air quality due to the Project would be limited in duration. Fugitive dust may be emitted during use of earth working equipment. Fugitive dust emissions during rehabilitation activities would vary daily based on activity type and level, fines content of the sediment, and the weather. Fine sediment composition is low throughout the Project Area; the majority of areas that would be disturbed are dredge tailings piles which consist largely of gravel and cobble.

The emissions estimates for criteria pollutants are all substantially below the Valley Air significance thresholds and implementation of **EC-1 – Reduce Dust and Air Quality Impacts** would minimize the production of fugitive dust. Therefore, this impact is **less than significant.**

d) The project would not create or contribute to a non-stationary source "hot spot" (primarily carbon monoxide). Project construction is limited in scope and duration, and over the long term the Project would contribute to improving air quality, as floodplain function, including native tree establishment and growth, are restored. Therefore, there is **no impact.**

e) Sensitive receptors include hospitals, schools, daycare facilities, elderly housing, and convalescent facilities. The occupants of these facilities, children, elderly, and the infirm, are more sensitive to poor air quality and associated health effects than the general population. In addition, residential areas are considered sensitive receptors because the general public spends substantial amounts of time at home. The closest sensitive receptor to the Project boundary, the Snelling-Merced Falls Elementary School, is approximately 2.7 miles west from the nearest area where rehabilitation activities would occur. Therefore, **no impact** is expected.

The Project would result in short term emissions of diesel particulate matter. Heavy equipment, including excavators and front-end loaders, all run on diesel and would produce diesel emissions during excavation, grading, transport, and placement of material. Valley Air has not adopted a methodology for analyzing the impact of diesel particulate matter emission. However, the estimated emissions of PM_{10} are substantially below the significance threshold (**Table 4**). Considering the Project's two-year limited construction season (15 July through 15 November) and the rehabilitation activities occurring in an area with few nearby residences or businesses, it is not likely that the Project would expose sensitive receptors to substantial pollutant concentrations. Therefore, **no impact** is expected.

f) The only objectionable odor that may be produced by the Project would be from diesel exhaust from operation of heavy equipment and a mobile screening plant. The closest residences to the Project boundary where construction would occur are approximately 0.1 miles north. Overall, there are a low number of residences in the immediate vicinity of the Project and the area is primarily agricultural. The nearest residents are north of Merced Falls Road and are widely spaced, typical of rural areas. Diesel exhaust from rehabilitation activities would be restricted to the limited two-year construction season and would dissipate over time and distance. Therefore, diesel exhaust resulting from construction activities would not be expected to create objectionable odors which would affect a substantial number of people, resulting in a **no impact**.

Documentation:

California Air Pollution Control Officers Association (CAPCOA). 2017. *California Emissions Estimator Model* (CalEEMod). CalEEMod Version 2016.3.2. Accessed January 11, 2018. http://www.caleemod.com.

California Air Resources Board (ARB). 2014. *Final Regulation Order, Area Designations for State Ambient Air Quality Standards*. Chapter 1. Air Resources Board. Subchapter 1.5. Air Basins and Air Quality Standards. Article 1.5. Area Pollutant Designations. Accessed August 19, 2017. http://www.arb.ca.gov/regact/2013/area13/area13fro.pdf.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2015. *Guidance of Assessing and Mitigating Air Quality Impacts*. Accessed August 8, 2017. http://www.valleyair.org/transportation/GAMAQI_3-19-_15.pdf.

U.S. Environmental Protection Agency (EPA). 2017. *Green Book – California Nonattainment/Maintenance Status for Each County By Year for All Criteria Pollutants, As of June 20, 2017*. Accessed July 19, 2017. https://www3.epa.gov/airquality/greenbook/anayo_ca.html.

Mitigation:

EC-1. Reduce Dust and Air Quality Impacts.
The following dust reduction measures shall be implemented during movement of materials from the construction staging areas to sites where gravel augmentation occurs to reduce construction-related emissions:

- wet materials to limit visible dust emissions using water;
- provide at least 6 in (15.2 cm) of freeboard space from the top of the container; or,
- cover the container.

The following dust reduction measure shall be implemented during cobble and gravel placement to reduce construction-related emissions:

- limit or promptly remove any of mud or dirt on construction equipment and vehicles at the end of each workday, or once every 24 hours.

The following measure shall be implemented to ensure that emissions meet current air quality standards:

- the off-road work fleet average at a minimum must meet the current California Air Resources Control Board standards, including the use of Tier II emission standards of at least 4.8 g/hp-hr Nitrogen Oxides (NOx).

IV. Biological Resources	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, or NOAA Fisheries?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐

c) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Discussion:

a) Special status species are species that are classified as such based on the following categories:

1. Species listed or proposed for listing on the federal Endangered Species Act as threatened or endangered (animals: 50 CFR §17.11, plants: 50 CFR §17.12, and proposed species: federal register notices)
2. Candidate species for possible future federal ESA listing as threatened or endangered (61 FR 40)
3. Species listed or proposed for listing under the California Endangered Species Act as threatened or endangered (14 California Code of Regulations §670.5)
4. Plants listed as rare or endangered under the California Native Plant Protection Act (California Fish and Game Code, Section 1900 et seq.)
5. CDFW designated species of special concern (CDFW 2018)
6. Animals designated as fully protected under California Fish and Game Code (birds: Section 3511, mammals: 4700, and reptiles and amphibians: 5050)
7. Species that meet the definition of rare or endangered even if not on one of the official lists (CEQA Guidelines, Section 15380)
8. Plants considered by the California Native Plant Society (CNPS) and CDFW to be rare, threatened or endangered in California (California Rare Plant Rank 1A, 1B, and 2) as well as California Rare Plant Rank 3 and 4 species (CNPS 2018)

An official species list was requested for the entire Action area from the U.S. Fish and Wildlife Service (USFWS) on 25 January 2018, by accessing their database: https://ecos.fws.gov/ipac/ (Consultation Code: 08ESMF00-2018-SLI-1003). The California Department of Fish and Wildlife, California Natural Diversity Database (CNDDB) was queried for records of protected species within 10 miles of the Project boundary (CDFW 2018). The two lists were combined to create **Table 5**.

Pre-project vegetation surveys of the Project Area were performed in 2017 (Vaghti and CFS 2017). Several species listed by state and federal agencies as threatened, endangered, or a species of special concern are present on the Merced River (CDFW 2018; USFWS 2018). **Table 5** lists the special status species that have the potential to occur in the Project Area (Nine quadrangles associated with Snelling quadrangle) and may be affected by rehabilitation activities. This list includes spring and winter-run Chinook Salmon listed in the USFWS Sacramento Endangered Species Program database (http://www.fws.gov/sacramento/es/default.htm). While spring and winter-run Chinook Salmon are on this list, they do not include the San Joaquin River or tributaries as habitat in their respective National Oceanic and Atmospheric Administration (NOAA) Evolutionary Significant Unit (ESU) determinations (http://www.nwr.noaa.gov/ESA-Salmon-Listings/), as defined in Federal Register 50 CFR Parts 222 and 226 (NMFS 2005). These species are not listed for the Snelling or Merced Falls quadrangles in the CDFW CNDDB

(http://www.dfg.ca.gov/biogeodata/cnddb/). Spring-run Chinook Salmon have been extirpated from the San Joaquin Basin (NMFS 2014); therefore, we assume there would be no adverse impacts to this ESU. Winter-run Chinook Salmon are not present in the San Joaquin Basin nor were they likely historically present; therefore, we assume there would be no adverse impacts to this ESU.

Table 6 lists the critical periods when disturbance could result in significant impacts to individuals or populations of special status species. To avoid these impacts, most ground disturbing activities would be conducted during the period 15 July through 15 November, which is outside the listed critical periods for most species listed in the table as having the potential to occur within the Project boundary (**Table 5**). No in-stream work would occur after 15 October to avoid impacts to spawning Chinook Salmon.

Table 5. Federal and state special status species that may occur in the Project Area. Data compiled from the USFWS database for Merced County (USFWS 2018) and from the CNDDB database by searching the Snelling quadrangle and eight adjoining quadrangles (CDFW 2018).

Species	Status[1]	Effects[2]	Potential to occur and summary basis for ESA determination[3]
Amphibians			
Western Pond Turtle *Emys marmorata*	SSC	NLAA	Possible
California Tiger Salamander *Ambystoma californiense*	FT, ST	NLAA	Unlikely
Western Spadefoot *Spea hammondii*	SSC	NLAA	Unlikely
Giant Garter Snake *Thamnophis gigas*	FT, ST	NLAA	Unlikely
Foothill Yellow-legged Frog *Rana boylii*	CST, SSC	NLAA	Unlikely
California Red-legged Frog *Rana draytonii*	FT, SSC	NLAA	Unlikely
Birds			
Cooper's Hawk *Accipiter cooperii*	SWL	NLAA	Possible
Swainson's Hawk *Buteo swainsoni*	ST	NLAA	Possible
Northern Harrier *Circus cyaneus*	SSC	NLAA	Possible
White-tailed Kite *Elanus leucurus*	SFP	NLAA	Possible
Bald Eagle *Haliaeetus leucocephalus*	SE/SFP	NLAA	Possible
Yellow Breasted Chat *Icteria virens*	SSC	NLAA	Possible
Osprey *Pandion haliaetus*	SWL	NLAA	Present
Tri-colored Blackbird *Agelaius tricolor*	CFE	NLAA	Unlikely
Golden Eagle *Aquila chrysaetos*	SFP, SWL	NLAA	Unlikely
Burrowing Owl *Athene cunicularia*	SSC	NLAA	Unlikely
Ferruginous Hawk *Buteo regalis*	SWL	NLAA	Unlikely
Mountain Plover *Charadrius montanus*	SSC	NLAA	Unlikely
California Horned Lark *Eremophila alpestris actia*	SWL	NLAA	Unlikely
Merlin *Falco columbarius*	SWL	NLAA	Unlikely
Prairie Falcon *Falco mexicanus*	SWL	NLAA	Unlikely
Least Bell's Vireo *Vireo bellii pusillus*	FE, SE	NLAA	Unlikely
Fish			
Riffle Sculpin *Cottus gulosus*	SSC	NLAA	Possible
Pacific Lamprey *Entosphenus tridentata*	SSC	NLAA	Possible
Kern Brook Lamprey *Lampetra hubbsi*	SSC	NLAA	Possible

River Lamprey *Lampetra ayresi*	SSC	NLAA	Possible
Hardhead *Mylopharodon conocephalus*	SSC	NLAA	Present
Sacrament Hitch *Lavinia exilicauda exilicauda*	SSC	NE	Unlikely
California Central Valley steelhead *Oncorhynchus mykiss*	FT, X	NLAA	Possible
Fall-run Chinook Salmon *Oncorhynchus tshawytscha*	FSC, NMFS, EFH	NLAA	Present
North American Green Sturgeon *Acipenser medirostris*	FT	NE	Unlikely
Delta Smelt *Hypomesus transpacificus*	FT, SE	NE	Unlikely
Winter-run Chinook Salmon *Oncorhynchus tshawytscha*	FE, SE	NLAA	Unlikely
Spring-run Chinook Salmon *Oncorhynchus tshawytscha*	FT, ST	NLAA	Unlikely
Invertebrates			
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus*	FT	NLAA	Possible
Conservancy Fairy Shrimp *Branchinecta conservation*	FE	NE	Absent
Vernal Pool Fairy Shrimp *Branchinecta lynchi*	FT	NE	Absent
Vernal Pool Tadpole Shrimp *Lepidurus packardi*	FE	NE	Absent
Mammals			
Western Red Bat *Lasiurus blossevilli*	SSC	NLAA	Possible
Pallid Bat *Antrozous pallidus*	SSC	NE	Unlikely
Townsend's Big-eared Bat *Corynorhinus townsendii*	CST, SSC	NE	Unlikely
Western Mastiff Bat *Eumops perotis californicus*	SSC	NE	Unlikely
San Joaquin Kit Fox *Vulpes macrotis mutica*	FE, ST	NE	Unlikely
American Badger *Taxidea taxus*	SSC	NE	Unlikely
Plant			
Henderson's Bent Grass *Agrostis hendersonii*	RP 3.2	NE	Unlikely
Hoover's Calycadenia *Calycadenia hooveri*	RP 1B.3	NE	Absent
Fleshy Owl's Clover *Castilleia campestris* ssp. *succulenta*	FT, SE, RP 1B.2	NE	Absent
Mariposa Clarkia *Clarkia biloba* ssp. *australis*	RP 1B.2	NE	Absent
Beaked Clarkia *Clarkia rostrata*	RB 1B.3	NE	Absent
Hoover's Cryptantha *Cryptantha hooveri*	RP 1A	NE	Absent
Mariposa Cryptantha *Cryptantha mariposae*	RP 1B.3	NE	Absent
Peruvian Dodder *Cuscuta obtusiflora* var. *glandulosa*	RP 2B.2	NE	Absent
Ewan's Larkspur *Delphinium hansenii* spp. *ewanianum*	RP 4.2	NE	Absent
Dwarf Downingia *Downingia pusilla*	RP 2B.2	NE	Absent
Delta Button-celery *Eryngium racemosum*	SE, RP 1B.1	NE	Absent
Spiny-sepaled Button-celery *Eryngium spinosepalum*	RP 1B.2	NE	Absent
Hoover's Spurge *Euphorbia hooveri*	FT, RP 1B.2	NE	Absent

Stinkbells *Fritillaria agrestis*	RP 4.2	NE	Absent
Hogwallow Starfish *Hesperevax caulescens*	RP 4.2	NE	Absent
Foothill Jepsonia *Jepsonia heterandra*	RP 4.3	NE	Absent
Northern California Black Walnut *Juglans hindsii*	RP 1B.1	NE	Absent
Forked Hare-leaf *Lagophylla dichotoma*	RP 1B.1	NE	Absent
Merced Monardella *Monardella leucocephala*	RP 1A	NE	Absent
Pincushion navarretia *Navarretia myersii* spp. *Myersii*	RP 1B.1	NE	Absent
Shining Navarretia *Navarretia nigelliformis* spp. *radians*	RP 1B.2	NE	Absent
Colusa grass *Neostapfia colusana*	FT, SE, RP 1B.1	NE	Absent
San Joaquin Valley Orcutt Grass *Orcuttia inaequalis*	FT, SE, RP 1B.1	NE	Absent
Hairy Orcutt Grass *Orcuttia pilosa*	FE, SE, RP 1B.1	NE	Absent
Plant			
Hartweg's Golden Sunburst *Pseudobahia bahiafolia*	FE, SE, RP 1B.1	NE	Absent
Sanford's Arrowhead *Sagittaria sanfordii*	RP 1B.2	NE	Absent
Keck's Checkerbloom *Sidalcea keckii*	FE, RP 1B.1	NE	Absent
Greene's Tuctoria *Tuctoria greenei*	FE, RP 1B.1	NE	Absent

1 Status = Status of state and federally protected species protected under the ESA.
SE: Listed as State Endangered
FE: Listed as Federally Endangered
NMFS: Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service
ST: Listed as State Threatened
FT: Listed as Federally Threatened
SSC: Listed as State Species of Concern
SWL: State Watch List
SFP: Listed as State Fully Protected
RP: Designated by CNPS as a Rare Plant
EFH: Essential Fish Habitat
X: Critical Habitat designated for this species

2 Effects = ESA Effect determination
MA: Project may Adversely Affect federally listed species and/or designated critical habitat
NE: No Effect anticipated from the Project to federally listed species or designated critical habitat
NLAA: Project Not Likely to Adversely Affect federally listed species

3 Definition of Occurrence Indicators
Present: Species recorded in area and suitable habitat present.
Possible: Species recorded in area and habitat suboptimal.
Unlikely: Species recorded in area but habitat marginal or lacking entirely.
Absent: Species not recorded in study area and suitable habitat absent.

Table 6. Critical periods for special status species that may be affected by the construction activities.

Common Name	Critical Period
Fall-run Chinook Salmon	October through June
California Central Valley steelhead	December through May
Riffle Sculpin	February through April
Pacific Lamprey	March through June
River Lamprey	March through June
Kern Brook Lamprey	March through June
Hardhead	April through May
Swainson's Hawk	March through August
White-tailed Kite	February through October
Bald Eagle	November through July
Yellow-breasted Chat	April through August
Osprey	March through July
Western Pond Turtle	March through July
Valley Elderberry Longhorn Beetle	November through June
Western Red Bat	May through August

Special Status Plants

Pre-project monitoring was conducted within the Project Area in 2017 (Vaghti and CFS 2017). It was also a control site for vegetation monitoring associated with the Merced River Ranch and Henderson Park Salmonid habitat restoration projects, and plant surveys were conducted over several years. No special status plant species were observed within the Project boundary during these surveys (Vaghti and CFS 2015, 2016); however, the special status plant species listed below have the potential to occur in the Project boundary.

Henderson's Bent Grass *Agrostis hendersonii*

Henderson's Gent Grass is a monocot annual grass in the Poaceae family. It is 6 to 70 cm tall with a 1 to 5 cm long inflorescence (Peterson and Harvey 2014). It is found in association with vernal pools and other mesic areas in valley and foothill grassland. Its current range includes Calaveras, Merced, Napa, Shasta, Tehama, and Tuolumne counties. There are no documented occurrences of Henderson's Bent Grass in the Snelling quadrangle but it is documented in two of the adjacent quadrangles (CDFW 2018). Henderson's Bent Grass is not likely to be present in the Project Area as vernal pool habitat is absent.

Hoover's Calycadenia *Calycadenia hooveri*

Hoover's Calycadenia is a California native plant and is an annual herb in the Asteraceae family. Plants are 10-60 cm tall with relatively many branching stems. Leaves are alternate and hairy. It has small white flowers during its blooming period, July through September (CNPS 2018). It is found in rocky exposed areas 100-400 meters in elevation, in Valley Grassland and Foothill Woodland communities throughout California. Its current range includes Calaveras, Madera,

Merced, Mariposa, and Stanislaus counties. There are documented occurrences of the species in CNDDB in the Snelling quadrangle (CDFW 2018). However, Hoover's Calycadenia is likely absent from the Project Area because rocky habitat is not present.

Succulent Owl's Clover *Castilleja campestris* ssp. *succulenta*
Succulent Owl's-Clover, is a partly parasitic (hemiparasitic) native annual herb in the snapdragon family (Scrophulariaceae). Its stems are erect, generally 2 – 10 inches (5 – 25.4 cm) tall, and may be branched or unbranched. The leaves are succulent and brittle. Bright yellow to white flowers appear in May, clustered near the ends of branches and surrounded by leafy bracts. Like other members of Castilleja and related genera, it is partly parasitic (hemiparasitic) on the roots of other plants. It occurs on the margins of vernal pools, swales and some seasonal wetlands, often on acidic soils. It is never dominant and it is found in only a few of the pools in a given area. Succulent Owl's-Clover is found only in vernal pools along the rolling lower foothills and valleys along the eastern San Joaquin Valley in the Southern Sierra Foothills Vernal Pool Region. The CNDDB has catalogued occurrences in 24 quads, including the Snelling quadrangle (CDFW 2018). About one third of these occurrences are in Merced County, catalogued in association with rare plant and wildlife surveys of eastern Merced County grass and ranch lands conducted during 2001 by a team of consultants to Merced County and CDFW (Robins and Vollmar 2002). The Project Area does not possess the soil properties needed to sustain vernal pools or their plant communities; therefore, succulent owl's clover is likely absent.

Mariposa Clarkia *Clarkia biloba* ssp. *australis*
Mariposa Clarkia is an annual herb that is endemic to California. It has linear to narrowly lanceolate leaves and bright pink to magenta petals (Lewis and Lewis 1955). Mariposa Clarkia is found in chaparral and foothill woodland on serpentinite soils generally from 300 to 500 m elevation. There are no documented occurrences in the Snelling quadrangle but it is documented in two adjacent quadrangles (CDFW 2018). The Project Area does not contain serpentine soils; therefore, Mariposa Clarkia is likely absent.

Beaked Clarkia *Clarkia rostrata*
Beaked Clarkia is a native annual herb in the evening primrose family (Onagraceae) that is endemic to California. It stands up to approximately 24 inches in height and produces pink to purple-red flowers from April to May. It is found in oak/pine woodlands and valley grasslands in Merced, Mariposa, Stanislaus, and Tuolumne counties (CNPS 2018). Beaked Clarkia is usually found on steep/rocky slopes. Beaked clarkia has been recorded in the Snelling quadrangle (CDFW 2018). The Project Area does not contain steep/rocky grass covered slopes; therefore, Beaked Clarkia is likely absent.

Hoover's Cryptantha *Cryptantha hooveri*
Hoover's Cryptantha is an annual herb that inhabits inland dunes and sandy areas within valley and foothill grassland. It is presumed to be extinct in California (CNPS 2018); therefore, it is not likely to be present within the Project Area.

Mariposa Cryptantha *Cryptantha mariposae*
Mariposa Cryptantha is an annual herb found growing on rocky, serpentinite soil in chaparral. It is generally less than 10 inches tall, with yellow flowers, and bristles on its leaves, flowers, and

influorescence (Kelley et al. 2012). The Project Area does not contain serpentine soils; therefore, Mariposa Cryptantha is likely absent.

Peruvian Dodder *Cuscuta obtusiflora* var *glandulosa*
Peruvian Dodder is an annual, parasitic vine found in freshwater marshes and swamps. It has not been observed in California in recent years, with the last observation in a marsh near Snelling in 1948 (CNPS 2018). Therefore, it is not likely present within the Project Area.

Ewan's Larkspur *Delphinium hansenii* ssp. *ewanianum*
Ewan's Larkspur is a native perennial herb belonging to the buttercup family (Ranunculaceae). It occurs in rocky habitats in valley grasslands and foothill woodlands, and is found in Calaveras, Fresno, Kern, Madera, Merced, and Tulare counties (CNPS 2018). It is generally 25-130 cm in height with few leaves and produces violet-purple to maroon flowers during the blooming period in March through May (Jepson Flora Project 2018). There are no recorded occurrences of the species in the Snelling quadrangle but it is documented in an adjacent quadrangle, Yosemite Lake (CDFW 2018). The Project Area lacks rocky, grassland habitat; therefore, Ewan's Larkspur is likely absent.

Dwarf Downingia *Downingia pusilla*
Dwarf Downingia is an erect annual plant belonging to the bellflower family (Campanulaceae) and is native to California. It occurs in vernal pool habitats and wetlands within the valley and foothill grassland communities and is found in Amador, Fresno, Merced, Napa, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties (CNPS 2018). Dwarf Downingia grows from spiral-lined seeds to a height of 15-27 millimeters (0.6 to 1 in), and its flowers have white or blue, narrowly triangular petals, with two yellow spots near the throat (Jepson Flora Project 2018). There are documented occurrences of the species in the Snelling quadrangle as well as adjacent quadrangles (CDFW 2018). The Project Area does not contain vernal pool habitat; therefore, Dwarf Downingia is unlikely to be present.

Delta Button-celery *Eryngium racemosum*
Delta Button-celery is an annual or perennial herb that is endemic to California. It grows in riparian scrub habitat in seasonally wet clay depressions in floodplains and is found in Amador, Calaveras, Sacramento, Sonoma, and Tuolumne counties (CNPS 2018). It is a glabrous erect plant, approximately 15 to 50 cm in height, with inflorescent heads producing tiny white florets during the blooming period; May through August (Preston et al. 2012a). There are no documented occurrences in CNDDB of the species in the Snelling quadrangle but it is documented in one of the eight adjacent quadrangles, Turlock Lake (CDFW 2018). The Project Area lacks floodplains with clay soils; therefore, Delta Button-celery is not likely to be present.

Spiny-sepaled Button-celery *Eryngium spinosepalum*
Spiny-sepaled Button-celery is an annual or perennial herb that is endemic to California. It is a glabrous erect plant, approximately 30 to 75 cm in height, with spines on the margins of the inflorescence bracts, and having small white flowers in bloom from April to June (Preston et al. 2012b). There are documented occurrences of Spiny-sepaled Button-celery in the Snelling quadrangle as well as in the adjacent La Grange and Merced Falls quadrangles (CDFW 2018). Spiny-sepaled Button-celery occurs in wetland areas particularly vernal pools, swales, and ditches.

The Project Area does not contain vernal pools; therefore, Spiny-sepaled Button-celery is not likely to be present.

Hoover's Spurge *Euphorbia hooveri*
Hoover's Spurge, also known as Hoover's Sanmat, is a prostrate, tap-rooted, annual herb in the spurge family (Euphorbiaceae). It is a California native plant growing exclusively in vernal pools and wetlands, and is found in Butte, Colusa, Glenn, Merced, Stanislaus, Tehama, and Tulare counties (CNPS 2018). It forms growths of mats several inches to several feet across and produces small cup-like flowering structures (cyathium) as in other spurges (Chamaesyce and Euphorbia). Flowers possess petal-like glands that are red to olive in color produced during the blooming period July through late September (Jepson Flora Project 2018). The species is readily distinguished from other species of Chamaesyce by characteristics of growth habit, plant color and leaf shape. It is distinguished from plants in the genus Euphorbia by differences in growth habit, vascular anatomy, and photosynthetic pathway. Hoover's Spurge grows in relatively large, deep vernal pools among the rolling hills, remnant alluvial fans and depositional stream terraces at the base of the Sierra Nevada foothills. It tends to occur where competition from other species has been reduced by prolonged seasonal inundation or other factors. Hoover's Spurge is most concentrated in the northeastern Sacramento Valley, primarily in the Vina Plains of Tehama and Butte counties. It is also present in the Southern Sierra Foothills, including the Visalia-Yettem area of Tulare County and the Hickman-La Grange area of Stanislaus County. Three other occurrences are on the Sacramento National Wildlife Refuge in Glenn County. There are no documented occurrences in CNDDB of the species in the Snelling quadrangle, but it has been documented in Merced County (CDFW 2018). The Project Area does not possess the vernal pool habitat required by Hoover's spurge; therefore, it is unlikely to be present.

Stinkbells *Fritillaria agrestis*
Stinkbells are a perennial bulbiferous herb in the lily family (Liliaceae) and are native to California. The species grows in clay and serpentine soils, in Chaparral, Valley Grassland, Foothill Woodland and wetlands habitats. It is found in Alameda, Contra Costa, Fresno, Kern, Mendocino, Merced, Monterey, Mariposa, Placer, Sacramento, Santa Barbara, San Benito, Santa Clara, Santa Crus, San Luis Obispo, San Mateo, Stanislaus, Tuolumne, Ventura, and Yuba counties (CNPS 2018). The species is an erect plant growing to 5 to 15 cm in height. It has 5 to 12 alternate leaves crowded below the middle of the stem and produces green-white or yellow and purple-brown nodding, ill-scented flowers during the blooming season, March through June (Jepson Flora Project 2018). There are documented occurrences of the species in the Snelling quadrangle (CDFW 2018). The Project Area does not contain the soil types used by Stinkbells; therefore, it is unlikely to be present.

Hogwallow Starfish *Hesperevax caulescens*
Hogwallow Starfish is an erect to decumbent annual herb in the Asteraceae family and is native to California. It grows in mesic, clay, alkaline, and serpentine soils; often on the periphery of vernal pools and wetlands in Valley and Foothill grasslands. It is found in Alameda, Amador, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Merced, Monterey, Napa, Sacramento, San Diego, San Joaquin, San Luis Obispo, Solano, Stanislaus, Sutter, Tehama, and Yolo counties (CNPS 2018). The species is small, growing to less than 20 cm in height and produces inflorescent heads with 1-2 mm disc flowers during the blooming period, March through June (Jepson Flora Project

2018). The species is not documented in CNDDB in the Snelling quadrangle and there are three unprocessed records for the species in adjacent quadrangles (CDFW 2018). The Project Area does not contain vernal pools or soil types used by Hogwallow Starfish; therefore, it is unlikely to be present.

Foothill Jepsonia *Jepsonia heterandra*
Foothill Jepsonia is a perennial herb in the Saxifragaceae family and is native to California. It grows in rocky, metamorphic soils in Foothill Woodland and Yellow Pine Forest communities, commonly occupying crevices in slate-like rock on rocky slopes. The species is found in Amador, Calaveras, El Dorado, Mariposa, Stanislaus, and Tuolumne counties (CNPS 2018). It produces inflorescent heads with 3.5 to 6 mm pink flowers with deep pink veins during the blooming period August through January (Jepson Flora Project 2018). There are no documented occurrences of the species in the Snelling quadrangle but there are three unprocessed records of the species occurring in the following adjacent quadrangles: Merced Falls, Penon Blanco Peak, and La Grange (CDFW 2018). The Project Area does not possess rocky, metamorphic soils; therefore, Foothill Jepsonia is unlikely to be present.

Northern California Black Walnut *Juglans hindsii*
Northern California Black Walnut is a perennial, deciduous tree that is endemic to California. It grows in riparian forests and woodlands at elevations from 0 to 500 meters. The Northern California black walnut grows to heights of 60 feet and blooms in April and May. There are currently only a few confirmed native occurrences of Northern California Black Walnut (CNPS 2018). There were no documented observations of the Northern California black walnut in the Snelling quad but an unprocessed observation occurs in the adjacent La Grange quad (CDFW 2018). Northern California Black Walnut is unlikely to be present as there are few native occurrences currently extant.

Forked Hare-leaf *Lagophylla dichotoma*
Forked Hare-leaf is a California endemic annual plant belonging to the Asteraceae family. It grows in Valley grassland and Foothill Woodland communities and is found in Butte, Calaveras, Fresno, Merced, Monterey, San Benito and Stanislaus counties (CNPS 2018). The species reaches 10 to 60 cm in height and is self-sterile (cannot self-pollinate). It has distal, often glandless leaves, and inflorescences are panicle-like clusters that are minutely hairy. The species produces yellow ray flowers during its April to May blooming period. There are no documented occurrences of the species in CNDDB in the Snelling quadrangle, but the species has been documented in the adjacent Cooperstown quadrangle (CDFW 2018). Forked Hare-lead is unlikely to be present as the Project Area lacks grassland habitat.

Merced Monardella *Monardella leucocephala*
The Merced Monardella is a California endemic annual herb that grows in sandy, mesic areas of valley and foothill grasslands (CNPS 2018). It blooms from May to August. The Merced Mondardella is presumed to be extirpated in California and has not been observed since 1941 (CNPS 2018). Therefore, Merced Monardella is unlikely to be present within the Project Area.

Pincushion Navarretia *Navarretia myersii* ssp. *myersii*
Pincushion Navarretia is a California endemic annual herb that is found associated with valley and foothill vernal pools, often in acidic soils (CNPS 2018). It blooms in April and May with white tube flowers. It is found in Amador, Calaveras, Merced, Placer, and Sacramento counties (CNPS 2018). Pincushion Navarretia has not been documented in the Snelling quadrangle but has been mapped in the adjacent Haystack Mountain quadrangle (CDFW 2018). There are no vernal pools present in the Project Area; therefore, pincushion Navarretia is unlikely to be present.

Shining Navarretia *Navarretia nigelliformis* ssp. *radians*
Shining Navarretia is a California endemic annual herb that is found in vernal pools or clay depressions in foothill woodland and valley and foothill grasslands (CNPS 2018). It is wider than it is high, with gray-green stems and leaves and a white hairy inflorescence (Johnson 2013). Shining Navarretia blooms from May to July. It has not been documented to occur in the Snelling quadrangle but has been mapped in the adjacent quadrangles Haystack Mountain and Yosemite Lake (CDFW 2018). There are no vernal pools or clay depressions present in the Project Area; therefore, Shining Navarretia is unlikely to be present.

Colusa Grass *Neostapfia colusana*
Colusa Grass is a California endemic annual herb belonging to the grass family (Poaceae). It grows exclusively in vernal pool habitat, and is found in Colusa, Glenn, Merced, Solano, Stanislaus, and Yolo counties (CNPS 2018). The species reaches 10 to 30 cm in height with continuous sheath leaves. It produces inflorescences that are cylindrical and dense, with spikelets arranged along an axis breaking between florets during the blooming season May through August. The species is not documented in CNDDB in the Snelling quadrangle but it has been documented in four of the eight adjacent quadrangles: Haystack Mountain, Yosemite Lake, Turlock Lake, and Cooperstown (CDFW 2018). The Project Area does not possess vernal pool habitat that Colusa Grass requires; therefore, it is unlikely to be present.

San Joaquin Valley Orcutt Grass *Orcuttia inaequalis*
San Joaquin Valley Orcutt Grass is a California endemic annual herb belonging to the grass family (Poaceae). The species is a federally threatened, state endangered species. CNPS ranks it as very rare. The species grows almost exclusively in vernal pool habitat, and is found in Fresno, Madera, Merced, Solano, Stanislaus, and Tulare counties. The species grows erect from 5 to 25 cm, occasionally spreading to form mats. It produces inflorescences with irregularly toothed florets during the blooming period April through September. There are no documented occurrences of the species in CNDDB in the Snelling quadrangle but it is documented in two of the eight adjacent quadrangles: Haystack Mountain and Yosemite Lake (CDFW 2018). The Project Area does not possess the vernal pool habitat required by San Joaquin Valley Orcutt grass; therefore, it is unlikely to be present.

Hairy Orcutt Grass *Orcuttia pilosa*
Hairy Orcutt Grass, also called pilose Orcutt grass, is a California endemic annual herb belonging to the grass family (Poaceae). The species is a federally threatened and state endangered species ranked by the CNPS as very rare (CNPS 2018). The species grows almost exclusively in vernal pool habitats, and is found in Glenn, Madera, Merced, Stanislaus, and Tehama counties. The species grows decumbent to erect 5-35cm in length, and is densely hairy. It produces

inflorescences crowded at the tip with florets that have awn tipped teeth during the May through September blooming season. There are no documented occurrences of the species in CNDDB in the Snelling quadrangle but it has been documented in three adjacent quadrangles: Yosemite Lake, Turlock Lake, and Cooperstown (CDFW 2018). The action area does not possess the vernal pool habitat required by Hairy Orcutt Grass; therefore, it is unlikely to be present.

Eel-grass Pondweed *Potamogeton zosteriformis*
Eel-grass Pondweed is an annual aquatic herb that is native to California and flowers in June and July. It has a stem that is generally less than 60 cm long and light green leaves that are submersed and 5 to 20 cm long and 2 to 5 mm wide. Eel-grass Pondweed is found along the margins of ponds, lakes, and streams. The species has not been observed in the Snelling quadrangle but is documented in the adjacent Merced Falls quadrangle (CDFW 2018). The Project Area lacks areas of slow water with silty substrate; therefore, the species is unlikely to be present.

Hartweg's Golden Sunburst *Pseudobahia bahiifolia*
Hartweg's Golden Sunburst, also called Hartweg's pseudobahia, is a California endemic annual herb in the Asteraceae family. The species is listed as federally and state endangered, and the CNPS ranks the species as seriously endangered in California. The species is slender and woolly with one or a few stems and grows to 5-20 cm in height, with mostly linear-oblanceolate leaves. It produces inflorescences with yellow disc flowers during the blooming period March through April. It grows in clay and often acidic soils in valley grasslands and foothill woodlands in Fresno, Madera, Merced, Stanislaus, Tuolumne, and Yuba counties. It occurs primarily in shallow, well-drained, fine-textured soils, nearly always on the north face of "mima mounds." These are mounds of earth with unknown origins, roughly 3 to 30 m in diameter at the base interspersed with basins that pond during the rainy season. The species is found only in the central valley of California. Historically, the range of the species may have extended from Yuba County south to Fresno County. Within this range, the species was only locally abundant. Today, there are 16 populations remaining on the eastern edge of the San Joaquin Valley. Remaining populations are concentrated in the Friant region of Fresno and Madera counties and the La Grange region in Stanislaus County. According to the USFWS, Hartweg's Golden Sunburst has declined because of habitat loss caused by agricultural and urban development, levee construction, pumice mining, cattle grazing, and competition with nonnative weeds, road widening and off-road vehicle use. One population is protected under a conservation agreement between The Nature Conservancy and the U.S. Bureau of Reclamation. The remaining populations continue to be threatened by some or all of the above activities. The species is documented in the Snelling quadrangle and four adjacent quadrangles: Cooperstown, Merced Falls, La Grange, and Haystack Mountain (CDFW 2018). The Project Area does not possess the mima mound habitat required by the Hartweg's Golden Sunburst; therefore, it is unlikely to be present.

Sanford's Arrowhead *Sagittaria sanfordii*
Sanford's Arrowhead is a California endemic perennial, emergent rhizomatous herb. It is found in freshwater marshes including along ponds and ditches. Sanford's arrowhead blooms from May to October. It is found in low elevation areas (< 300 m) from northern to southern California. However, it is currently believed to be extirpated from southern California and most of the Central Valley (CNPS 2018). Sanford's arrowhead has not been documented in the Snelling quadrangle but is documented in the Yosemite Lake adjacent quadrange (CDFW 2018). The Project boundary

only contains small marshes in which Sanford's arrowhead was not observed. It is not likely to be present because it is very rare in the Central Valley and has never been observed in the Snelling quadrangle.

Keck's Checkerbloom *Sidalcea keckii*
Keck's Checkerbloom is California endemic annual herb which blooms from April to May. It is from 6 to 13 inches tall and has pink five petalled flowers (USFWS 2012). Keck's Checkerbloom seeds can remain dormant for long periods of time. It is found in relatively open grassy areas in foothill woodland and valley and foothill grassland on serpentine or clay soils (USFWS 2012). Keck's Checkerbloom is listed as federally endangered (65 FR 7757). It has not been documented in the Snelling quadrangle but has been documented in the Yosemite Lake adjacent quadrangle (CDFW 2018). The Project Area lacks grassy areas with serpentine or clay soils; therefore, the species is likely absent.

Greene's Tuctoria *Tuctoria greenei*
Greene's Tuctoria, also known as Greene's Orcutt Grass or Awnless Spiralgrass, is a California endemic annual herb belonging to the grass family (Poaceae). The species is listed as federally endangered, is a state rare species, and the CNPS ranks the species as seriously endangered. The species grows almost exclusively in vernal pools and is found in Butte, Fresno, Glenn, Madera, Merced, Modoc, Shasta, San Joaquin, Stanislaus, Tulare, and Tehama counties. Eastern Merced County has about 30% of the known occurrences, and the species is presumed extirpated from Fresno, Madera, San Joaquin, Stanislaus and Tulare counties. The species has several to many stems 5 to 15 cm in length, each ending in a spike-like inflorescence that may be partly enfolded in the upper leaf. The bracts are strongly curved and more or less truncate at the apex. The species produces florets during the blooming period May to July. There are no documented occurrences of the species in the Snelling quadrangle but two of the eight adjacent quadrangles have documented occurrences: Cooperstown and Haystack Mountain (CDFW 2018). The Project Area does not contain vernal pool habitat; therefore, Greene's Tuctoria is not likely to be present.

No special-status plant species were observed at the Project Area during pre-project field vegetation surveys (Vaghti and CFS 2017). If special status plants are discovered, they would be flagged and fenced with 100-foot buffers to prevent impact. Implementing these measures would avoid adverse effects on special status plant species and associated habitats. Therefore, the impact to special status plant species would be **less than significant**.

Special Status Wildlife Species
The Project Area includes perched floodplain habitat and heavily impacted riparian areas. There is residual riparian habitat in the Project Area that is used by various wildlife species. Special-status wildlife species are defined as taxa that are: 1) designated as threatened or endangered by the state or federal governments; 2) proposed or petitioned for federal threatened or endangered status; 3) state or federal candidate species; 4) listed as Species of Concern by the USFWS; or, 5) identified by the CDFW as Species of Special Concern. The special-status wildlife species that may potentially occur in the Project Area are described below. Pre-construction surveys shall be conducted for these species and if any are found, the required avoidance and conservation measures will be implemented.

Special-Status Invertebrates

Conservancy Fairy Shrimp *Branchinecta conservatio*

The Conservancy Fairy Shrimp, an anostracan, is found in cool water ponds with low to moderate amounts of dissolved solids. Pools containing conservancy fairy shrimp are seasonally astatic, filled by winter and spring rains, and are generally inundated into June at the latest (Eriksen and Belk 1999). Individuals have been collected November-April, when temperatures are 5°C – 24°C. Hatching occurs about a week after pool filling at 10°C, and at least 19 days are required to reach maturity if water temperatures slowly increase to 20°C. Individuals may live up to 154 days. Only one cohort is produced each year, so both sexes usually disappear long before their native pools are dry. Cysts are produced in large numbers and are relatively small (mean diameter of 0.23 mm) compared to other California fairy shrimp (Eriksen and Belk 1999). The conservancy fairy shrimp is found in grasslands in the northern two-thirds of the Central Valley, at elevations of 16 – 476 ft (4.9 – 145 m). Within this area, populations are even more restricted and occur in just a few fragmented localities. The limited range of the species is within a prime region for agriculture and urban development, which constitute the largest threat to this species (Eriksen and Belk 1999). The Conservancy Fairy Shrimp is a federally listed endangered species. The conservancy fairy shrimp is not documented in the Snelling quadrangle but is documented in the adjacent Haystack Mountain quadrangle (CDFW 2018). This species is not likely to occur within or adjacent to the Project Area as it dependent upon short grass vernal pool landscapes which is absent from within or directly adjacent to the Project Area.

Vernal Pool Fairy Shrimp *Branchinecta lynchi*

The Vernal Pool Fairy Shrimp is federally listed as threatened. It occurs in a wide variety of vernal pool habitats in the coast ranges and Central Valley of California as well as at two locations in southern Oregon's Jackson County (USFWS 2005). The vernal pool fairy shrimp typically occurs in vernal pools but have also been found in alkali pools, ephemeral drainages, stock ponds, roadside ditches, vernal swales, and rock outcrop pools (Helm 1998). The seasonal habitat in which this species is found is usually small and shallow (Helm 1998). It has a rapid life cycle, usually completing reproduction within 40 days, thus allowing it to complete reproduction in its ephemeral habitat (Helm 1998). The Vernal Pool Fairy Shrimp has been observed to live as long as 147 days (Helm 1998). Like other vernal pool crustaceans, cysts of the Vernal Pool Fairy Shrimp remain dormant in the soil when its vernal pool habitats are dry (USFWS 2006b). This species is typically found at elevations from 33 to 4,000 ft (Eng et al. 1990). Mortality has been observed to occur once water temperature exceed 75°F (Helm 1998) or when water temperatures drop below 40°F (Eriksen and Belk 1999). The Vernal pool Fairy Shrimp feeds on algae, bacteria, protozoa, rotifers, and bits of detritus (USFWS 2006b). It is documented in the Snelling quadrangle and five adjacent quadrangles: Haystack Mountain, Yosemite Lake, Merced Falls, Winton and Turlock Lake (CDFW 2018). This species is not likely to occur within or adjacent to the Project Area as it does not contain vernal pool habitat.

Vernal Pool Tadpole Shrimp *Lepidurus packardi*

The Vernal Pool Tadpole Shrimp is a notostracan characterized by few, similarly-sized median spines on its supra-anal plate, which are not placed on a keel, and 35 pairs of legs (Pennack 1989). They are typically found in temporary ponds and swales containing clear to highly turbid water. Pools containing Vernal Pool Tadpole Shrimp are commonly found in unplowed grasslands, and

currently exist in vernal pools ranging from the north end of the Central Valley around Redding to the south Central Valley around Visalia, between the Coast Range and the Sierra Nevada. Within this range, distribution is patchy and generally in clustered vernal pool complexes. The vernal pool tadpole shrimp appears in pools filled by fall and winter rains, re-establishing each year from diapaused (resting) cysts (King et al. 1996). Virtually all pools inhabited by this species become inundated, even during drought years (King et al. 1996). The majority of the sites where Vernal Pool Tadpole shrimp occur are on flat, developable land that has easy accessibility (Cheatham, 1976). As a result, habitat loss constitutes the largest threat to this species. The Vernal Pool Tadpole Shrimp is not documented to occur in the Snelling quadrangle but is documented in three adjacent quadrangles: Yosemite Lake, Turlock Lake, and Haystack Mountain (CDFW 2018). Because this species only occurs in short grass vernal pool landscapes, it is unlikely that this species occurs within the Project Area.

Longhorn Fairy Shrimp *Branchinecta longiantenna*
The Longhorn Fairy Shrimp is a short-lived anostracan found in clear to turbid grass-bottomed vernal pools in unplowed grasslands and clear-water pools in sandstone depressions (Eng et al. 1990). The Longhorn Fairy Shrimp occurs only in ephemeral freshwater habitats that are filled by winter and spring rains (Eriksen and Belk 1999). Only one cohort is produced each year, so both sexes usually disappear long before their native pools are dry. The Longhorn Fairy Shrimp is found in northern, central, and portions of southern California (Eng et al. 1990). Within this area, populations are often discontinuous and occur in just a few fragmented localities. The Longhorn Fairy shrimp is a federally listed endangered species. The CNDDB shows no known occurrences of the Longhorn Fairy Shrimp in or near the Project Area. This species is dependent upon vernal pool landscapes, so is not likely to occur within or directly adjacent to the Project Area.

Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus*
The Valley Elderberry Longhorn Beetle (VELB) is a medium-sized (about 0.8 in [2 cm] long) beetle, with dimorphous sexes; the male forewings are primarily red with dark green spots, while the female have dark metallic green with red margins. Its entire life cycle is associated with elderberry trees in California's Central Valley. In the Central Valley, elderberry trees are associated with riparian forests (Vaghti et al. 2009, USFWS 2014), and the VELB appears to be more abundant in dense native plant communities with a mature overstory and a mixed understory (USFWS 1999). The beetle historically ranged throughout the valley, but recent surveys find it persists only in limited localities along the Sacramento, American, San Joaquin, and Kings rivers and their tributaries. Occurrences have been documented from southern Shasta County to Fresno County (USFWS 2014). Kellner (1992) reported the most observations of VELB along the Merced River and further north. The adult stage is short-lived, and adults are active from early March to early June; mating occurs in May (Barr 1991). Eggs are laid singly, or in groups, along the elderberry bark's crevices, and hatch in about 10 days. Larvae burrow a cavity inside the bark, roots and branches of the elderberry and pupate. Larvae gestate for one to two years before emerging as adults (Barr 1991). They appear to prefer elderberry trees of certain size classes, typically larger mature plants (Kellner 1992). The USFWS Conservation Guidelines for the beetle consider elderberry plants with one or more stems (>0.98 in [2.5 cm]) at ground level to be potential host plants (USFWS 1999). There are 678 elderberry plants present within the Project footprint and some could potentially be occupied by the VELB (**Figure 3**). Formal consultation

occurred with the USFWS for impacts to the VELB and USFWS subsequently issued a concurrence letter for the Project.

To minimize adverse Project Area effects on the VELB, elderberry plants with ground level stem diameter one inch or greater would be avoided or buffered with a 20-ft buffer around the drip line of the plant **(EC-2 – Adaptive Construction Approach to Protect Elderberry Plants, Monitor Survival, and Mitigate for Loss)**. The majority of the 678 elderberry plants present in the Project boundary would be completely avoided, but heavy equipment and dust may disturb some elderberry plants during Project construction activities, which is a **potentially significant impact**. Implementation of **EC-2 - Adaptive Construction Approach to Protect Elderberry Plants** would reduce any potentially significant impacts to VELB to **less than significant**.

Special Status Amphibians

California Tiger Salamander *Ambystoma californiense*

The California Tiger Salamander is an amphibian in the family Ambystomatidae. Adult stages are primarily terrestrial and larval stages are aquatic. It is large and stocky with a broad, rounded snout with small eyes with black irises protruding from their heads. Adult males are about 8 in (20 cm) long, females a little less than 7 in (18 cm). Coloration consists of white or pale yellow spots or bars on a black background on the back and sides. The belly varies from almost uniform white or pale yellow to a variegated pattern of white or pale yellow and black. The California Tiger Salamander is restricted to breeding in vernal pools and seasonal ponds, including many constructed stock ponds, in grassland and oak savannah plant communities, predominantly from sea level to 2,000 ft (609.6 m), in central California. Larvae require significantly more time to transform into juvenile adults than other native amphibians. They are relatively poor burrowers, requiring refuges provided by ground squirrels and other burrowing mammals in which they live underground during dry months. The primary causes of California Tiger Salamander decline are the loss and fragmentation of habitat from urban and agricultural development, land conversion, and other human-caused factors. The California Tiger Salamander requires large contiguous areas of vernal pools (vernal pool complexes or comparable aquatic breeding habitat) containing multiple breeding ponds to ensure recolonization of individual ponds, in association with extensive upland areas. A strong negative association between Bullfrogs (*Rana catesbiana*) and California Tiger Salamanders has been documented (USFWS 2009). Louisiana Crayfish (*Procambarus clarkia*), Mosquitofish, Green sunfish and other introduced fishes also prey on adult or larval salamanders (USFWS 2009). Other impacts to this species include disease, reduction of ground squirrel populations and direct and indirect impacts from pesticides. The introduction of various nonnative tiger salamander subspecies may out-compete the California Tiger Salamander or interbreed with them to create hybrids that may be less adapted to the California climate or are not reproductively viable past the first or second generations. Automobiles and off-road vehicles kill a significant number of migrating California Tiger Salamanders, and contaminated runoff from roads, highways and agriculture may adversely affect them. Suitable breeding and upland habitat is not present in the portion of the Project Area to be disturbed. The range of the California Tiger Salamander does not overlap with the Project Area.

California Red-legged Frog *Rana aurora draytonii*

The California Red-legged Frog *Rana aurora draytonii* is the largest native frog in the western United States, ranging from 1.6 – 5.1 in (4 – 13 cm) long. The abdomen and hind legs of adults

are largely red, and the back has small black flecks and larger irregular dark blotches. The spots on the frogs' backs usually have light centers. Lateral folds are prominent on the back. The frog has indistinct outlines on a brown, gray, olive, or reddish background color. It is most commonly found in quiet pools of streams, marshes, and occasionally ponds. The California Red-legged Frog prefers habitat in aquatic sites with substantial riparian and aquatic vegetation cover, especially those areas that lack invasive predators such as Bullfrogs, bass (*Micropterus* spp.), and sunfish (*Lepomis* spp.) (USFWS 1997). Coastal lagoons, marshes, springs, permanent and semi-permanent natural ponds, ponded or backwater portions of streams, and artificial impoundments such as stock ponds, irrigation ponds, and siltation ponds can all be inhabited by the California red-legged Frog. This species occurs along the Coast Range Mountains from Mendocino County south, and in portions of the Sierra Nevada and Cascade mountain ranges. Sierra populations are highly restricted and consist of small numbers of individuals.

Breeding occurs from late November to April. Females lay loose masses of eggs attached to the undersides of emergent vegetation near the top of the water, and eggs hatch within 6 – 14 days. Within 14 – 21 weeks, tadpoles transform into frogs, and metamorphosis usually occurs in the summer months (USFWS 1997). Human activities that result in habitat destruction and/or the introduction of exotic competitors such as bullfrogs and green sunfish may have a negative effect on this species. There is an unprocessed observation of California Red-legged Frog in the Snelling quadrangle (CDFW 2018). However, pre-construction wildlife surveys for the nearby Merced River Ranch and Henderson Park salmonid habitat restoration projects did not observe California Red-legged Frog. Pre-construction wildlife surveys would be performed for the Project. However, based on previous surveys the California Red-legged Frog is likely absent within the Project Area.

Western Spadefoot Toad *Spea hammondii*
Ranging from 1.5 to 2.95 inches, the Western Spadefoot Toad is a relatively smooth-skinned species; eye is pale gold with vertical pupil; green or grey dorsum often with skin tubercles tipped in orange; whitish color on venter; wedge-shaped black spade on each hind foot (USGS 2004). The toad is nocturnal and can occur in oak woodlands, but is more common in grasslands, scrub, and chaparral; open areas with sandy or gravelly soil (USGS 2004). Breeding occurs in vernal pools and other temporary rain pools, water or feed tanks, and pools of intermittent streams. Breeding occurs after heavy rainfall creates the temporary shallow rain pools preferred for breeding, generally January through May. Western Spadefoot Toad habitat is characterized by open, grassy areas in vernal pool habitats. The preferred habitat of the species is not present within or near the Project location, therefore this species is unlikely to occur.

Special Status Reptiles

Western Pond Turtle *Emys marmorata*
The Western Pond Turtle is a CDFW species of special concern. Its status is currently under review by the USFWS to determine if it warrants listing under the federal ESA (80 FR 19259). The Western Pond Turtle is typically 3.5 to 8.5 in in shell length with a marbled carapacial pattern and drab coloration; dark brown, olive brown, or blackish. The Western Pond Turtle is found in California in the coast ranges north of Santa Cruz and in the Central Valley west of the Sierra crest, and there are also isolated populations near Susanville and in the Truckee, Carson, and East Walker rivers (Spinks et al. 2014). The Western Pond Turtle is typically found at elevations from sea level to 5,000 ft in a wide variety of aquatic habitats including rivers, streams, lakes, ponds,

and marshes as well as human created habitat such as irrigation ditches and sewage treatment ponds. Structures such as logs, rocks, bedrock outcrops, and exposed banks are required for basking. The western pond turtle preferred aquatic habitats with access to deep, slow water containing underwater refugia (Ashton et al. 1997). In some environments the western pond turtle may spend half the year or more on land (Ashton et al. 1997). In both aquatic and terrestrial environments, this species demonstrates a high degree of site fidelity, with males using a larger aquatic home range than females (Ashton et al. 1997). Mating takes place underwater in the spring and mature females typically oviposit every other year (Ashton et al. 1997). Oviposition occurs on land, from just above the floodplain to a few thousand ft from water, and the nest typically occurs in sparsely vegetated areas of annual grasses and herbs with dry soil, with the clutch size typically from 4 to 7 eggs (Ashton et al. 1997). In northern California, hatching occurs in the fall, and the hatchlings usually remain in the nest chamber over the winter and emerge in spring (Holland 1994). In lakes and ponds, the Western Pond Turtle generally overwinters underwater by burying itself in the mud, while turtles in streams and rivers overwinter on land by burrowing in the duff or soil (Ashton et al. 1997). The Western Pond Turtle is a dietary generalist, feeding on both live prey and browsing on plants as well as scavenging carrion (Ashton et al. 1997). Commonly consumed food items include aquatic macroinvertebrates, crustaceans, annelids, and carcasses of mammals, birds, reptiles, amphibians, and fish (Ashton et al. 1997). The altered flow regime and cold water temperatures in rivers below dams have been found to have negative effects on basking behavior, growth, development, and body condition in the Western Pond Turtle, which has implications for reproductive output and population fitness (Ashton et al. 2011). There is potential for competitive exclusion by introduced species such as the Bullfrog or Largemouth Bass. Habitat destruction is also noted as a reason for decline (Jennings et al. 1992). The greatest threats to the species are the predation of hatchlings by the introduced, non-native Bullfrog and habitat loss due to urbanization.

The Project Area overlaps the range of the Western Pond turtle and contains potentially suitable aquatic habitat for the western pond turtle. The Project construction activities have the potential to cause harassment, injury, or mortality to the Western Pond Turtle, if it is present. This would be a **potentially significant** impact. However, implementation of **EC-3 - Monitor for Fish and Wildlife to Prevent Impacts** would reduce impacts to Western Pond turtle to **less than significant**.

Giant Garter Snake *Thamnophis gigas*

The Giant Garter Snake is both a federally and state threatened species (Fisher et al. 1994). Wood et al. (2015) found levels of inbreeding and evidence of population bottlenecks in about half of populations sampled. The Giant Garter Snake is a large snake with keeled dorsal scales and a head slightly wider than the neck. Ground color is brown or olive to black. There is typically a yellowish dorsal stripe, a light yellowish stripe on each side, and two rows of dark blotches on the sides. Giant Garter Snakes in the Sacramento Valley often have distinct stripes and a dark ground color. The underside is light brown or light grayish. This species is endemic to California and ranges from Glenn County to the southern edge of the San Francisco Bay-Delta, and from Merced County to northern Fresno County, apparently no longer occurring south of northern Fresno County. The Giant Garter Snake is found in small, isolated patches of highly modified agricultural wetlands as 93% of historical wetlands in the Central Valley have been lost (Wood et al. 2015). This species is highly aquatic and prefers marsh and wetland type habitat including sloughs,

drainage canals, and irrigation ditches associated with rice cultivation (Halstead et al. 2014). The giant garter snake is not likely found at the Project Area as it does not contain suitable wetland habitat.

Special Status Birds

Cooper's Hawk *Accipiter cooperii*

The Cooper's Hawk is a medium-sized hawk with an elongated body. Individuals have a blue-gray back with a light nape and dark crown. The Cooper's Hawk can be distinguished from similar species by its long-barred tail with a rounded tip (Dewey and Perepelyuk 2000). Adults range from 13.8 – 19.7 in (35 – 50 cm) in length and average ~1.2 lb (~525 g) in weight (Johnsgard 1990; Peterson and Peterson 2002). The Cooper's Hawk is native to nearctic and neotropical regions and can be found wintering as far north as the northern U.S. and southern Canada and as far south as Costa Rica. The species prefers deciduous and mixed forests but can also be found in other open woodland habitats (Johnsgard 1990; Dewey and Perepelyuk 2000). The Cooper's Hawk is monogamous, and breeding begins in March and occurs once each year. Females deposit 3 – 6 eggs in a stick-built nest and hatching occurs in 32 – 36 days (Dewey and Perepelyuk 2000; Peterson and Peterson 2002). Common diet items include birds and small mammals (Dewey and Perepelyuk 2000). The Cooper's Hawk is likely to occur in the Project Area.

Tri-colored Blackbird *Agelaius tricolor*

The Tri-colored Blackbird ranges from Northern California in the U.S. (with occasional strays into Oregon and Washington) to upper Baja California in Mexico. The USFWS is currently performing a status review of this species to determine if it warrants listing under the ESA (80 FR 56423). The Tri-colored Blackbird forms the largest colonies of North American landbirds, as it is highly social and gregarious. Nesting colonies may consist of tens of thousands of individuals. This social nature makes the bird vulnerable to impacts from urban and agricultural land uses. Native freshwater marshes consisting of cattails and bulrushes once used for nesting and feeding have been lost to urban and agricultural development (Shuford and Gardali 2008). Birds adapting to nesting in agricultural fields have been disturbed by harvesting during the breeding season.

Burrowing Owl *Athene cunicularia*

The Burrowing Owl is a small, long-legged owl with bright yellow eyes. The beak can be yellowish or greenish depending on the subspecies. The owls have prominent white eyebrows and a white chin patch. The breast and belly are white with variable brown spotting or barring. Burrowing Owl populations in California have been greatly reduced over the past fifty years due to urban development in prime habitat areas. This species has not been observed in the Project Area, and the Project Area lacks the sandy substrate it requires for burrowing, therefore the Burrowing Owl is not likely to be present.

Golden Eagle *Aquila chrysaetos*

The Golden Eagle is a large, dark brown raptor with a wide distribution throughout the Northern Hemisphere. It is uncommon in California except for an isolated area in the middle of the Central Valley (CDFG 2005). The Golden Eagle is typically found in rolling foothills, mountainous areas, sage-juniper flats, and deserts, and require open terrain for hunting small mammals that make up most of its diet (CDFG 2005). Nesting takes place on cliffs and in large trees, and nest sites are

reused in successive years (CDFG 2005). Breeding occurs from late January through August (CDFG 2005). The Golden Eagle has not been observed in the Project Area and is unlikely to be nesting within the Project Area.

Ferruginous Hawk *Buteo regalis*
The Ferruginous Hawk is the largest hawk in North America. It hunts small mammals in open areas such as prairies and grasslands. The Ferruginous Hawk is present in the Central Valley during the winter. The Project would be constructed outside of the period when the ferruginous hawk is present in the Central Valley.

Swainson's Hawk *Buteo swainsoni*
The Swainson's Hawk is a medium-sized hawk that breeds in California and may migrate to Mexico and South America in the winter. It often nests adjacent to riparian systems of the valley and in lone trees or groves of trees in agricultural fields. Valley oak, Fremont Cottonwood, black walnut and large willows are the most commonly used nest trees in the Central Valley. This species also requires large open grasslands with suitable nest trees and abundant prey. Migrating individuals move south through the southern and central interior of California in September and October, and north March through May. Breeding occurs late March to late August. Nesting occurs primarily in the southern Sacramento Valley and northern San Joaquin Valley regions (Stillwater Sciences 2005). Swainson's Hawk has been documented in the Project Area (CFS unpublished data).

Northern Harrier *Circus cyaneus*
The Northern Harrier is an Accipiter hawk. Individuals have specialized feathers in the shape of a disk to focus sound into their ears, a white rump patch visible in flight, and wings that form a dihedral when gliding (Wheeler and Clark 1987). Adults range from 16.1 – 19.7 in (41 – 50 cm) in length and average ~1 lb (~450 g) in weight (Limas 2001). The northern harrier is found throughout the northern hemisphere and is known to breed from Alaska and Canada in northern North America to Baja California in southern North America. North American populations winter from southern Canada to Central America (Macwhirter and Bildstein 1996). The species prefers open habitats, such as fields, meadows, and marshes, but is also found in agricultural areas and riparian zones (Wheeler and Clark 1987; Macwhirter and Bildstein 1996). The northern harrier nests in loose colonies and breeding occurs from April through September. Nests are built on the ground on raised mounds (Limas 2001). Home range sizes vary and average 642 acres (~2.6 km^2) (Macwhirter and Bildstein 1996). Common diet items include small mammals, birds, reptiles, and amphibians (Wheeler and Clark 1987; Macwhirter and Bildstein 1996).

White-tailed Kite *Elanus leucurus*
The White-tailed Kite is a resident of coastal and valley lowlands west of the Sierra Nevada Mountains. The monogamous raptor breeds from February to October. Nests are built in loosely piled sticks near the tops of tree stands (Dixon et al. 1957) and a single clutch may contain 4 – 8 eggs. The species preys on small mammals, and other birds, insects and reptiles. They are solitary hunters but may roost communally (Dunk 1995). Essential habitats include herbaceous lowlands with limited tree growth and dense tree groves for perching and nesting. Urbanization of agricultural lands may have contributed to the decline of the white-tailed kite (Kalinowski and

Johnson 2010). The White-tailed Kite likely nests along the Merced River; therefore, this species may be present within the Project Area.

Bald Eagle *Haliaeetus leucocephalus*
The Bald Eagle is a large Accipiter with a brown body and white head and tail. Adults can have wingspans up to 7.5 ft (2.3 m) and average ~6.8 lb (~3.1 kg) in weight. Historically, the bald eagle was found throughout North America, from Alaska and northern Canada to Baja California and the Gulf of Mexico. Currently, most populations are limited to the northern portion of their historic range; however, the Bald Eagle can live anywhere in North America with adequate nesting sites and open water (Snyder and Snyder 1991). The Bald Eagle requires large bodies of water or free-flowing rivers. The Bald Eagle may be present within the Project Area.

Yellow-breasted Chat *Icteria virens*
The Yellow-breasted Chat is a very large, aberrant warbler with distinctive plumage. It has olive green to grayish upper parts with lemon-yellow chin, throat, and breast; the large bill is strongly curved. The face of this species is grayish with black lores, white supercilium, and white eye-crescent on lower eye-lid (Eckerle and Thompson 2001). It is an uncommon summer resident and migrant in coastal California and in foothills of the Sierra Nevada. The Yellow-breasted Chat is present in portions of the northern Sacramento Valley (Shuford and Gardali 2008). The breeding and nesting period extends from late April through September. Nesting yellow-breasted chat select early successional riparian habitat with a mature shrub layer and open canopy with nesting habitat typically only found along streams and rivers (Shuford and Gardali 2008). The Yellow-breasted Chat may occur in the Project Area; however, they are an uncommon summer resident, migrating through areas near the Project Area on the Merced River during the summer months (McCaskie et al. 1979).

Osprey *Pandion haliaetus*
The Osprey is a large bird of prey in the Accipiter family. Adults range from 21.7 – 22.8 in (55 – 58 cm) in length and 2.6 – 4.4 lb (1.2 – 2.0 kg) in weight, with wingspans ranging from 57.1 – 66.9 in (145 – 170 cm) (Kirschbaum and Watkins 2000). On average, the female osprey weighs 20% more than the male and has a 5% – 10% greater wingspan (Poole 1994). Individuals have a dark stripe through each eye, a dark brown back, and a white underside with dark brown patches at the carpal joints (Poole 1989). The Osprey has a worldwide distribution, with four sub-species that winter or breed on every continent except Antarctica. Of the four sub-species, *Pandion haliaetus carolinensis* is the only sub-species common in North America. This sub-species winters in South America and can be found breeding throughout North American and the Caribbean (Kirschbaum and Watkins 2000). Osprey are able to survive anywhere with adequate nesting sites and abundant fish. Nest sites are typically within 1.9 – 3.1 mi (3 – 5 km) of water and are commonly found near marshes, swamps, lakes, or rivers (Poole 1989). In North America, Osprey are migratory and typically begin breeding in April or May (Poole 1989). Females lay an average of three eggs per year, and eggs hatch within 32 – 43 days (Kirschbaum and Watkins 2000). Home range size varies from 2,471 – 3,459 ac (10 – 14 km^2), depending on the season (Poole et al. 2002). Osprey are almost exclusively piscivorous (Kirschbaum and Watkins 2000) and are known to forage along the Merced River and have been observed in locations surrounding the Project Area.

Least Bell's Vireo *Vireo bellii pusillus*
The Least Bell's Vireo is both state and federally listed as Endangered. It was once a common breeder in riparian areas throughout the Central Valley and southern California. Currently, almost all breeding records are restricted to southern California; breeding records are very rare in the Central Valley and entirely absent from the Sacramento Valley portion (USFWS 2006a, Howell et al. 2010). The primary factors for the decline of Least Bell's Vireo are cowbird parasitism and habitat loss and degradation (Kus 2002). Recently, breeding and attempted breeding by the Least Bell's Vireo has been documented in a riparian enhancement area on the San Joaquin River National Wildlife Refuge near Modesto (Howell et al. 2010). Prior to these recent observations, no nesting pairs had been confirmed in the San Joaquin Valley for 50 years (Howell et al. 2010). The Least Bell's Vireo spends its winter in southern Baja California and starts arriving in California for breeding in mid to late March (Kus 2002). This species usually leaves its breeding grounds by September (Kus 2002). The Least Bell's Vireo eats insects from leaves or bark (Kus 2002). Nesting typically occurs in early to mid-successional riparian vegetation, which provides dense shrub cover for hiding the nest and foraging within the structurally diverse canopy (Kus 2002). The Least Bell's Vireo is not likely to be found within the Project area, as it is very rarely observed in the Central Valley.

The riparian habitat within the Project Area may be used by nesting raptors and migratory birds. Project construction activities (15 July – 15 November) would overlap with the breeding season for some raptors and migratory birds (1 February – 31 August), resulting in the potential for adverse impacts. The potential adverse impacts include removal of habitat serving as nesting, roosting, or foraging locations and disturbance from construction equipment, including noise, and human presence during construction activities. These adverse impacts are **potentially significant**.

Pre-construction wildlife surveys would be performed annually before the start of any construction activities to determine if there are special status birds nesting in or nearby the Project Area (**EC-3 – Monitor for Fish and Wildlife to Prevent Impacts**). If special status bird nesting is confirmed, an appropriately sized, no-disturbance buffer would be created around each nest. Implementation of **EC-4 - Protect and Compensate for Native Trees, EC-5 - Work Outside of Critical Periods for Sensitive Species,** and **EC-3 - Monitor for Fish and Wildlife to Prevent Impacts** would reduce impacts to special status birds to **less than significant**.

Special status Mammals

Pallid Bat *Antrozous pallidus*
The Pallid Bat is a large, light colored bat with large prominent ears. It is common in desert and grassland habitats throughout the southwestern U.S., especially in areas near water (Hermanson and O'Shea 1983). The Pallid Bat roosts in small colonies in rock crevices and man-made structures, and rarely in caves. Diurnal roosts may be shared with other bat species such as the Brazilian Free-tailed Bat and Yuma myotis (Hermanson and O'Shea 1983). The Pallid Bat forages between 0.5 and 2.5 km from the day roost. Although locally common, populations are very sensitive to disturbance of roosting sites. The Pallid Bat has been documented within the Snelling quadrangle and four adjacent quadrangles in the CNDDB database. Neighboring bridges may serve as a summer maternity roost for this species, with the adjacent riparian corridor serving as summer foraging habitat.

Townsend's Big-eared Bat *Corynorhinus townsendii*
Townsend's Big-eared Bat is a medium-sized, light brown bat with very large ears. This species specializes in eating moths and other insects. They have been known to occur throughout California, but the details of its distribution are not well known. Once considered common, this species is now considered uncommon in California. It is most abundant in mesic habitats, prefers cave habitat, and is easily disturbed by human encroachment. No caves occur in the Project Area; therefore, the Townsend's Big-eared Bat is not likely to be present.

Western Mastiff Bat *Eumops perotis californicus*
The Western Mastiff Bat is a very large free tailed bat. Two of its distinguishing characteristics are long narrow wings and large rounded ears that are joined at the mid-line across the forehead and project forward, extending beyond the nose. An additional characteristic is the tail, which extends far beyond the interfemoral membrane. The color of the body and membranes are dark to brownish gray while slightly paler below. This is an uncommon bat in California's arid and semiarid lowlands in the lower Sonoran life zone. This bat is not likely to occur in the Project Area.

Silver-haired Bat *Lasionycteris noctivagans*
The Silver-haired Bat is dark in color with white-tipped dense fur, giving it a silver or frosty appearance. The silver-haired bat is distributed in foothill and mountainous areas throughout California. Summer habitat includes coastal and montane coniferous forests, valley foothill woodlands, pinyon-juniper woodlands, and valley foothill and montane riparian habitats. This species typically forages in or near coniferous and/or mixed deciduous forests adjacent to ponds or other sources of water (Davis and Schmidly 1994). The silver-haired bat is known to roost in tree cavities or in crevices on tree trunks. This species has not been observed in the Project quadrangles within the CNDDB (2018) database; therefore, is unlikely to be present.

Western Red Bat *Lasiurus blossevillii*
The Western Red Bat has an upper body that is brick red to rusty red washed with white; males are usually more brightly colored than females. This species is locally common in some areas of California, occurring from Shasta County to the Mexican border, west of the Sierra Nevada/Cascades Crest, and deserts. Roosting habitat includes forests and woodlands between sea level and mixed coniferous forest. Preferred roost sites are in edge habitat adjacent to streams, fields, or urban areas. Roost sites are usually solitary and can be between 2 ft and 40 ft (0.6 m and 12.2 m) from the ground. The Western Red Bat has been observed in the Snelling quadrangle and three adjacent quadrangles within the CNDDB database (CDFW 2018). Cottonwood riparian habitat associated with the Merced River provides significant roosting and foraging habitat for reproductive female Western Red Bats during the summer, and the species may be present within the Project Area.

Hoary Bat *Lasiurus cinereus*
The Hoary Bat is a large bat, dark brown and grey in color, tinged with white resulting in a frosted effect. This species has a patch on the throat that is unmistakably yellow (Shump and Shump 1982; Barbour and Davis 1969). The Hoary Bat is the most widespread North American bat and can be found anywhere in California. It roosts in large trees with medium to dense foliage and emerges 3-5 hours after sunset to feed. The Hoary Bat has been observed within the Snelling

quadrangle and three adjacent quadrangles (CDFW 2018), and is therefore likely to be present within the Project Area

Yuma Myotis *Myotis yumanensis*
The Yuma Myotis is a common and widespread bat occurring throughout California at elevation lower than 11,000 ft in open forest and woodlands near a water source (Zeiner et al. 1990). This species is light to dark brown in color with light underparts and is approximately 73 to 91 mm in total body length. The Yuma Myotis forages after sunset and can be found roosting in dark places such as crevices, caves, mines, or buildings (Barbour and Davis 1969). No caves occur in the Project Area; therefore, the species is unlikely to be present.

American Badger *Taxidea taxus*
The American Badger is a large, gray to reddish colored member of the weasel family (Mustelidae). This species is short and stout with a flattened body that is built for digging. Adults range from 20.5 – 34.4 in (52.0 – 87.5 cm) in length and may weigh up to 26.5 lb (12 kg) (Shefferly 1999). The American Badger is common in the Great Plains region of North America, but can be found throughout central and western Canada, the western U.S., and northern Mexico. The eastern limit of the species' range is Ontario, Canada (Kurta 1995; Long 1999). The American Badger prefers dry, open grasslands, but can also be found in mountain and desert regions (Long 1999). This species is primarily active at night when it digs burrows in search of rodent prey (Shefferly 1999). Dens are up to 9.8 ft (3 m) below the surface and may contain up to 32.8 ft (10 m) of tunnels (Kurta 1995; Long 1999). Home ranges are typically small (395 to 593 acres; Shefferly 1999) but expand during mating season in late summer through early autumn (Long 1999). The American Badger may be present within the Project Area.

San Joaquin Kit Fox *Vulpes macrotis mutica*
The San Joaquin Kit Fox is the largest of the eight subspecies of kit fox and is comparable in size to a large cat. The San Joaquin Kit Fox is primarily nocturnal, but is occasionally active during the day, and pups may be seen playing near the den. A mated kit fox pair may use up to 39 dens in a single year, although a fox usually spends its primarily solitary life within a 1 – 2 square mile area. It either digs the dens itself or enlarges a squirrel or badger den. Natal dens, generally the largest and most complex type of den, may be constructed over a period of several years (Morrell 1972). Kit fox are also known to use manmade structures, such as small-diameter culverts. The San Joaquin Kit Fox historically inhabited the semi-arid regions of California's Central Valley and adjacent foothills. Much of this range has been reduced as a result of agricultural and urban development, and the San Joaquin Kit Fox is now primarily found in the grasslands and scrub habitats of the southern San Joaquin Valley. They are also found in and adjacent to agricultural and urban areas (Spiegel et al. 1996). In 1965, the California Fish and Game Commission classified the San Joaquin kit fox as a protected furbearer, and in 1971 the State classified it as "rare" (now Threatened) under the 1970 California ESA. The U.S. Secretary of the Interior listed the subspecies as Federally Endangered under the Endangered Species Protection Act of 1973, as amended.

In the north, habitat is so fragmented by urbanization and agriculture that this portion of the population is very close to extinction. Throughout their range, the San Joaquin Kit Fox are also subject to disease, predation, roadkill, off-road vehicles, shooting, trapping, and rodenticide

mortality. The San Joaquin Kit Fox has not been observed in the Snelling quadrangle but was documented in the adjacent La Grange quadrangle (CDFW 2018). Potential habitat for the San Joaquin Kit Fox is present within a mile of the Project Area in remnant expanses of intact grassland habitat; however, this habitat does not exist within the Project Area, nor does it have the friable soils needed for denning. The species is not likely to occur within the Action Area.

Riparian vegetation in the Project Area may provide roosting and foraging habitat for special status bat species, including the Pallid Bat, the Western Red Bat, and the Hoary Bat. Project construction activities (15 July – 15 November) would overlap with the bat breeding season (1 April – 15 August) resulting in the potential for adverse impacts. The potential adverse impacts include removal of roosting habitat and disturbance from construction equipment, including noise, and human presence during construction activities. It is not anticipated that any trees that could potentially be used by bats for roosting would be removed as the Project would avoid removing large riparian trees. However, disturbance of roosting special status bats is a **potentially significant** impact.

Pre-construction bat surveys would be conducted annually prior to Project initiation and, if roosting bats are observed, a minimum 300 ft (91.4 m) buffer of roosting bats, maternity roosts or winter hibernacula until all young bats have fledged (**EC-6 - Monitor for Bats to Prevent Impacts**). Implementation of **EC-4 - Protect and Compensate for Native Trees, EC-5 - Work Outside of Critical Periods for Sensitive Species,** and **EC-6 - Monitor for Bats to Prevent Impacts** would reduce impacts to special status bats to **less than significant.**

Special Status Fish Species

The quantity and quality of salmonid habitat in the Merced River below Crocker-Huffman Diversion Dam has been greatly affected by anthropogenic disturbance. Spawning and rearing habitat are degraded by numerous historical and current impacts including; gold and gravel mining, development, diking of floodplains, and overall alteration of the lower Merced River system. Without inundation, the floodplains cannot provide terrestrial food for juvenile salmon or organic matter that helps produce more food within the river. Moreover, the lack of peak flood flows allows encroachment of riparian vegetation, which along with the engineered levees, tend to confine flows to the river channel. This in turn accelerates the rate that gravel is scoured from spawning and rearing habitat. With higher scour rates, spawning and rearing habitat tends to erode away and the river tends to incise (Kondolf et al. 1996).

Special-status fish species are defined as taxa that are: 1) designated as threatened or endangered by the state or federal governments; 2) proposed or petitioned for federal threatened or endangered status; 3) state or federal candidate species; or 4) identified by the CDFW as Species of Special Concern. Of the special-status species identified by the USFWS or from the California Natural Diversity Data Base, only fall-run Chinook Salmon, *O. mykiss*, Pacific Lamprey, River Lamprey, Kern Brook Lamprey, Splittail, Riffle Sculpin, and Hardhead may occur in the Project Area.

Riffle Sculpin *Cottus gulosus*

The Riffle Sculpin is a CDFW species of special concern. The population present in the San Joaquin River and its tributaries is genetically distinct from other populations (Baumsteiger 2013). In the San Joaquin River watershed they are found in most tributaries on the east side of the valley from the Mokelumne River south to the Kaweah River (Moyle et al. 2015). Riffle Sculpin show

considerable genetic differences among populations in the San Joaquin River tributaries, suggesting that each tributary contains an isolated population with little historic gene flow to other populations (Baumsteiger 2013, Moyle et al. 2015). The Riffle Sculpin is only found in permanent cold water streams (Moyle et al. 2015). Individuals can reach 16 cm in total length and live for 4 or more years, but most adults are 6 to 8 cm long and 2 to 3 years old (Moyle et al. 2015). The Riffle Sculpin spawns in February, March, and April; spawning occurs under rocks in riffles or in the cavities of submerged logs (Moyle et al. 2015). Both larvae and adults have poor dispersal ability, with larvae being benthic and remaining close to where they were born (Moyle et al. 2015). Due to poor dispersal, the Riffle Sculpin is found in increasingly isolated watersheds in the Central Valley (Moyle et al. 2015). The Riffle Sculpin feeds mostly at night, primarily consuming benthic invertebrates, particularly mayflies, caddisflies, and stoneflies (Moyle et al. 2015). The Riffle Sculpin may be present in the lower Merced River within the Project Area, however it has not been observed.

Pacific Lamprey *Entosphenus tridentatus*
The Pacific Lamprey is a CDFW species of special concern and a federal species of concern. This species is distributed around the Pacific Rim from Japan to Baja California. It is a large lamprey, reaching 80 cm TL and anadromous and parasitic. The Pacific Lamprey does not appear to home to natal streams, as little genetic variation has been observed in populations from British Columbia to southern California (Goodman et al. 2008). Instead, they appear to detect pheromones released by ammocoetes present in the river, and do not migrate upstream in a river that lacks ammocoetes (Goodman and Reid 2012). The result is a source –sink dynamic for Pacific Lamprey, in which large river systems containing robust populations serve as sources for smaller rivers and streams that can be sinks (Moyle et al. 2015).

The Pacific Lamprey has diverse life histories, with some rivers containing two distinct runs; one that returns in the spring and spawns immediately after upstream migration and another that migrates upstream in the fall and would spawn the following spring (Moyle et al. 2015). Most adult Pacific Lamprey spawning migrations occur between March and late June, with upstream movement typically occurring during the night (Moyle et al. 2015). Spawning typically occurs from April to July in low gradient stream reaches, with both sexes working together to create a nest in the gravel present in the tailouts of pools and riffles (Goodman and Reid 2012). The deposited eggs in the nest hatch into ammocoetes which are transported downstream to a low gradient silty area where they burrow in tail first and filter feed on detritus, diatoms, and algae (Goodman and Reid 2012, Moyle et al. 2015). Throughout the ammocoete life stage, individuals leave their burrows and drift to a new area at night (Moyle et al. 2015). After 4 to 7 years, ammocoetes metamorphose into macropthalmia in which they develop large eyes, a sucking disc, and silvery coloration as well as physiological changes that allow them to survive in salt water (Moyle et al. 2015). Once metamorphosis is complete macropthalmia migrate downstream to the ocean, typically during high flow events of winter and spring (Goodman et al. 2015). Pacific lamprey in the ocean are parasitic on fishes and smooth skinned marine mammals (Goodman and Reid 2012).

Pacific Lamprey populations have declined in the Pacific Northwest and California (Goodman and Reid 2012). In California, the Pacific Lamprey has been extirpated from 55% of their historical habitat north of Point Conception primarily due to impassable dams (Goodman and Reid 2012).

The Pacific Lamprey has undergone a range contraction northward, with no viable populations currently existing south of the Big Sur River (Goodman and Reid 2012). The primary threats to the Pacific Lamprey in California are passage barriers, flow management, and water and habitat quality issues (Goodman and Reid 2012). The Merced River population, as part of the lower middle San Joaquin Unit, was ranked as vulnerable by the Pacific Lamprey Assessment and Template for Conservation Measures in California (Goodman and Reid 2012). The Pacific Lamprey is still present in the lower Merced River (CFS unpublished data) and may be present within the Project Area, however it has not been observed.

River Lamprey *Lampetra ayresii*
The River Lamprey is a CDFW species of special concern. This species is small, reaching 12 in TL, anadromous and parasitic. It is found in coastal rivers and streams from just north of Juneau, Alaska to San Francisco Bay (Moyle et al. 2015). The river lamprey tends to be found in the lower reaches of larger rivers such as the Fraser, Columbia, Klamath, Eel, and Sacramento rivers (USFWS 2004). However, the River Lamprey has been little studied throughout its range and detailed information on life history, distribution and abundance is lacking (USFWS 2004). River lamprey adults make their spawning migration in the fall and then spawn in the winter or spring (Moyle et al. 2015). The species spawns in small, gravel bottomed tributary streams at the upstream end of riffles, with both sexes working together to build the nest (USFWS 2004, Moyle et al. 2015). Ammocoetes filter feed in low velocity, depositional areas containing fine sediment for 3 to 5 years. Metamorphosis into adults starts during the summer and can take up to 10 months with entry into the ocean occurring in late spring (Moyle et al. 2015). The River Lamprey spends 3 to 4 months in the ocean parasitizing primarily herring and salmon (Moyle et al. 2015). There is a lack of knowledge regarding River Lamprey in California, particularly in regards to habitat requirements and environmental tolerances (Moyle et al. 2015). In the Sacramento River system, the River Lamprey has been observed spawning in Cache Creek and captured in the Knight's Landing rotary screw trap (Moyle et al. 2015). The river lamprey may be present in the lower Merced River in some years, including within the Project Area, however it has not been observed.

Hardhead *Mylopharodon conocephalus*
The Hardhead is a special status freshwater fish native to California and limited to the Sacramento-San Joaquin and Russian river systems (Moyle 2002). This species is a large minnow with a slender, deeper body and pointier snout compared to the Sacramento Pikeminnow. The Hardhead is brown or dusky bronze in color. The Hardhead is typically found in small to large streams in a low to mid-elevation environment. It is an omnivore and eat benthic invertebrates, aquatic plants, and algae, in general. Juvenile Hardhead may be found at various temperature gradients, in shallow regions and deeper lake habitats. Spawning occurs in May and June in the sand, gravel and rocky areas of pools and side pools. Juveniles feed on plankton, insects, and small snails (Reeves 1964). Moyle and Nichols (1973) reported that the overall population of Hardhead has been declining rapidly. The Hardhead is present in the lower Merced River, and has been captured in recent seine surveys immediately downstream from the Project Area (CFS unpublished data).

California Central Valley steelhead *Oncorhynchus mykiss*
The CCV steelhead distinct population segment (DPS) includes all naturally spawned populations of steelhead in the Sacramento and San Joaquin rivers and tributaries. Propagated stocks from

Coleman National Fish Hatchery on Battle Creek and the Feather River Hatchery are also included in the CCV steelhead DPS (NMFS 2014). CCV steelhead critical habitat is designated in Central Valley rivers and streams from the Sacramento River in the north to the Merced River in the south.

O. mykiss have the greatest diversity of life history patterns of any Pacific salmonid species, including varying degrees of anadromy, differences in reproductive biology, and plasticity of life history within a genetic lineage. For anadromous *O. mykiss*, adult migration from the ocean to Central Valley spawning grounds occurs during much of the year, with peak migration occurring in the fall or early winter. Migration through the Sacramento River main stem begins in July, peaks at the end of September, and continues through February or March (Bailey 1954, Hallock et al. 1961; as cited in McEwan and Jackson 1996). CCV steelhead are mostly 'winter steelhead'; that is, they mature in the ocean and arrive on the spawning grounds nearly ready to spawn. Winter steelhead prefer cold water between 55°F – 70°F (13°C – 21°C) that is saturated with dissolved oxygen. In the Merced River, two forms of *O. mykiss* potentially exist: the resident form that remains in the river its entire life, and the anadromous form that migrates to the ocean and returns to the river to spawn, potentially multiple times. However, no data collected to date has confirmed definitively that the anadromous form is currently present in the Merced River (Pearse and Garza 2015, Zimmerman et al. 2009).

While little information has been collected on migration patterns for the San Joaquin River tributaries, migration has been observed on the lower Mokelumne River as early as August and as late as May, with peaks in January and February (Workman 2005). CCV steelhead typically return from the ocean at ages two or three, weighing 2 – 12 lbs (0.9 – 5.4 kg) (Reynolds et al. 1993). Steelhead are generally iteroparous, so some may return to the ocean and repeat the spawning cycle (Narum et al. 2008).

CCV steelhead typically use riffle transitions and riffles for spawning. *O. mykiss* in the Merced River likely spawn during a similar timeframe to other *O. mykiss* populations in Central Valley rivers, but formal spawning surveys have not been conducted. The number of days required for CCV steelhead eggs to hatch is inversely proportional to water temperature and varies from about 19 days at 60°Fahrenheit (F; 15.6 ° Celsius[C]) to about 80 days at 42°F (5.6°C). Embryo incubation occurs from January through May, and fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986). Upon emerging from the gravel, fry rear in stream margin habitats and move gradually into pools and riffles as they grow larger. In the Merced River, juvenile *O. mykiss* begin to emerge from upper reaches likely by April (CFS unpublished data). Older fry establish territories which they defend. Cover is an important habitat component for juvenile salmonids, both as velocity refuge and as a means of avoiding predation (Shrivell 1990, Meehan and Bjornn 1991, Beechie et al. 2005). Larger CCV steelhead fry, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young CCV steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles.

Optimal temperatures for steelhead growth range between 50°F and 68°F (10°C and 20°C), and juvenile CCV steelhead have an upper lethal limit of 75°F (24°C; Hokanson et al. 1977, Wurtsbaugh and Davis 1977, Myrick and Cech 2005). However, they can survive up to 80°F

(26.7°C) for short time intervals with saturated dissolved oxygen conditions and a plentiful food supply. Snorkel surveys conducted for monitoring associated with the Merced River Ranch and Henderson Park restoration projects from 2010 to 2016 generally observed the first *O. mykiss* fry (fork length ≤ 50 mm) in April (CFS unpublished data).

There is very little monitoring focused on CCV steelhead; as a result, population trends and status are largely unknown. However, analyses of CCV steelhead abundance across the DPS indicate that naturally reproducing stocks are suffering severe and long-term declines throughout their range. In the San Joaquin River tributaries, the CCV steelhead populations are very small, with most fish apparently demonstrating the resident phenotype (Zimmerman et al. 2009). Recent genetic analysis of *O. mykiss* in the lower Merced River suggests that the population is largely comprised of a resident *O. mykiss* hatchery strain (Pearse and Garza 2015). Chipps Island trawl data also suggests that natural CCV steelhead production is very low (NMFS 2016).

The apparent CCV steelhead population declines have been attributed to longstanding human induced factors that exacerbate the adverse effects of natural environmental variability (NMFS 1996). Important factors in this decline include habitat destruction and degradation of freshwater spawning and rearing habitat, river flow regulation, hatchery trout planting, over-fishing, and the introduction of non-native piscivorous fish species (62 FR 43937). In particular, impassable dams block access to 80 percent of historically available CCV steelhead habitat and block access to all historical CCV steelhead spawning habitat for about 38 percent of historical populations (Lindley et al. 2006).

The Project's construction activities would occur outside of the spawning and incubation period for CCV steelhead. Although no sustainable populations of steelhead have been observed in the Merced River, implementation of the Project is expected to benefit the quality and quantity of spawning, incubation, and rearing habitat within the Project Area.

Chinook Salmon *Oncorhynchus tshawytscha*
Central Valley fall- and late fall-run Chinook Salmon are considered by NMFS to be in the same Evolutionary Significant Unit (ESU) (64 FR 50394). NMFS determined in 1999 that listing this ESU as a threatened species was not warranted (64 FR 50394), but subsequently classified this ESU as a Federal Species of Concern because of specific risk factors, including population size and hatchery influence in 2004 (69 FR 19975). In the Central Valley, fall-run Chinook Salmon are the most numerous of the four salmon runs, and continue to support commercial and recreational fisheries of significant economic importance. Because of their commercial importance, fall-run Chinook Salmon and their designated essential fish habitat (EFH) are managed under the Magnuson-Stevens Fishery Conservation and Management Act. In the Merced River, EFH is designated downstream of Crocker-Huffman Diversion Dam. In the Merced River, CV fall-run Chinook Salmon occur from below Crocker-Huffman Diversion Dam downstream to the confluence with the San Joaquin River.

Central Valley fall-run Chinook Salmon spend most of their lifecycle in the coastal waters of the Pacific United States but must return to freshwater to reproduce (Merz et al. 2013). During immigration, adults stop feeding, causing them to live on body fat reserves. Although cues triggering adult return to spawning grounds are not well understood it is thought that the ability to

find their way is mainly related to long-term olfaction memory (Dittman and Quinn 1996). Homing ability may also be aided by vision (Healey 1991), celestial and magnetic compass orientation (Quinn 1980), and may be stimulated by changes in streamflow, turbidity, temperature, and oxygen content (Allen and Hassler 1986). Numerous issues, such as predation, harvest, and water quality affect an adult's ability to reach spawning areas and complete successful spawning (Hillemeier 1999, Beamesderfer 2000, Goniea et al. 2006).

In general, Chinook Salmon spawn in stream gravels with a median diameter up to about 10% of their body length (Zeug et al. 2014, Kondolf and Wolman 1993). Proximity to cover and flow shear zones provide important refuge from predation and resting zones for energy conservation (Merz 2001, Wheaton et al. 2004). During spawning, females force gravel and fine sediment into the water column; this action coarsens the spawning substrate, forming an oval depression with a mound of bed material located immediately downstream (Crisp and Carling 1989). Often several males will court the female and her eggs may be fertilized by more than one male. Chinook Salmon spawn once and then die (semelparity) although individuals may survive for days to weeks after spawning completion.

Fecundity and egg size differs among salmon stocks inhabiting different geographic areas (Fleming and Gross 1990, Myers et al. 1998). For example, the average number of eggs per female CV fall-run Chinook Salmon from the Mokelumne River is 5,423 (range: 2,132-9,492) while the average for the Sacramento River is 7,423 eggs (range: 4795-11,012) (Healey and Heard 1984, Kaufman et al. 2009). Density dependent (e.g., disease, redd superimposition) and independent variables (e.g. temperature, flow) can affect spawning success and health of gametes released to the stream (Patterson et al. 2004, Tierney et al. 2009). Since available spawning areas are limited, late spawners may superimpose redds on previously constructed sites. Superimposition can be a major mortality factor for incubating embryos causing a density dependent relationship where fry production is inversely related to adult spawner numbers (McNeil 1964, Heard 1978, Buklis and Barton 1984, Parenskiy 1990, Chebanov 1991).

Female salmon bury fertilized eggs in redds where they develop in gravel interstices. Incubation generally lasts from 40 to 90 days at water temperatures of 40 to 54 °F (4.4 to 12.2 °C; Bams 1970, Heming 1982, Bjornn and Reiser 1991 Geist et al. 2006). Alevins may remain in the gravel for 4 to 6 weeks after hatching, receiving nutrients and energy from their yolk sacs before emerging to the water column (Moyle 2002). Incubation is highly dependent on water temperature, DO, and substrate permeability (Merz et al. 2004). For successful incubation, gravel must be sufficiently fine sediment free to adequately bring DO to embryos, carry off metabolic wastes, and not hinder emergence (Tappel and Bjornn 1983, Chevalier et al. 1984, Groot and Margolis 1991). Other water quality-related parameters (e.g. disease, contaminants) can further affect development and survival (Merz and Moyle 2006).

Newly emerged young are often found in shallow, slow-moving water and transition to deeper, faster water as they increase in size (see Cramer and Ackerman 2009). Habitat complexity (e.g., woody debris, overhanging vegetation, seasonally inundated areas) provides juvenile hiding, resting, and feeding habitat, increasing ability to grow, mature, and survive emigration. Juvenile diets often vary by habitat type, but terrestrial and aquatic invertebrates, and larval fish and eggs are important prey for juvenile salmon upstream of the Delta (Sasaki 1966, Merz and Vanicek

1996, Sommer et al. 2001). Prey size and ingestion rates are affected by juvenile size and water temperature (Merz 2002). At times, floodplains may provide better juvenile rearing opportunities because they often create optimum temperatures, rich in prey items away from salmon predators and high flows (Sommer et al. 2001, Jeffres et al. 2008). Habitat availability, water quality, and predation are examples of environmental parameters that can affect successful rearing (Lindley and Mohr 2003).

When and how emigrants leave a natal stream depends on individual genetics, social cues, and environmental factors individuals are exposed to as they emerge, rear, and migrate downstream. Within the Central Valley, fall-run Chinook Salmon emigration size varies extensively. For example, juvenile CV fall-run emigrate as fry (<55 mm [2.2 in] Fork Length [FL]), parr (>55 mm [2.2 in] FL and <75 mm [3 in] FL), or smolts (>75 mm [3 in] FL) (Brandes and McLain 2000, Williams 2001). In some systems, the proportion of salmon leaving as fry, parr, or smolts may shift from year to year. While several researchers have questioned if fry migrants make a significant contribution to adult populations (Brandes and McLain 2000, Williams 2001), Miller et al. (2010) demonstrated that fry-sized CV Chinook Salmon emigrants are a viable life history strategy. Flow, temperature, water quality, diversion, and predation are thought to be key parameters affecting successful emigration (Sabal et al. 2016, Cavallo et al. 2013).

CV fall-run Chinook Salmon are present within the Action Area. CV fall-run Chinook Salmon primarily spawn during October to December in the upper reaches of the lower Merced River between Crocker-Huffman Diversion Dam and the Hwy 59 bridge (CFS, unpublished data). Juvenile CV fall-run Chinook Salmon in the nearby Stanislaus River primarily outmigrate as fry during wet years and fry and smolts during dry years (Sturrock *et al.* 2015) with a similar pattern likely occurring in the Merced River. According to snorkel and seining data, CV fall-run Chinook Salmon emergence and rearing period generally extends from mid-January through June, and outmigration may occur throughout this period (CFS, unpublished data).

The following special status fish species are likely to occur in the Project Area: fall-run Chinook Salmon, Pacific Lamprey, River Lamprey, Kern Brook Lamprey, Riffle Sculpin, and Hardhead. Project construction activities have the potential to adversely impact these special status fish species and their habitat. The special status salmonids have similar habitat requirements therefore they are considered together in the impact analysis of the Project. Likewise, Pacific Lamprey, River Lamprey, and Kern Brook Lamprey have similar habitat requirements and so they are considered together. The potentially adverse effects expected during Project construction activities are temporary loss of benthic macroinvertebrates, unintentional spread of non-native invasive species, sediment mobilization and increase in turbidity, temporary loss of riparian vegetation, disturbance or harassment from construction equipment including noise, and potential spills of toxic substances.

Turbidity and Sedimentation

Construction activities would temporarily disturb soil and riverbed sediments, resulting in the potential for temporary increases in turbidity and suspended sediments in the main channel of the Merced River. Construction-related increases in sedimentation and siltation above the background level could potentially affect fish species and their habitat by reducing egg and juvenile survival,

interfering with feeding activities, causing breakdown of social organization, and reducing primary and secondary productivity. The magnitude of potential effects on fish depends on the timing and extent of sediment loading and flow in the river before, during, and immediately following construction.

High concentrations of suspended sediment can have both direct and indirect effects on salmonids and other special status fishes. The severity of these effects depends on the sediment concentration, duration of exposure, and sensitivity of the affected life stage. Based on the types and duration of proposed in-water construction methods, short-term increases in turbidity and suspended sediment may disrupt feeding activities or result in avoidance or displacement of fish from preferred habitat. Juvenile salmonids have been observed to avoid streams that are chronically turbid (Lloyd 1987) or move laterally or downstream to avoid turbidity plumes (Sigler et al. 1984). Bisson and Bilby (1982) reported that juvenile Coho Salmon (*Oncorhynchus kisutch*) avoid turbidities exceeding 70 NTU's. Sigler et al. (1984) found that prolonged exposure to turbidities between 25 and 50 NTUs resulted in reduced growth and increased emigration rates of juvenile Coho Salmon and CCV steelhead compared to controls. These findings are generally attributed to reductions in the ability of salmon to see and capture prey in turbid water (Water 1995).

Chronic exposure to high turbidity and suspended sediment may also affect growth and survival by impairing respiratory function, reducing tolerance to disease and contaminants, and causing physiological stress (Water 1995). Berg and Northcote (1985) observed changes in social and foraging behavior and increased gill flaring (an indicator of stress) in juvenile Coho Salmon at moderate turbidity (30-60 NTUs). In this study, behavior returned to normal quickly after turbidity was reduced to lower levels (0-20 NTU). In addition to direct behavioral and physical effects on fish, increased sedimentation can alter downstream substrate conditions, as suspended sediment settles and increases the proportion of fine particles in the system. Adult salmonids require coarse substrate (gravel and small cobbles) to construct redds, and deposition of fine substrate may reduce egg and alevin survival and lead to decreased production of the macroinvertebrate prey of juvenile salmonids (Chapman 1988, Phillips et al. 1975, Colas et al. 2013). Deposited fine sediment can impair growth and survival of juvenile salmonids (Suttle et al. 2004, Harvey et al. 2009). However, minor accumulations of deposited sediment downstream of construction zones are generally removed during normal annual high flow events (Anderson et al. 1996).

Any increase in turbidity associated with instream work is likely to be brief and occur only in the vicinity of the Project Area, attenuating downstream as suspended sediment settles out of the water column. Instream projects with a larger footprint than the Project have created turbidity plumes of 25-75 NTU extending up to 1,000 ft downstream from construction activities (NMFS 2006). These temporary spikes in suspended sediment may result in behavioral avoidance of the Project Area by fish; several studies have documented active avoidance of turbid areas by juvenile and adult salmonids (Bisson and Bilby 1982, Lloyd 1987, Servizi and Martens 1992, Sigler et al. 1984).

The number of juvenile salmonids and other special status fishes potentially residing in the Project Area during in-water construction is expected to be low because of the time of year and low quality of existing habitat (CFS unpublished data). Individual fish that encounter increased

turbidity or sediment concentrations would be expected to move laterally, downstream, or upstream of the affected areas. For juveniles, this may increase their exposure to predators if they are forced to leave protective habitat.

The impacts of sedimentation and turbidity from construction on fish species are **potentially significant.** However, with implementation of **EC-7 - Monitor Water Quality and Prevent Impacts,** the Project's sedimentation and turbidity impacts on special status fish species and their habitat would be **less than significant.**

Contaminants

During construction activities, the potential exists for spills or leakage of toxic substances that could enter the Merced River. Refueling, operation, and storage of construction equipment and materials could result in accidental spills of pollutants (e.g., fuels, lubricants, concrete, sealants, and oil). High concentrations of contaminants can cause adverse direct (sublethal to lethal) and indirect effects on fish. Direct effects include mortality from exposure or increased susceptibility to disease that reduces the overall health and survival of the exposed fish. The severity of these effects depends on the contaminant, the concentration, duration of exposure, and sensitivity of the affected life stage. A potential indirect effect of contamination is reduced prey availability; invertebrate prey survival could be reduced following exposure, therefore making food less available for fish. Fish consuming infected prey may also absorb toxins directly.

For special status fishes, potentially significant direct and indirect effects of reduced water quality during construction would be addressed by avoiding construction during times when fish are most likely to be present, utilization of vegetable-based lubricants and hydraulic fluids in equipment operated in the wet channel, and by implementing the construction housekeeping measures described in the SWPPP (see **EC-7 - Monitor Water Quality and Prevent Impacts).** These measures include provisions to control erosion and sedimentation, as well as a Spill Prevention and Response Plan to avoid, and if necessary, clean up accidental releases of hazardous materials. The construction contractor would be responsible for complying with all conditions of these commitments. Implementation of the measures discussed above and **EC-8 – Use Clean Equipment and Bio-degradable Lubricants,** the direct and indirect impacts of contaminants on special status fish species would be **less than significant.**

Non-native invasive species can be considered a biological contaminant because many species have adverse impacts on the community that they invade. For example, the thick, filamentous algae Didymo (*Didymosphenia geminata*) is thought to have a significant effect on ecosystems due to its ability to alter abundance and distribution of organisms at the base of the aquatic food web (e.g., Gillis and Chalifour, 2010, Anderson et al. 2014). In waters where Didymo is abundant, macroinvertebrate taxonomic composition tends to shift from a highly diverse assemblage of large-bodied taxa to a less diverse assemblage of smaller-bodied taxa such as diptera, especially Chironomidae (Mundie and Crabtree, 1997; Blanco and Ector, 2009; Gillis and Chalifour, 2010; James et al., 2010). Likewise, molluscs such as the Overbite Clam (*Corbula amurensis*) and New Zealand Mud Snail (*Potamopyrgus antipodarum*) can out-compete native benthic invertebrates that dominate the diets of juvenile salmonids and other salmonids (Feyrer et al. 2003, Brenneis et al. 2011, Merz et al. 2016). These species are often spread by aquatic vehicles or other equipment,

which carry propagules from one watershed to another. Because equipment would be working within the river channel during Project construction, this is a potentially significant impact. However, implementation of **EC-9 - Prevent Spread of New Zealand Mudsnails and other Aquatic Invasive Species** would reduce this impact to **less than significant.**

Noise

Noise generated by heavy equipment and personnel during construction activities could adversely affect special status fish species. The potential direct effects of underwater noise on fish depend on a number of biological characteristics (e.g., fish size, hearing sensitivity, behavior) and the physical characteristics of the sound (e.g., frequency, intensity, duration) to which fish are exposed. Potential direct effects include behavioral effects, physiological stress, physical injury (including hearing loss), and mortality. The loudest noise generated is expected from the placement of gravel to create/enhance spawning riffles and other habitat features. Using experienced heavy equipment operators would help minimize the noise impact during gravel augmentation. Diesel engines will also generate noise within the Project Area. No diesel engines or their exhaust systems would come into contact with the flowing channel. Any fish present in the vicinity of the active construction area would be expected to detect and temporarily avoid the area as a result of the noise and disturbance. Implementation of **EC-5 – Work Outside of Critical Periods for Sensitive Species** and **EC-10 - Reduce Impacts from Noise**, would reduce the impact of noise on special status fish to **less than significant.**

Instream Construction Activities

In-stream construction activities are expected to cause juvenile salmonids and other special status fish species to temporarily migrate away from the disturbance zone to avoid construction impacts in areas where fish relocation does not occur. In-stream construction activities are not expected to affect juvenile Chinook Salmon because construction activities would occur after nearly all juvenile fall-run Chinook Salmon have migrated out of the Merced River. The only juvenile fall-run Chinook Salmon that may be affected would be demonstrating the yearling life history strategy, and the yearling life history strategy for fall-run Chinook Salmon in the Merced River is extremely rare (CFS unpublished data).

Fish that temporarily or permanently relocate in response to in-stream construction activities may endure short term stress from being forced to migrate away from their rearing area and needing to locate a new rearing area downstream. Fish may endure some short-term stress from crowding and competition with resident fish for food and habitat. Fish may also be subject to increased predation risk while they are locating a new rearing area. However, this effect would be temporary. If they are present, a small number of juvenile *O. mykiss*, Hardhead, or Riffle Sculpin may be displaced (CFS unpublished data). Given the limited size of the Project Area and small number of individual fish that may be affected, is not expected that the temporary displacement of fish or the competition they endure would affect the survival of individual fish or the population as a whole.

The majority of juvenile salmonid migration occurs in low light to dark hours (dusk until dawn) during which construction activities would not be occurring, and adequate fish passage conditions

would be maintained within the Project Area for the duration of construction. Instream construction activities are therefore unlikely to impede migration of special status fish species within the Project Area.

Instream construction activities are expected to cause disturbance of benthic aquatic macroinvertebrates as coarse sediment is placed into the river channel. However, these effects would be temporary because construction activities would be relatively short in duration and over a limited area. Rapid recolonization (approximately two weeks to two months) of the new sediment is expected (Merz and Chan 2005, CFS unpublished data).

Implementation of **EC-5 – Work Outside of Critical Periods for Sensitive Species** would result in a **less than significant** impact of instream construction activities on special status fish species.

Physical Habitat Modification

Construction activities would modify bank habitat by removing nonnative and native vegetation along the bank, and grading and excavating tailings piles and banks to create floodplain and side channel entrances and exits. To the maximum extent practicable, existing riparian habitat would be retained and disturbance would be minimized. Following construction, all disturbed or exposed soils would be stabilized and/or planted with native woody and herbaceous vegetation to control erosion and offset any loss of vegetation. Non-native plant species would be replaced with native riparian plants. Some short-term loss of mature riparian vegetation may occur during construction; however, natural riparian vegetation recruitment is expected to occur rapidly following construction (Sellheim et al. 2016), resulting in an increase in the amount and extent of riparian habitat within the Project Area. This increase in riparian habitat is expected to provide increased rearing habitat, complexity, and cover for fall-run Chinook Salmon and other native fishes in the Project Area.

Large woody material will also be added to the floodplain and side channels to serve as structural cover and velocity refuge for juvenile salmonids, and serve a variety of geomorphic functions including scour protection, scour enhancement, sediment deposition and sorting. Large woody material added as part of the Project would increase instream habitat diversity and complexity within the Project Area, which is expected to result in a beneficial impact to salmonids and other native fishes.

When complete, the Project is expected to improve migration conditions for fish in the main channel of the Merced River. Upon Project completion, during certain times of the year there would be less water within the main channel compared to current conditions because some of the flow would be routed down the floodplain and side channel complexes. However, the floodplain and side channel complexes will not inundate during base flows (150-400 cfs), which typically occur from June to November, when spreading out the limited surface water may reduce salmonid habitat quality in the main channel.

Overall, completion of the Project is expected to provide higher quality and quantity of habitat for juvenile and adult salmonids and other native fishes. Although some short-term disturbance may occur when cobble and gravel are added to the main channel, structures are placed into the river

channel, and the floodplains and side channels are graded, these effects would be minimized through implementing **EC-5 – Work Outside of Critical Periods for Sensitive Species** and therefore impacts on special status fish species would be **less than significant**. Indirect and long-term effects on salmonids and their habitat would be beneficial.

Critical Habitat and Essential Fish Habitat

The instream construction is expected to have short term effects on the Critical Habitat Physical and Biological Features (PBFs) of freshwater rearing habitat, spawning habitat, and freshwater migration corridors and the EFH Habitat Areas of Particular Concern (HAPC) of complex channels and floodplain habitats, spawning habitat, and migration corridors through construction disturbance and modification as well as the removal of some riparian trees and shrubs. Freshwater rearing habitat, spawning habitat, and migration corridors would be temporarily disturbed during the addition of cobble and gravel to create/enhance salmonid spawning riffles and other main channel habitat features.

These habitats may be impacted by temporary increases to turbidity and suspended sediment as well as release of contaminants; however, these impacts are expected to be localized, minor, and short term. Implementation of a SWPPP with a spill prevention and response plan, construction BMPs, and performing work outside of critical periods for special status species would result in a **less than significant** impact to critical habitat and EFH.

Long-term direct effects on designated critical habitat and EFH are beneficial, including: increased channel complexity and shallow water salmonid rearing habitat, increased adult salmonid spawning habitat, and increased native riparian vegetation. These modifications would result in a beneficial effect on special status fish by converting existing low quality nearshore and riparian habitat in the Project Area to rehabilitated side channel and floodplain habitat as well as main channel alternating gravel bars. Spawning habitat quality and quantity would be increased through addition of appropriately sized salmonid spawning gravel in several locations in the main channel with suitable depths and velocities for spawning. The main channel within the Project Area would continue to function as a freshwater migration corridor by providing adequate passage for adults and juvenile salmonids. The Project would provide additional high quality rearing and spawning habitat for Chinook Salmon.

In summary, the project may have significant short-term impacts on special-status species. However, with implementation of the EC's these impacts are expected to be **less than significant**.

b) Project construction activities, including excavation and grading of the floodplain and side channel complexes, would have temporary impacts which are potentially significant on these sensitive natural communities. This includes some limited removal of riparian vegetation to create floodplains and side channels. However, most of the construction activities will occur in areas that are currently mine tailings, with little existing vegetation. Ultimately, the Project will increase the extent of Great Valley mixed riparian forest, which is considered a sensitive natural community by CDFW. In addition, the Project will improve habitat conditions for elderberry shrubs, which are considered sensitive by the USFWS since they are obligate habitat for the ESA listed VELB.

Riparian planting will occur as part of the Project, including species contributing to these sensitive communities such as Fremont cottonwood, elderberry, alder, and willow. In addition, the topographic manipulations are expected to improve recruitment of native riparian vegetation within the Project Area (Sellheim et al. 2016).

Riparian planting and predicted natural recruitment, as well as **EC-4 - Protect and Compensate for Native Trees** and **EC-2 - Adaptive Construction Approach to Protect Elderberry Plants, Monitor Survival, and Mitigate for Loss** would reduce impacts to sensitive natural communities to **less than significant**. Overall, implementation of the Project is expected to improve quality and quantity of riparian vegetation, including the vegetation alliances of Great Valley mixed riparian forest within the Project Area.

c) Implementation of the Project would result in floodplain and riparian rehabilitation to improve habitat for fall-run Chinook Salmon and other native fishes. Within the Project boundary there are 0.45 acres of emergent wetland, 6.85 acres of riparian wetland above the ordinary high-water mark (OHWM), 5.37 acres of riparian wetland below the OHWM, and 11.92 acres of perennial channel (**Table 7**).

Table 7. The existing versus Project acres of the various aquatic resource types within the Project boundary and the associated change in acreage.

Aquatic Resource Type	Existing Acreage	Project Acreage	Change in Acreage
Emergent Wetland	0.45	0.24	-0.21
Riparian Wetland above OHWM	6.85	6.18	-0.67
Riparian Wetland below OHWM	5.37	6.15	0.78
Perennial Channel	11.92	11.92	0
Intermittent Channel (Side Channel)	0	2.23	2.23
Total	**24.59**	**26.72**	**2.13**

Overall, implementation of the Project would result in the creation of 2.13 acres of new aquatic resources, permanent change to the aquatic resource type of 1.28 acres, and temporary impacts to 7.65 acres (**Table 8**). Specifically, the Project would result in the permanent change of 0.21 acres of emergent wetland, 0.67 acres of riparian wetland above the OHWM, and 0.4 acres of riparian wetland below the OHWM (**Table 8**); this acreage would remain an aquatic resource, but would be converted to either riparian wetland below OHWM or intermittent channel. There would be temporary impacts to 0.45 acres of riparian wetland and 7.49 acres of perennial channel (**Table 8**). However, the Project would result in 0.95 acres of new intermittent channel and 1.18 acres of new riparian wetland within the OHWM (**Table 8**).

Table 8. The type of impacts the Project would have on the aquatic resource types present within the Project boundary.

Aquatic Resource Type	Temporary Impact (acres)	Conversion to Intermittent Channel (Side Channel)	New (acres)
Emergent Wetland	0	0.21	0
Riparian Wetland above OHWM	0.1	0.67	0
Riparian Wetland below OHWM	0.35	0.4	1.18
Perennial Channel	7.2	0	0
Intermittent Channel (Side Channel)	0	0	0.95
Total	**7.65**	**1.28**	**2.13**

Implementation of the Project would result in no net loss in Waters of the U.S. and would result in an increase in riparian wetland and intermittent channels (**Table 8**). Overall, implementation of the Project would result in an increase in Waters of the U.S. Therefore, the impact on jurisdictional Waters of the U.S. would be **less than significant**.

d) The lower Merced River and the adjacent riparian areas within the Project Area serve as a migration corridor for wildlife. Likewise, the river serves as a migratory corridor for resident and anadromous fish. Wildlife may experience some temporary disturbance to movement corridors from the construction activities. Construction activities would occur primarily from 7:00 am to 5:00 pm, allowing wildlife to migrate without disturbance outside of the Project work hours. Resident and migratory fish may experience short term migration disturbance when course substrate is being added to the river. However, the course substrate addition would occur outside of the migration window for juvenile and adult salmonids. Course substrate addition would occur for up to a month within each construction year, from 7:00 am to 5:00 pm. Adult and juvenile anadromous salmonids generally migrate from dusk until dawn so, if salmonids are present, peak migration times would not overlap with Project work hours. Implementation of the Project would have long term beneficial impacts on riparian habitat and instream habitat for special status fish species. Therefore, adverse impacts to wildlife or fish movement or wildlife migration corridors would be **less than significant**.

e) Merced County does not have a tree protection ordinance. Therefore, there would be **no impact**. Implementation of the Project would have long term benefits for quality and quantity of riparian vegetation within the Project Area.

f) The Project does not include any area that is covered by an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Therefore, there would be **no impact**.

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